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Abstract: Meteoritical Bulletin 103 contains 2582 meteorites including 10 falls (Ardón, Demsa, Jinju, Križevci, Kuresoi, Novato, Tinajdad, Tirhert, Vicência, Wolcott), with 2174 Ordinary chondrites, 130 HED achondrites, 113 Carbonaceous chondrites, 41 Ureilites, 27 Lunar meteorites, 24 Enstatite chondrites, 21 Iron meteorites, 15 Primitive achondrites, 11 Mesosiderites, 10 Martian meteorites, 6 Rumuruti chondrites, 5 Ungrouped achondrites, 2 Enstatite achondrites, 1 Relict meteorite, 1 Pallasite, and 1 Angrite, and with 1511 from Antarctica, 588 from Africa, 361 from Asia, 86 from South America, 28 from North America, and 6 from Europe. Note: 1 meteorite from Russia was counted as European. The complete contents of this bulletin (244 pages) are available on line. Information about approved meteorites can be obtained from the Meteoritical Bulletin Database (MBD) available on line at http://www.lpi.usra.edu/meteor/ .

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1. Alphabetical text entries for non-Antarctic meteorites

Abar al' Uj 012 (AaU 012) 22°23.999'N, 48°42.409'E
Ash Sharqiyah, Saudi Arabia
Found: 31 Jan 2012
Classification: Lunar meteorite
History: Found by Edwin Gnos, Beda Hofmann, Khalid al Wagdani, Ayman Majoub, Abdulaziz Solami, Siddiq Habibullah, Maruan Al Bokari during a search for meteorites on January 31, 2012.
Physical characteristics: Medium gray stone with a total mass of 122.78 g. The wind-ablated meteorite consists of two fitting fragments, with masses of 104.5 and 18.27 g, respectively. Fusion crust is absent. Contains black, white and red mineral and lithic clasts (up to 6 mm) embedded in a very fine-grained matrix. Vesicles are abundant. Some vesicles and thin cracks are filled with terrestrial mineral assemblages.
Petrography: (B. Hofmann *NMBE*; M. Mészáros *NMBE*/*Bern*) Clast-rich impact-melt breccia, consisting of partly resorbed mineral clasts (up to 1 mm) and subrounded/rounded lithic clasts (up to 6.8 mm) set in a very fine-grained, well-crystallized impact-melt matrix. Most common mineral clasts are plagioclase with minor pyroxene and olivine. The lithic clast population is dominated by anorthositic breccias. Rare clasts of igneous rocks and a single basalt clast were observed. Vesicles (up to 3.0 mm diameter) are abundant. Shock features (polycrystalline grains, mosaicism, recrystallization) were observed in pyroxenes, olivine and plagioclase. Trace mineral phases are troilite, FeNi-metal, spinel (pleonast), SiO_2 and terrestrial alteration products (carbonates, celestine, Fe-hydroxides).
Geochemistry: (N. Greber, M. Mészáros, *Bern*) Mineral composition: feldspar (n=46): $An_{93.4\text{-}97.7}\,Or_{0.0\text{-}1.6}$; olivine (n=7): $Fa_{28.4\text{-}35.3}$, Fe/Mn=95.7; orthopyroxene (n=1): $Wo_{3.6}\,Fs_{25.2}$, Fe/Mn=52.8; clinopyroxene (n=10): $Wo_{5.1\text{-}40.6}\,Fs_{12.8\text{-}36.9}$, Fe/Mn=89.9. Bulk analysis (ICP/ICPMS): Al_2O_3=28.9 wt%, FeO=5.0 wt%, Sc=8 ppm, Sm=1.2 ppm, Th=0.5 ppm. Oxygen isotopes: (R. Greenwood, *OU*): $\delta^{18}O$=5.46 permil, $\delta^{17}O$=2.86 permil $\Delta^{17}O$=0.018 permil.
Classification: Lunar feldspathic impact-melt breccia.
Specimens: Type material (25.1 g) and 3 polished thin sections at *MHNGE*, main mass at *SGS*.

Abar al' Uj 014 (AaU 014) 22°26.380'N, 48°52.250'E
Ash Sharqiyah, Saudi Arabia
Found: 31 Jan 2012
Classification: Carbonaceous chondrite (CO3)
History: Found by Edwin Gnos, Beda Hofmann, Khalid al Wagdani, Ayman Majoub, Abdulaziz Solami, Siddiq Habibullah, Maruan Al Bokari during a search for meteorites on Jan. 31, 2012.
Physical characteristics: Dark brown, wind-ablated, partially broken 429.4 g individual, no preserved fusion crust.
Petrography: (E. Gnos, *MHNGE* and B. Hofmann, *NMBE*) Abundant chondrules (approx. 60% vol), matrix approx. 40% vol. CAIs up to 500 μm. Chondrule size averages 0.28±0.14 mm (n= 180, maximum size 0.90 mm). Chondrules commonly contain brown glass. Abundant troilite and iron metal (approx. 5:1). Shock grade S1. Weathering: about 50% of metal is oxidized.
Geochemistry: Olivine compositions are $Fa_{0.5\text{-}56.5}$, median $Fa_{35.5}$ (n=72), pyroxene compositions are $Fs_{0.0\text{-}22.1}Wo_{0.5\text{-}6.2}$, median $Fs_{2.6}Wo_{1.4}$ (n=19). Oxygen isotopes: (R. Greenwood, *OU*) gave $\delta^{18}O$ = -0.14, $\delta^{17}O$ = -4.59, $\Delta^{17}O$ = -4.52 (all permil)
Classification: Based on Chondrule size, matrix abundance and geochemistry this is a CO3 chondrite.
Specimens: Type material (21.70 g) and three polished thin sections at *MHNGE*, main mass at *SGS*.

Al Hawaya 002 19°50.603'N, 49°11.197'E
Ash Sharqiyah, Saudi Arabia
Found: 15 Feb 2013
Classification: Ureilite

History: Found by Edwin Gnos, Beda Hofmann, Ayman Majoub search for meteorites on small patch of desert soil between dunes on Feb. 15, 2013.
Physical characteristics: Dark brown, wind-polished broken individual of 7.61 g. Strongly weathered.
Petrography: Polished thin section shows typical ureilitic texture with interlocked olivine and pyroxene grains typically 1 mm in size, with undulose extinction. Carbon platelets are very common (~10 vol%) and consist mainly of diamond. Metal and troilite are largely oxidized, only few remnant inclusions in silicates. Silicates are partly affected by terrestrial alteration.
Geochemistry: (N. Greber, *Bern*) Olivine compositions are $Fa_{10.2\text{-}21.8}$, median $Fa_{21.4}$, median Cr_2O_3 0.49 wt% (n=29), pyroxene compositions are $Fs_{7.2\text{-}18.3}Wo_{4.7\text{-}22.1}$, median $Fs_{14.4}Wo_{10.7}$, median Cr_2O_3 1.25 wt% (n=8). Bulk analysis of cut surface by XRF (wt%): Fe 17.0, Mn 0.28 (Fe/Mn 60.4), Ni 0.16, Cr 0.53.
Classification: Based on texture, silicate compositions and abundant diamond platelets this is a ureilite.
Specimens: 2.28 g and one polished thin section at *MHNGE*. Remaining material *SGS*.

Al Hawaya 004 19°47.634'N, 49°09.605'E
Ash Sharqiyah, Saudi Arabia
Found: 16 Feb 2013
Classification: HED achondrite (Eucrite, polymict)
History: Found by Abu Badr al Obeidi during a search for meteorites on small patch of sandy soil between dunes on February 16, 2013.
Physical characteristics: Wind-polished individual with a total mass of 176.9 g, showing partial brecciated texture, no fusion crust preserved.
Petrography: Breccia containing a variety of basaltic lithologies, generally plagioclase-rich with lath-like plagioclase typically 0.5-0.9 mm long, and some pyroxene laths up to 1.8 mm. A silica phase is commonly present. A macroscopically dark grey, fine-grained clast (mean grain size 5-10 μm) with equilibrated metamorphic texture also contains silica phase. Accessories are ilmenite, magnetite, troilite and rare iron metal.
Geochemistry: (N. Greber, *Bern*) Orthopyroxene compositions are $Fs_{55.0\text{-}60.2}Wo_{1.7\text{-}8.4}$, median $Fs_{56.9}Wo_{5.2}$ (n=12). Clinopyroxene compositions are $Fs_{27.7\text{-}53.2}Wo_{10.5\text{-}41.5}$, median $Fs_{42.4}Wo_{22.7}$ (n=4). Plagioclase: $An_{92.2}Or_{0.3}$ (n=1). Bulk analysis of cut surface by XRF (wt%): Fe 14.6, Mn 0.43 (Fe/Mn 34.2). Oxygen isotopes: (R. Greenwood, *OU*) gave $\delta^{18}O = 3.93$, $\delta^{17}O = 1.82$, $\Delta^{17}O = -0.226$ (all per mil).
Classification: Based on texture, mineral composition, oxygen isotopes and bulk Fe/Mn this is a eucrite (basaltic eucrite breccia).
Specimens: 31.66 g and one polished thin section at *MHNGE*. Remaining material *SGS*.

Al Hawaya 010 19°30.068'N, 48°01.808'E
Ash Sharqiyah, Saudi Arabia
Found: 16 Feb 2013
Classification: Ureilite
History: Found by Hassan Al Marsouki during search for meteorites on small patch of desert soil between dunes on February 14, 2013.
Physical characteristics: Dark brown fragment of 3.91 g, partially covered by cemented dune sand.
Petrography: Polished thin section shows typical ureilitic texture with interlocked olivine (~25 vol%) and pyroxene (~70 vol%) grains 0.8-1.6 mm in size. Common graphite crystals up to 1 mm (~5 vol%), no diamond observed. Metal is largely oxidized, only few remnant inclusions in silicates. Graphite shows only minor deformation. Olivine is partly affected by terrestrial alteration.
Geochemistry: (N. Greber, *Bern*) Olivine compositions are $Fa_{12.0\text{-}13.2}$, median $Fa_{12.3}$ (n=14), pyroxene compositions are $Fs_{10.4\text{-}11.0}Wo_{4.7\text{-}4.9}$, median $Fs_{10.6}Wo_{4.8}$ (n=15). Silicates are Cr-rich (0.49±0.16 wt% in olivine, 0.95±0.32 wt% in pyroxene). Bulk analysis of cut surface by XRF (wt%): Fe 13.3, Mn 0.38 (Fe/Mn 35.0), Ni 0.23, Cr 0.64.
Classification: Based on texture, silicate compositions and abundant graphite this is a ureilite.
Specimens: 1.33 g and one polished thin section at *MHNGE*. Remaining material *SGS*.

Al Jawf 001 (AJ 001) 29°44.57’N, 39°47.329’E
Al Jawf, Saudi Arabia
Found: 2009 May 7
Classification: Ordinary chondrite (H4-5)
History: Mr. Jahn found the meteorite while he was working in Saudi Arabia. He brought the sample to the University of Tennessee in May 2013, where it was analyzed and identified as a meteorite.
Physical characteristics: The stone is covered with black fusion crust and indentations.
Petrography: The cut surface shows a coarse brecciated texture, with clasts ranging up to 4 cm. Abundant metal grains are visible. Clasts vary from relatively unshocked (S1) to impact melted.
Geochemistry: The Fa and Fs values represent mean values of all the clasts. There is no significant difference in the Fa and Fs values for the type 4 and type 5 clasts.
Classification: A number of individual clasts were analyzed and their olivine and pyroxene compositions and textures indicate classification as H4 or H5. The clasts are distinguished based on texture and on percent mean deviation of the low-Ca pyroxene.
Specimens: 20 g *UTenn*, 327 g *SI*.

Alatage Mountain 001 (AM 001) 41°41’25.68"N, 92°57’27.12"E
Xinjiang, China
Found: 30 April 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 170 g (only 1 piece) no fusion curst, gray surface
Petrography: Chondrules are abundant. The main chondrule types are barred olivine chondrule, porphyritic olivine, and porphyritic pyroxene. The matrix is fine-grained and the feldspars have sizes over 2 μm. Shock-induced metal-sulfide veins and melt pockets are pervasive. Many mineral grains are heavily fractured. More than 50% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.9\pm0.9}$ (n=7); low-Ca pyroxene: $Fs_{19.8\pm1.1}Wo_{1.6\pm0.3}$ (n=11)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 45 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 002 (AM 002) 41°41’11.5"N, 92°57’58.5"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 697 g (only 1 piece) no fusion curst, gray surface
Petrography: Chondrules are commonly deformed and the boundaries are not clear. The matrix is fine-grained and the feldspars have sizes around 20 μm. Shock-induced metal-sulfide veins and melt pockets are pervasive. Many mineral grains are heavily fractured. More than 50% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.1\pm1.1}$ (n=11); low-Ca pyroxene: $Fs_{19.3\pm0.4}Wo_{1.7\pm0.5}$ (n=7)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 110 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 003 (AM 003) 41°41’3.9"N, 92°57’37.3"E
Xinjiang, China
Found: 1 May 2013

Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 41.7 g (only 1 piece) no fusion curst, gray surface
Petrography: The meteorite consists of olivine, orthopyroxene, and feldspar, associated with comparatively minor amounts of clinopyroxene, Fe-Ni, diopside, troilite, chromite and phosphate. The matrix is fine-grained and the feldspars have sizes <2 μm. Shock-induced metal-sulfide veins and melt pockets are pervasive. Many mineral grains are heavily fractured. More than 40% of metal and sulfide are oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{21.7\pm0.9}$ (n=8); low-Ca pyroxene: $Fs_{19.8\pm0.9}Wo_{1.7\pm0.2}$ (n=5)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 8 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 004 (AM 004) 41°41’3.9"N, 92°57’37.3"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 12.2 g (only 1 piece) no fusion curst, gray surface
Petrography: Chondrules are readily defineated. The main silicates are olivine and pyroxene, with less abundant fine-grained plagioclase and minor apatite. Shock-induced metal-sulfide veins and melt pockets are pervasive. Many mineral grains are heavily fractured. More than 40% of metal and sulfide are oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{23.0\pm0.5}$ (n=6); low-Ca pyroxene: $Fs_{19.3\pm0.5}Wo_{1.8\pm0.2}$ (n=6)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 3 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 006 (AM 006) 41°41’8.5"N, 92°56’24.3"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 17.4 g (only 1 piece) no fusion curst, gray surface
Petrography: Chondrules are commonly deformed and the boundaries are not clear. The matrix is fine-grained and the feldspars have sizes over 2 μm. Shock-induced metal-sulfide veins and melt pockets are pervasive.More than 40% of metal and sulfide are oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.9\pm0.9}$ (n=7); low-Ca pyroxene: $Fs_{19.8\pm1.1}Wo_{1.6\pm0.3}$ (n=11)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 6 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 007 (AM 007) 41°41’13"N, 92°56’19.4"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)

History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 91.4 g (only 1 piece) no fusion curst, gray surface
Petrography: Troilite is more abundant than metal, with grain size up to 0.5 mm and 1 mm respectively. The matrix is well recrystallized with secondary plagioclase up to 50 μm. Highly developed shock-induced vein and mosaic extinction of olivine are common. Metal and troilite are heavily weathered.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.1\pm0.9}$ (n=10); low-Ca pyroxene: $Fs_{19.9\pm1.5}Wo_{1.8\pm0.3}$ (n=8)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 20 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 008 (AM 008) 41°41’13.8"N, 92°56’19.3"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 19.4 g (only 1 piece) no fusion crust, gray surface
Petrography: The main chondrules types are barred olivine chondrule, porphyritic olivine, and porphyritic pyroxene. Plagioclase occurs as maskelynite. More than 40% of metal and sulfide are oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{21.8\pm1.1}$ (n=13); low-Ca pyroxene: $Fs_{18.5\pm0.7}Wo_{1.9\pm0.6}$ (n=9)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 5 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 010 (AM 010) 41°41’14.1"N, 92°56’18.5"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 8.1 g (only 1 piece) no fusion crust, gray surface
Petrography: Chondrules are abundant. Chondrules are commonly deformed and the boundaries are not clear. Shock-induced metal-sulfide veins and melt pockets are pervasive. Many mineral grains are heavily fractured. More than 40% of metal and sulfide are oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.5\pm0.8}$ (n=11); low-Ca pyroxene: $Fs_{118.7\pm0.9}Wo_{2.3\pm0.6}$ (n=10)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 3 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 011 (AM 011) 41°41’14.1"N, 92°56’18.5"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass:7.2 g (only 1 piece) no fusion crust, gray surface

Petrography: Chondrule types mainly include granular olivine chondrules. Chondrules are commonly deformed and the boundaries are not clear. The matrix is fine-grained and the feldspars have sizes over 2 μm. Shock-induced metal-sulfide veins and melt pockets are pervasive. Many mineral grains are heavily fractured. More than 40% of metal and sulfide are oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.1\pm1.9}$ (n=14); low-Ca pyroxene: $Fs_{18.1\pm1.0}Wo_{2.1\pm0.5}$ (n=6)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 3 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 012 (AM 012) 41°41’14.1"N, 92°56’18.5"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 3 g (only 1 piece) no fusion crust, gray surface
Petrography: The matrix is fine-grained and the feldspars have sizes over 2 μm. Shock-induced metal-sulfide veins and melt pockets are pervasive. Many mineral grains are heavily fractured. Mosaic extinction of olivine are common. Plagioclase occurs as maskelynite. More than 40% of metal and sulfide are oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.0\pm1.1}$ (n=11); low-Ca pyroxene: $Fs_{19.1\pm1.6}Wo_{2.6\pm1.2}$ (n=13)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 2.6 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 015 (AM 015) 41°41’13.3"N, 92°56’16.0"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 83.7 g (only 1 piece) no fusion curst, gray surface
Petrography: Chondrule types mainly include barred olivine chondrule and barred olivine-pyroxene chondrule.The matrix is fine-grained and the feldspars have sizes over 2 μm. Shock-induced metal-sulfide veins and melt pockets are pervasive. Many mineral grains are heavily fractured. More than 50% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{21.7\pm1.0}$ (n=11); low-Ca pyroxene: $Fs_{18.8\pm2.5}Wo_{1.7\pm0.4}$ (n=13)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 18 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 016 (AM 016) 41°41’15.4"N, 92°56’19.6"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 315.9 g (only 1 piece) no fusion curst, gray surface

Petrography: Only a few of chondrules and chondrule fragments remain. Chondrule types mainly include granular olivine and barred olivine. Chondrules are commomly deformed. The matrix is fine-grained and the feldspars have sizes over 2 μm. Shock-induced metal-sulfide veins and melt pockets are pervasive. Many mineral grains are heavily fractured. More than 50% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.2\pm0.5}$ (n=7); low-Ca pyroxene: $Fs_{18.5\pm1.6}Wo_{1.8\pm1.3}$ (n=7)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 80 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 017 (AM 017) 41°41’13.4"N, 92°56’21.9"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 129.2 g (only 1 piece) no fusion curst, gray surface
Petrography: Chondrule types mainly include barred olivine, granular olivine, and porphyritic olivine-pyroxene. The matrix is coarse-grained and the feldspars have sizes over 2 μm. Shock-induced metal-sulfide veins and melt pockets are pervasive. Many mineral grains are heavily fractured. More than 50% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.4\pm0.9}$ (n=10); low-Ca pyroxene: $Fs_{118.8\pm0.9}Wo_{1.8\pm0.8}$ (n=10)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 26 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 018 (AM 018) 41°41’15.3"N, 92°56’18.9"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 23.4 g (only 1 piece) no fusion crust, gray surface
Petrography: The mainly chondrule types are barred olivine and porphyritic. Chondrules are commomly deformed and the boundaries are not clear. The matrix is fine-grained and the feldspars have sizes about 20 μm. Shock-induced metal-sulfide veins and melt pockets are pervasive. Many mineral grains are heavily fractured. Plagioclase occurs as maskelynite. Almost 70% metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.4\pm1.7}$ (n=10); low-Ca pyroxene: $Fs_{19.2\pm0.9}Wo_{1.9\pm0.9}$ (n=5)
Classification: Ordinary chondrite L5; S5; W3.
Specimens: 7 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 019 (AM 019) 41°41’16.0"N, 92°56’16.4"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 42.7 g (only 1 piece) no fusion crust, gray surface
Petrography: Many barred olivine chondrules occur. Chondrules are commomly deformed and the boundaries are not clear. The matrix is fine-grained and the feldspars have sizes over 2 μm. Shock-

induced metal-sulfide veins and melt pockets are also occur. More than 40% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.1\pm0.8}$ (n=12); low-Ca pyroxene: $Fs_{18.4\pm0.3}Wo_{1.8\pm0.4}$ (n=11)
Classification: Ordinary chondrite L5; S5; W3.
Specimens: 9 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 021 (AM 021) 41°41’13.5"N, 92°56’7.2"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 37.8 g (only 1 piece) no fusion curst, gray surface
Petrography: Chondrule types are barred olivine and porphyritic olivine. Shock-induced metal-sulfide veins and melt pockets are pervasive. Many mineral grains are heavily fractured. More than 40% of metal and sulfide are oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{23.2\pm0.7}$ (n=7); low-Ca pyroxene: $Fs_{19.2\pm1.2}Wo_{1.6\pm0.1}$ (n=6)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 9 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 022 (AM 022) 41°41’13.5"N, 92°56’7.2"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 77.7 g (only 1 piece) no fusion curst, gray surface
Petrography: The sections exhibit some chondrules in a matrix of silicates, metal and troilite. Chondrules are commomly deformed and the boundaries are not clear. Shock-induced metal-sulfide veins and melt pockets are pervasive. Many mineral grains are heavily fractured. More than 50% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.6\pm0.9}$ (n=8); low-Ca pyroxene: $Fs_{18.6\pm1.0}Wo_{1.9\pm0.3}$
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 17 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 023 (AM 023) 41°41’13.7"N, 92°56’4.1"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 26.8 g (only 1 piece) no fusion crust, gray surface
Petrography: The sections exhibit some chondrules in a matrix of fine-grained silicates, metal and troilite. Plagioclase occurs as maskelynite. Shock-induced metal-sulfide veins and melt pockets are pervasive. Many mineral grains are heavily fractured. More than 50% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.0\pm1.0}$ (n=12); low-Ca pyroxene: $Fs_{18.1\pm1.3}Wo_{2.6\pm0.7}$ (n=10)

Classification: Ordinary chondrite L5; S5; W2.
Specimens: 8 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 024 (AM 024) 41°41’31.0"N, 92°56’20.5"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 239.7 g (only 1 piece) no fusion crust, gray surface
Petrography: The meteorite consists of olivine, orthopyroxene, and feldspar, associated with comparatively minor amounts of clinopyroxene, Fe-Ni, diopside, troilite, chromite and phosphate. The matrix is fine-grained and the feldspars have sizes over 2 μm. Shock-induced metal-sulfide veins and melt pockets are pervasive. Many mineral grains are heavily fractured. More than 50% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{21.9\pm0.4}$ (n=9); low-Ca pyroxene: $Fs_{20.0\pm1.1}Wo_{1.8\pm0.4}$ (n=14)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 75 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 025 (AM 025) 41°41’31.0"N, 92°56’20.5"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 9.3 g (only 1 piece) no fusion crust, gray surface
Petrography: Chondrules are commomly deformed and the boundaries are not clear.The matrix is fine-grained. Highly developed shock-induced vein and mosaic extinction of olivine are common. Metal and troilite are highly weathered. More than 40% of metal and sulfide are oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.9\pm0.9}$ (n=7); low-Ca pyroxene: $Fs_{19.8\pm1.1}Wo_{1.6\pm0.3}$ (n=11)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 3 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 026 (AM 026) 41°41’29.9"N, 92°56’22.1"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 33.3 g (only 1 piece) no fusion crust, gray surface
Petrography: Barred olivine chondrules are common. The matrix is well recrystallized with secondary plagioclase up to 50 μm. Shock-induced metal-sulfide veins and melt pockets are pervasive. Many mineral grains are heavily fractured. More than 40%-50% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{21.4\pm1.1}$ (n=8); low-Ca pyroxene: $Fs_{19.4\pm1.2}Wo_{2.1\pm0.7}$ (n=9)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 11 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 027 (AM 027) 41°41’28.9"N, 92°56’24.1"E

Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 17.7 g (only 1 piece) no fusion crust, gray surface
Petrography: The sections exhibit some chondrules in a matrix of coarse-grained silicates, metal and troilite. Chondrules are commomly deformed and the boundaries are not clear. Shock-induced metal-sulfide veins and melt pockets are pervasive.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.7\pm0.3}$ (n=8); low-Ca pyroxene: $Fs_{19.6\pm1.0}Wo_{1.9\pm0.2}$ (n=7)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 6 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 028 (AM 028) 41°41’28.3"N, 92°56’30.0"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 17.7 g (only 1 piece) no fusion crust, gray surface
Petrography: Chondrules are commomly deformed and the boundaries are not clear. The matrix is fine-grained. Highly developed shock-induced vein and mosaic extinction of olivine are common. Almost 80% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.0\pm0.4}$ (n=10); low-Ca pyroxene: $Fs_{19.3\pm1.4}Wo_{2.0\pm0.8}$ (n=11)
Classification: Ordinary chondrite L5; S5; W3.
Specimens: 7 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 029 (AM 029) 41°41’21.0"N, 92°56’34.4"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 44.7 g (only 1 piece) no fusion crust, gray surface
Petrography: The sections exhibit some chondrules in a matrix of silicates, metal and troilite. The matrix is fine-grained and the feldspars have sizes over 2 μm. Highly developed shock-induced veins and mosaic extinction of olivine are common. More than 40% of metal and sulfide are oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{24.4\pm0.7}$ (n=8); low-Ca pyroxene: $Fs_{21.3\pm1.9}Wo_{2.3\pm0.7}$ (n=6)
Classification: Ordinary chondrite L5; S5; W2
Specimens: 12 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 031 (AM 031) 41°41’18.2"N, 92°56’37.4"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)

History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 38 g (only 1 piece) no fusion crust, gray surface
Petrography: The meteorite consists of olivine, orthopyroxene, and feldspar, associated with comparatively minor amounts of clinopyroxene, Fe-Ni, diopside, troilite, chromite and phosphate. Chondrules are commomly deformed and the boundaries are not clear. The matrix is fine-grained and the feldspars have sizes over 2 μm. Shock-induced metal-sulfide veins and melt pockets are pervasive. More than 50% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.9\pm0.9}$ (n=7); low-Ca pyroxene: $Fs_{19.8\pm1.1}Wo_{1.6\pm0.3}$ (n=11)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 9 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 032 (AM 032) 41°41’11.5"N, 92°56’46.2"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass:23.5 g (only 1 piece) no fusion crust, gray surface
Petrography: A barred olivine chondrule is deformed and the boundary not clear. Highly developed shock-induced veins and mosaic extinction of olivine are common. Almost 70% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{23.3\pm3.3}$ (n=8); low-Ca pyroxene: $18.6\pm0.9Wo_{1.9\pm0.6}$ (n=8)
Classification: Ordinary chondrite L5; S5; W3.
Specimens: 5 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 033 (AM 033) 41°41’14.4"N, 92°56’52.3"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 23.1 g (only 1 piece) no fusion crust, gray surface
Petrography: Many mineral grains in this meteorite are heavily fractured. The matrix is well recrystallized with secondary plagioclase up to 50 μm. Highly developed shock-induced veins and mosaic extinction of olivine are common. Metal and troilite are highly weathered.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.5\pm0.8}$ (n=21); low-Ca pyroxene: $Fs_{19.1\pm0.6}Wo_{1.8\pm0.4}$ (n=14)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 7 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 034 (AM 034) 41°41’10.9"N, 92°56’55.6"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.

Physical characteristics: Total mass: 101.6 g (only 1 piece) no fusion crust, gray surface
Petrography: The barred olivine and porphyritic olivine chondrules are commomly deformed and the boundaries are not clear. The matrix is well recrystallized with secondary plagioclase up to 20 μm. Highly developed shock-induced veins and mosaic extinction of olivine are common. More than 50% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{23.4\pm0.7}$ (n=8); low-Ca pyroxene: $Fs_{20.2\pm2.2}Wo_{1.9\pm0.4}$ (n=14)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 25 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 035 (AM 035) 41°41’10.9"N, 92°56’55.6"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 19.9 g (only 1 piece) no fusion crust, gray surface
Petrography: Chondrules are commonly deformed and the boundaries are not clear. The matrix is well recrystallized with secondary plagioclase up to 20 μm. Highly developed shock-induced veins and mosaic extinction of olivine are common. More than 50% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.1\pm0.3}$ (n=11); low-Ca pyroxene: $Fs_{18.8\pm0.6}Wo_{2.3\pm0.9}$ (n=17)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 6 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 036 (AM 036) 41°41’17.1"N, 92°56’51.8"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 24.8 g (only 1 piece) no fusion crust, gray surface
Petrography: The granular olivine chondrules are commonly deformed and the boundaries are not clear. The matrix is fine-grained and feldspars have sizes about 20 μm. Shock-induced metal-sulfide veins and melt pockets are pervasive. Many mineral grains are heavily fractured.
Geochemistry: Minerals are uniform. Olivine: $Fa_{26.0\pm1.5}$ (n=8); low-Ca pyroxene: $Fs_{20.6\pm1.0}Wo_{1.8\pm0.3}$ (n=7)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 6 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 038 (AM 038) 41°41’24.2"N, 92°56’51.2"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 103.2 g (only 1 piece) no fusion crust, gray surface
Petrography: The barred olivine chondrules are commonly deformed and the boundaries not clear. The matrix is fine-grained and the feldspars have sizes >2 μm. Shock-induced metal-sulfide veins and melt

pockets are pervasive. Many mineral grains are heavily fractured. More than 50% of metal and sulfide are oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{23.3\pm1.6}$ (n=12); low-Ca pyroxene: $Fs_{19.4\pm2.4}Wo_{4.8\pm6.6}$ (n=11)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 20 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 039 (AM 039) 41°41’27.4"N, 92°56’58.6"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 67.6 g (only 1 piece) no fusion curst, gray surface
Petrography: The matrix is fine-grained and the feldspars have sizes >2 μm. Shock-induced metal-sulfide veins and melt pockets are pervasive.
Geochemistry: Minerals are uniform. Olivine: $Fa_{23.1\pm0.4}$ (n=8); low-Ca pyroxene: $Fs_{19.5\pm0.2}Wo_{1.7\pm0.2}$ (n=7)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 18 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 040 (AM 040) 41°41’33.6"N, 92°56’57.4"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 97.2 g (only 1 piece) no fusion crust, gray surface
Petrography: The barred olivine chondrules are commonly deformed and the boundaries not clear.The matrix is fine-grained and the feldspars have sizes >2 μm. Plagioclase occurs as maskelynite. More than 50% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{23.6\pm0.6}$ (n=9); low-Ca pyroxene: $Fs_{19.8\pm0.6}Wo_{1.7\pm0.2}$ (n=11)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 22 g sample and one thin section are deposited in *GUT*.

Alatage Mountain 041 (AM 041) 41°41’19.8"N, 92°57’10.3"E
Xinjiang, China
Found: 1 May 2013
Classification: Ordinary chondrite (L5)
History: An expedition found 42 meteorites between 30 April and 1 May 2013 in a 2.7 × 1.4 km area 80 km east of Alatage Mountain. The expedition included Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi, Peng Wang, and Zhipeng Xia.
Physical characteristics: Total mass: 340.5 g (only 1 piece) no fusion crust, gray surface
Petrography: The barred olivine chondrules are commonly deformed and the boundaries not clear. The matrix is fine-grained and the feldspars have sizes >2 μm.Plagioclase occurs as maskelynite. More than 50% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{22.8\pm0.4}$ (n=17); low-Ca pyroxene: $Fs_{20.3\pm2.1}Wo_{1.7\pm0.3}$ (n=7)
Classification: Ordinary chondrite L5; S5; W2.
Specimens: 93 g sample and one thin section are deposited in *GUT*.

Ardón 42°26.18’N, 5°33.63’W
Castilla y Leon, Spain
Fell: 9 July 1931
Classification: Ordinary chondrite (L6)
History: Rosa González Pérez, who was 11 years old at the time, witnessed this meteorite falling in front of her, just after seeing a bolide in the sky. In a recent telling of the event, she reported that she immediately collected the specimen from the ground "having the feeling that the meteorite was still hot." She kept the specimen in a box, where it has been preserved for 80 years. She kept the meteorite as a "family secret" until she explained the event to her nephew (J. Antonio González) and niece. She still knows the exact recovery location, as the meteorite fell in a known Ardón street. No other specimens are known.
Physical characteristics: About 90% of the 5.48 g specimen is covered by a fresh fusion crust. Once cut, the metal grains are intact and barely oxidized by terrestrial alteration. The appearance of the thin sections also supports not being exposed to significant terrestrial weathering.
Petrography (M. Weyrauch, A. Bischoff, *IfP*; J.M. Trigo-Rodríguez, *CSIC-IEEC*; J. Llorca, *UPC*): Contains minor chromite and ilmenite. The meteorite is fresh, and moderately shocked with shock veins.
Geochemistry: Olivine, $Fa_{23.7\pm0.4}$; range $Fa_{23.1\text{-}24.4}$, n=22. Low Ca pyroxene $Fs_{20.4\pm0.2}Wo_{1.5\pm0.2}$, range $Fs_{20.0\text{-}20.7}Wo_{1.1\text{-}2.0}$, n=19. Mean plagioclase: $An_{10.3\pm0.5}Ab_{84.3\pm1.2}$; range: $An_{9.2\text{-}11.5}Ab_{81.8\text{-}86.3}$, n=24.
Classification: L6 Ordinary chondrite
Specimens: 1 g at Institute of Space Sciences (*CSIC-IEEC*) plus two thin sections

Blackhawk Mountain 34°24’53.47"N, 116°47’18.91"W
California, USA
Found: 20 Oct 2012
Classification: Ordinary chondrite (H4)
History: Michael Mulgrew found one 20.16 g stone while searching for meterorites with Roy Miller, Robby Hoover, and Tom Poole on the Blackhawk landslide in Lucerne Valley, California. The single meteorite was an oriented, shaped like an elongated dome, with dark black primary fusion crust on the leading edge and a roll-over lip and secondary fusion crust on the trailing edge.

Calama 001 ~22°25’S, ~68°45’W
Antofagasta, Chile
Found: 3 June 2010
Classification: Ureilite
History: Found June 3, 2010, on a limestone deflation plain near Calama by Eric and Gary Christensen while searching for meteorites. Fourteen fragments weighing 270 g were found within a 1 m area: largest fragment is 99 g.
Physical characteristics: Exterior of the stones is desert polished. Easy to cut. Sawn surface is dark with scattered graphite flakes.
Petrography: Typical ureilite with a protogranular texture, dominated by roughly equal proportions of anhedral, fine- to medium-grained (0.5 to 2 mm) olivine and pyroxene. Olivines surrounded by thin (<20 μm) reduction rims. Graphite flakes to 1 mm.
Geochemistry: (L. Garvie, *ASU*) Olivine cores $Fa_{11.2\pm0.8}$, FeO/MnO=20.5±3.0, Cr_2O_3=0.53±0.05, CaO=0.25±0.02, n=12, rims down to $Fa_{1.2}$ and FeO/MnO=2.8. Pyroxenes: augite $Fs_{6.3\pm0.1}Wo_{37.1\pm0.1}$, Na_2O=0.20±0.02wt% n=6; low-Ca pyroxene $Fs_{10.8\pm0.1}Wo_{4.8\pm0.03}$, n=5.
Specimens: 22.1 g and two thin sections at *ASU*.

Coyote Dry Lake 319 (CyDL 319) 35°4.581’N, 116°45.871’W
California, USA
Found: 2006 Sep 17
Classification: Ordinary chondrite (H5)

History: The finder was a member of a meteorite-recovery team in 2006 when he found this meteorite on the surface of a dry lakebed in the California Mojave Desert.
Physical characteristics: Physical Characteristics: A domed-top, but flat-bottomed, button-sized, weathered fragment of a chondritic stone.
Petrography: (Alan Rubin, *UCLA*) The weathered stone has low shock.
Geochemistry: $Fa_{19.2\pm0.7}$ (n=7); $Fs_{17.7}Wo_{1.9}$ (n=9); Ca-pyx $Fs_{6.4}Wo_{45.4}$
Classification: Ordinary Chondrite (H5 S2 W5)
Specimens: 0.68 g type specimen at *UCLA*; main mass with *Verish*

Cruz Alta 28°33’43"S, 53°37’4"W
Rio Grande do Sul, Brazil
Found: 2008
Classification: Iron meteorite (IIAB)
History: A farmer who was removing stones exposed on a plowed field found that one was much heavier than the others. The finder sent samples to Andre Moutinho who did preliminary tests and then sent to *Rio* for further analysis and classification.
Physical characteristics: A flatted elipsoidal mass weighing 48 kg and measuring approximately 30 × 20 × 35 cm.
Petrography: Hexaedrite, showing the usual irregular patches of clear and frosty kamacite, troilite, and schreibersite.
Geochemistry: (J.T. Wasson, *UCLA*) INAA: 5.77% Ni; 0.45% Co; 59.1 ppm Ga; 211 ppm Ge; 16.2 ppm Ir; 0.546 ppm Au.
Classification: This IIAB has no close relatives in South America; the only similar IIAB irons are Coahuila (16.1 μg/g Ir) and Yarroweyah (16.0 μg/g Ir). All other Ir values differ by >10% relative (J. Wasson *UCLA*).
Specimens: Main mass with finder, 50 g Andre Moutinho, 25 g *Rio*.

Dar al Gani 1064 (DaG 1064) 27°2.10’N, 16°24.27’E
Al Jufrah, Libya
Found: 21 Nov 2000
Classification: Ureilite (polymict)
Petrography: (C.A. Lorenz, *Vernad*) The meteorite is medium-to coarse-grained breccia, composed by angular olivine, minor pyroxene fragments of 0.3-2.5 mm of size. Locally, the olivine is rich in tiny metal inclusions concentrated along grain boundaries, some cracks and olivine-graphite contacts. Fine-grained clastic matrix mainly consists of the same minerals. Minor minerals are feldspar, sulfide, FeNi metal, graphite and diamond. The minor lithologies of the meteorite are melt rocks, feldspathic clasts, carbonaceous chondrite inclusions. The carbonaceous chondrite inclusions range from 50–700 μm and make up 0.9 vol.% of this meteorite.
Classification: According to the coordinates of find, the stone could be pared with DaG 999.

Dar el Kahal 22°5’50"N, 2°32’35"W
Gao, Mali
Purchased: Oct 2013
Classification: Ordinary chondrite (H5-6)
History: A first individual, completely covered by black fusion crust, was found by a nomad while searching for historical artifacts near the former salt mines of Taoudenni, northern Mali. During the following systematic search many fragments totaling 85 kg were recovered from a strewn field about 10 km in diameter.
Petrography: The meteorite is an H type breccia consisting of completely recrystallized type 6 and less intensely recrystallized type 5 fragments. The latter contain delineated chondrules. The meteorite is strongly shocked (S4), i.e., olivine shows mosaicism.

Demsa 9.4559°N, 12.1526°E
Adamawa, Nigeria
Fell: 2006 Oct 31
Classification: Ordinary chondrite (H6)
History: On October 31, 2006 between 10 and 11 am, local time, a sonic boom and change in sky color frightened local residents in Adamawa State. Nigerian authorities were alerted and the incident was reported on Nigerian television. Three meteorite individuals totaling 4 to 5 kg were subsequently recovered in and around the village of Demsa. The reports came to the attention of meteorite hunter, E. Egbe of Kaduna, who traveled to the location and was able to purchase one crusted 980 g individual stone. This stone had been struck with a hammer, and the reassembled mass (consisting of five pieces totaling 959 g) was purchased by *Twelker* in April and July 2007.
Physical characteristics: A single fresh, gray stone (959 g) with glossy black fusion crust.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fresh specimen containing sparse chondrules (mostly 0.7-1.4 mm, some up to 2.5 mm) in a coarse-grained matrix rich in holly-leaf shaped metal grains.The matrix plagioclase ranges in size from 100 to 300 μm, and accessory troilite and merrillite are present.
Geochemistry: Olivine ($Fa_{19.1\text{-}19.4}$, N = 3), orthopyroxene ($Fs_{16.5\text{-}17.2}Wo_{1.7\text{-}1.3}$, N = 4), clinopyroxene ($Fs_{5.4\text{-}5.5}Wo_{46.4\text{-}46.0}$, N = 2).
Classification: Ordinary chondrite (H6).
Specimens: 20.7 g of sample and one polished thin section are on deposit at *UWB*. The main mass is held by *Twelker*.

Dhofar 1768 (Dho 1768) 19.038°N, 54.906°E
Zufar, Oman
Found: 2011 Mar
Classification: HED achondrite (Diogenite, polymict)
History: Found by an anonymous prospector in March 2011.
Petrography: (A. Irving and S. Kuehner, *UWS*) Angular mineral grains of orthopyroxene, olivine, calcic plagioclase, exsolved pigeonite, silica polymorph, ilmenite, chromite, troilite and minor pentlandite are set in a sparse, finer grained matrix.
Geochemistry: Olivine ($Fa_{43.3\text{-}44.6}$, FeO/MnO = 46-48), diogenitic orthopyroxene ($Fs_{21.6\text{-}23.4}Wo_{0.4\text{-}1.7}$, FeO/MnO = 34-36), orthopyroxene host ($Fs_{58.7}Wo_{5.6}$, FeO/MnO = 32), clinopyroxene exsolution lamellae ($Fs_{27.2\text{-}30.5}Wo_{42.6\text{-}39.9}$, FeO/MnO = 30-33), ferropigeonite ($Fs_{45.5}Wo_{25.4}$).
Classification: Diogenite (polymict).
Specimens: Type specimen plus one polished thin section at *PSF*; main mass with anonymous collector.

Dhofar 1825 (Dho 1825) 18°20’28.5’’N, 54°11’48.9’’E
Zufar, Oman
Found: 15 Mar 2011
Classification: Ordinary chondrite (L3)
Geochemistry: Cr_2O_3 in olivine: 0.04-0.2; 3.4 sub-type estimated according to Bunch et al. (2012)

Dhofar 1829 (Dho 1829) 18°30.688’N, 54°36.773’E
Zufar, Oman
Found: Jan 2011
Classification: Ordinary chondrite (H5)
Geochemistry: Silicate compositions obtained following the Dodd et al. (1967) method.
Specimens: 17.6 g type specimen, including thin section, on deposit at *UAb*. Main mass at *SQU*.

Dhofar 1830 (Dho 1830) 18°35.13’N, 54°24.472’E
Zufar, Oman

Found: Jan 2011
Classification: Ordinary chondrite (H6)
Geochemistry: Silicate compositions obtained following the Dodd et al. (1967) method.
Specimens: 16.4 g type specimen on deposit at *UAb*. Main mass, including thin section, at *SQU*.

Dhofar 1831 (Dho 1831) 18°41.138'N, 54°22.002'E
Zufar, Oman
Found: Jan 2011
Classification: Ordinary chondrite (H5)
Geochemistry: Silicate compositions obtained following the Dodd et al. (1967) method.
Specimens: 21.6 g type specimen, including thin section, on deposit at *UAb*. Main mass at *SQU*.

Dhofar 1832 (Dho 1832) 18°32.857'N, 54°16.297'E
Zufar, Oman
Found: Jan 2011
Classification: Ordinary chondrite (H4)
Petrography: Although silicate compositional variation is consistent with petrologic type 5, petrologic type 4 is indicated by petrography, including well-defined chondrules, devitrified glass, and paucity of feldspar.
Geochemistry: Silicate compositions obtained following the Dodd et al. (1967) method.
Specimens: 37.1 g type specimen on deposit at *UAb*. Main mass, including thin section, at *SQU*.

Dhofar 1833 (Dho 1833) 18°20.525'N, 54°18.465'E
Zufar, Oman
Found: Jan 2011
Classification: Ordinary chondrite (LL6)
Geochemistry: Silicate compositions obtained following the Dodd et al. (1967) method.
Specimens: 47.0 g type specimen, including thin section, on deposit at *UAb*. Main mass at *SQU*.

Dhofar 1834 (Dho 1834) 18°9.323'N, 54°21.327'E
Zufar, Oman
Found: Jan 2011
Classification: Ordinary chondrite (L6)
Geochemistry: Silicate compositions obtained following the Dodd et al. (1967) method.
Specimens: 51.1 g type specimen, including thin section, on deposit at *UAb*. Main mass at *SQU*.

Dhofar 1835 (Dho 1835) 18°15.145'N, 54°25.117'E
Zufar, Oman
Found: Jan 2011
Classification: Ordinary chondrite (H5)
Geochemistry: Silicate compositions obtained following the Dodd et al. (1967) method.
Specimens: 44.3 g type specimen, including thin section, on deposit at *UAb*. Main mass at *SQU*.

Dhofar 1836 (Dho 1836) 18°43.012'N, 54°23.44'E
Zufar, Oman
Found: Jan 2011
Classification: Ordinary chondrite (L4)
Petrography: Although silicate compositional variation is consistent with petrologic type 5, petrologic type 4 is indicated by petrography, including well-defined chondrules, devitrified glass, and paucity of feldspar.
Geochemistry: Silicate compositions obtained following the Dodd et al. (1967) method.

Specimens: 33.5 g type specimen, including thin section, on deposit at *UAb*. Main mass at *SQU*.

Dhofar 1980 (Dho 1980) 19°0.643'N, 54°32.242'E
Zufar, Oman
Found: 2012 Dec
Classification: Lunar meteorite
History: Found during a foot search.
Physical characteristics: Six stones with masses of 5.8, 5.5, 4.9, 3.2, 3.2, and 0.9 g and ~2.5 to 1.5 cm in maximum size. Two stones contain significant dark, speckled fusion crust that cover most of one face of the respective stones. Shapes are angular to sub-rounded and colors range from grey, reddish, and tan with dark, sub-mm veins that connect melt pods. A 1.2-g slice of the 5.5-g stone shows a well consolidated rock with a brecciated texture of angular clasts that exhibit orange staining, and a few that are light colored. These clasts are set in a very fine-grained, gray groundmass that accounts for ~20 vol% of the sample.
Petrography: (A. Wittmann, *WUSL*) A 23.3 by 15.9 mm petrographic thin section exhibits a well consolidated, crystalline, melt rock that contains abundant angular, dark, apahnitic clasts, and light, angular to sub-rounded clasts that display rusty, orange staining. The complex, clast-rich, intergranular melt rock has a groundmass of 10 μm feldspar, olivine, and pyroxene, plus minor merrillite, FeNi metal, and troilite grains. Monomineralic clasts include <1 mm plagioclase, olivine, pyroxene, and spherical FeNi metal grains that are variably deformed and partly assimilated. Polymineralic clasts include dark, microcrystalline, intergranular lithic clasts that contain up to 100 μm mineral clasts of plagioclase; medium to fine-grained poikilitic lithic clasts with noritic and anorthositic mineralogies; medium-grained anorthositic clasts with granulitic textures; medium-grained anorthositic cumulate clasts of >0.3 mm feldspar with interstitial, poikilitic pyroxene and FeNi metal particles; and medium to fine-grained sub-ophitic domains of feldspar laths, zoned pigeonite, rhyolitic mesostasis, armalcolite, troilite, and FeNi metal intergrown with schreibersite. Silicate minerals frequently show reduced birefringence and intense brittle deformation. Many olivine and magnesian pyroxene clasts are extensively altered to phyllosilicates, and plagioclase shows orange staining in places. Other common alteration phases are SrSO4, CaSO4, CaCO3, and Fe-oxides that fill fractures; Fe-oxides also replace metal and troilite.
Geochemistry: Mineral compositions and geochemistry: (A. Wittmann, P. Carpenter, *WUSL*) Feldspar ($Ab_{2.7\text{-}14.6}An_{84\text{-}97}Or_{0.1\text{-}1.9}$; n=21) is the most abundant component, followed by pyroxene that is mainly pigeonite ($En_{61\text{-}75}Fs_{20\text{-}31}Wo_{5\text{-}14}$; Fe/Mn = 38-75; n=18), minor augite ($En_{76\text{-}79}Fs_{46\text{-}50}Wo_{36\text{-}39}$; Fe/Mn = 41-48; n=3), and rare low-Ca pyroxene ($En_{75\text{-}76}Fs_{20\text{-}21}Wo_{4.3\text{-}4.5}$; Fe/Mn = 55-58; n=2), and olivine that is mainly magnesian ($Fo_{71\text{-}74}$; n=16; Fo_{66}; n=1; Fe/Mn = 74-119). Minor components are rhyolitic mesostasis (SiO_2 = 70%, K_2O = 4%), Fe-Mg armalcolite (n=2) with 0.17% ZrO_2, FeNi-metal (Ni = 4.4-5.9%, Co = 0.28±0.56%, n=5) and is in some cases associated with minor troilite and schreibersite (P = 12.6%, Ni = 10.6-14%, Co = 0.24-0.36%; n=2). Bulk composition (INAA, R. Korotev, *WUSL*): Na_2O = 0.56, FeO = 5.8 (both in %), Ni = 475, Sr = 800, Sm = 7.3, and Th = 2.5 (all in ppm). Overall, indistinguishable from Dhofar 1627.
Classification: lunar (feldspathic breccia).
Specimens: Type specimen, *ASU*; TS and INAA samples at *WUSL*.

Dhofar 1982 (Dho 1982) 19°11.87'N, 54°54.17'E
Zufar, Oman
Found: January 2013
Classification: Ordinary chondrite (L5)
History: Collected by *SQU-UWO* meteorite research team in January 2013
Physical characteristics: Physical Characteristics: A 1205.76 g sample supplied by *SQU*, which has a 2-mm thick, brown-black fusion crust present on three out of five faces of the stone. Regmaglypts and contraction cracks are present on the surface of the fusion crust. This specimen has undergone extensive

terrestrial weathering. This sample has been split in two, most likely due to weathering. The sample is magnetic.
Petrography (P. Hill, *UWO*) Many chondrules can be discerned, but lack sharp edges. Most of the chondrules are fairly large (~0.7 mm) with many of the non-porphyritic chondrules exceeding 1 mm in diameter. A majority of the chondrules are porphyritic olivine-pyroxene but porphyritic pyroxene chondrules also make up significant portion of the chondrules. Porphyritic olivine, radial pyroxene, granular and cryptocrystalline chondrules are present but occur less frequently throughout the thin section. The entire chondrite has been strongly oxidized, with rust present on all mineral phases present. A large amount of deformation is evident, and fractures ~100 μm wide cut across the thin section. There is evidence of brecciation. The matrix has been completely recrystallized with secondary feldspar common throughout the thin section. Troilite is present primarily as inclusions within the chondrules and Fe-Ni oxide rims but also as coarser grains. All of the Fe-Ni metal has been oxidized within the thin section but there is little evidence of weathering of silicate minerals, indicating weathering grade W3. Weak mosaicism, planar fractures and undulatory extinction in olivine suggest shock stage S4.
Geochemistry: Mineral composition and geochemistry (M. Beauchamp, P. Hill, *UWO*) Olivine ($Fa_{22.3\pm0.65}$, n=30) with PMD Fa=1.8%, low-Ca pyroxene ($Fs_{18.9\pm0.67}Wo_{1.5\pm1.02}$, n=13) with PMD Fs=3.1%. The high-Ca pyroxene was observed is suggestive of augite composition of ($Fs_{5.5\pm5.0}Wo_{23.9\pm16.3}$, n=2)
Classification: Ordinary chondrite (L5, S4, W3).
Specimens: 6078 g type specimen, including polished thin section, are on deposit at *SQU*.

Dhofar 1983 (Dho 1983) 18°42.682'N, 54°9.438'E
Zufar, Oman
Found: Jan 2011
Classification: Lunar meteorite (feldspathic breccia)
Physical characteristics: Dark brown fusion crust with an orange tint covers the sample. Fracture surfaces have light orange colourations due to minor weathering. Cut section shows a clast-rich gray interior with white and gray clasts ranging from 0.5 to 10 mm in diameter. There are no obvious signs of oxidation of the interior with the exception a single orange veinlet.
Petrography: (P. Strickland and C. Herd, *UAb*). Petrographic microscope examination of thin section. Dominated by ferroan anorthosite and less frequent gabbroic clasts embedded in two distinct matrices. Melt breccia clasts up to 1 cm across are present, as are much smaller mineral fragments of pyroxene and less commonly, olivine. Glassy spherules approximately 100 μm are also present. Clasts and spherules are embedded in either a lighter, devitrified fine-grained matrix, or a less abundant, darker, glassy melt matrix. A preferred orientation of clasts is not observed. Very few fractures are present, indicating low shock deformation. Minimal presence of calcite veins and oxidation indicate low weathering grade.
Geochemistry: EPMA examination of carbon-coated thin sections (C. Herd and P. Strickland, *UAb*; T. Theye, *UStutt*; P. Hill, *UWO*): Olivine $Fa_{20.0\text{-}45.8}$ (n=28); low-Ca pyroxene $Fs_{16.2\text{-}82.4}Wo_{2.6\text{-}19.3}$ (n=30); augite $Fs_{10.3\text{-}57.8}Wo_{17.6\text{-}43.6}$ (n=26); plagioclase $An_{90.6\text{-}98.3}$ (n=53). Bulk composition (R. Korotev, *WUSL*): INAA of subsamples give mean abundances of (in wt.%) FeO 5.6, Na_2O 0.369, CaO 15.2, and (in ppm) Sc 11.7, La 2.3, Sm 1.17, Eu 0.79, Yb 1.01, and Th 0.37. Oxygen isotopic composition (A. Ali and N. Banerjee, *UWO*): $\delta^{17}O = 2.6\pm0.3$ ‰, $\delta^{18}O = 5.1\pm0.5$ ‰, $\Delta^{17}O = -0.03\pm<0.01$ ‰ (n=2; unleached specimens).
Classification: Achondrite, lunar feldspathic regolith breccia.
Specimens: 11.4 g type specimen, including polished thin section and 0.3 g bulk powdered sample, are on deposit at *UAb*. A 0.55 g slice of the type specimen was used for INAA by Korotev. Remainder at *SQU*.

Dhofar 1984 (Dho 1984) 18°42.69'N, 54°9.42'E
Zufar, Oman
Found: January 2011
Classification: Lunar meteorite (feldspathic breccia)

Petrography: (S. Bell and C. Herd, *UAb*). Petrographic microscope examination of thin section. A clast-rich breccia with a clastic, fine-grained matrix composed mainly of plagioclase. Clasts range in size from 50 to 600 μm, and are dominated by impact breccias, cataclastic ferroan anorthosite, and rarer basaltic clasts. The latter consist of subophitic, Mg-Fe zoned augite and An-rich plagioclase; one such clast also contains part of a larger Fo_{69} olivine phenocryst. Fragments of plagioclase and rarer pyroxene and olivine are also present, as are glassy clasts. A preferred orientation of clasts is not observed. Very few fractures are present, indicating low shock deformation. Minimal presence of calcite veins and oxidation indicate low weathering grade.
Geochemistry: EPMA examination of carbon-coated thin sections (C. Herd and S. Bell, *UAb*; T. Theye, *UStutt*): olivine $Fa_{21.3\text{-}43.3}$ (n=7); pyroxene $Fs_{13.9\text{-}69.7}Wo_{10.8\text{-}40.9}$ (n=17); plagioclase $An_{93.6\text{-}97.0}$ (n=15). Bulk composition (R. Korotev, *WUSL*): INAA of subsamples give mean abundances of (in wt.%) FeO 5.26, Na_2O 0.372, CaO 15.4, and (in ppm) Sc 11.32, La 2.8, Sm 1.35, Eu 0.79, Yb 1.10, and Th 0.41.
Classification: Achondrite, lunar feldspathic fragmental breccia.
Specimens: 7.2 g type specimen, including polished thin section and 2.4 g bulk powdered sample, are on deposit at *UAb*. A 0.36 g slice of the type specimen was used for INAA by Korotev. Remainder at *SQU*.

El Médano 216 ~24°51'S, ~70°32'W
Antofagasta, Chile
Found: 2011 Jun 22
Classification: Carbonaceous chondrite (CO3)
History: The meteorite was found in June 2011 in the Atacama desert by Rodrigo Martinez while he was looking for meteorites.
Physical characteristics: A single dull brown stone
Petrography: (J. Gattacceca, *CEREGE*) Abundant chondrules, predominantly of type I, in a dark matrix. Chondrule:matrix ratio is ~1:1. Chondrule mean size 228±119 μm (N=96).
Geochemistry: Olivine in type I chondrules $Fa_{4.4\pm3.2}$ range $Fa_{0.6\text{-}11.1}$, n=18; olivine in type II chondrules $Fa_{39.3\pm9.7}$ range $Fa_{24.9\text{-}52.6}$, n=5. Cr_2O_3 in ferroan olivine 0.13±0.07 wt.% (N=22). Low-Ca pyroxene $Fs_{1.5\pm0.7}Wo_{1.2\pm0.2}$ (N=5). Magnetic susceptibility log $\chi = 4.46$ (χ in 10^{-9} m^3/kg).
Classification: Carbonaceous chondrite (CO3). Minor weathering
Specimens: 48 g and a polished section at *CEREGE*. Main mass at *MMC*.

Faina 15°26'46"S, 50°21'38"W
Goias, Brazil
Found: 2011
Classification: Iron meteorite (IAB complex)
History: Found in a backyard when Mr. G. Rodrigues dug a hole for septic tank of his house. He suspected that the mass was a meteorite after watching a TV program about meteorites. Purchased by Andre Moutinho on 31 Aug 2013.
Physical characteristics: A mass weighing 440 g and measuring about 7 × 4 × 5 cm.
Petrography: (M.E. Zucolotto, *Rio*) Exhibits a microscopic Widmanstätten structure typical of plessitic octahedrites, with kamacite spindles of 80±20 μm. Schreibersite bodies are very common, mostly with swathing kamacite. Faina resembles Ballinoo, Cratheús (1950) and several other plessitic octahedrites from group IIC.
Geochemistry: (J.T. Wasson, *UCLA*) INAA: 8.67% Ni; 23.4 ppm Ga; 82 ppm Ge; 3.91 ppm Ir; 1.42 ppm Au. Composition of major phases (I.P. Ludka, *IGEO-UFRJ*) WDS/EPMA: kamacite (Ni=5.56±0.4; Co=0.61; N=20), taenite (Ni=28.8±1.4; Co=0.61; N=16), phosphides (Ni=27.7±1.2; P=16.68±0.7, N=12), all in wt%.
Classification: IAB-ungrouped. The meteorite has no close relatives. The nearest (but distinctly different) are Gun Creek, EET 84300 and Ellicott (J. Wasson, *UCLA*)
Specimens: 22 g *Rio*

Gapyeong 37°53.1'N, 127°27.9E
Kyonggi-do, Korea, Republic of
Found: 1999 Nov
Classification: Iron meteorite (IAB-sLL)

History: The iron of ~180 kg was found at the mountain area near Gapyeong-Gun, Gyeonggi-Do, during forest road construction in 1999 Nov. The owner sliced the surface of the iron and brought it to *Seoul-NU* in 2005 where it was examined and confirmed as an iron meteorite by Byeon-Gak Choi. The owner cut the iron into 5 pieces and donated one of them (32 kg) to *Seoul-NU* in 2014 July.

Physical characteristics: The iron is a single mass of 180 kg. The outmost surface of the iron is mostly oxidized by terrestrial weathering but has broad regmaglypts. The weathering depth varies, but is typically a few mm to 1 cm; the interior is very fresh, showing little evidence of weathering.

Petrography: The iron mostly consists of kamacite and taenite with minor or trace amounts of troilite, graphite, schreibersite and cohenite. It shows a coarse Widmanstätten pattern: bandwidth of kamacite varies from 1.2 to 2 mm. Troilite and graphite are found as round or irregularly shaped inclusions. Schreibersite occurs eithier around the troilite-graphite inclusions or along the grain boundaries of kamacite or taenite. No silicate inclusions were found on the surface examined.

Geochemistry: Composition by INAA (J.T. Wasson, *UCLA*): Cr 23 μg/g, Co 4.93 mg/g, Ni 82.7 mg/g, Ga 66.4 μg/g, Ge 247 μg/g, As 15.9 μg/g, W 0.76 μg/g, Re 266 ng/g, Ir 2.31 μg/g, Au 1.736 μg/g.

Classification: Based on the composition of metal by INAA, the meteorite belongs to the low-Ni, low Au (sLL) group of the IAB complex.

Specimens: The iron was cut into 5 pieces: 72.45 kg, 44.02 kg, 34.02 kg, 21.70 kg, 8.30 kg. The 34.02 kg piece is the type specimen at *Seoul-NU*.

Gila Mountains 32°41.101'N, 114°24.460'W
Arizona, USA
Found: 20 May 2012
Classification: Ordinary chondrite (H4)

History: One specimen weighing 3.854 kg was recovered by Jason Ira Ryan in May, 2012, from the Arizona desert near the Gila Mountains.

Physical characteristics: One piece, weighing a total of 3.854 kg, was recovered. A dark brown fusion crust, uniformly covering the entire sample, with a total thickness of ~0.5 mm was observed. A thin layer of carbonate material, likely of terrestrial origin, was observed on the surface of the fusion crust. The sample showed no signs of post-fall fractures or damage.

Petrography: (A.J. Lussier, *NotreD*) Gila Mountains shows a brecciated texture in hand sample, with reddish-brown-to-tan colored, irregularly-shaped clasts (ranging in size from 2-7 mm) set in dark brown/black matrix material; the volume ratio of clasts to matrix is approximately 1:1.5. Chondrules are present in both the clast and matrix material and opaque phases (i.e., oxides and sulfides) are disseminated throughout intra-chondrule areas. Scanning electron microscopy shows that chondrules in the clast material are reasonably well preserved with well-defined edges, whereas chondrules in the matrix are less well preserved, with edges that range from being well- to poorly-defined or ruptured. The cpx:opx ratios of the clast and matrix regions are 3:2 and 2:3, respectively. Throughout the entire sample, pyroxene grain sizes range from 20 to ~150 μm, with the average size being ~70 μm; cpx grains are dominantly equant, whereas opx grains range from equant to elongate. No feldspar grains are visible by petrographic microscope.

Geochemistry: (A. Lussier, *NotreD*, and I. Steele, *UChi*) EMPA. Olivine $Fa_{19.0\pm0.7}$, Fe/Mn=39±2, n=124; low-Ca pyroxene $Fs_{17\pm1}Wo_{1}$, Fe/Mn=23±2, n=110; high-Ca pyroxene $Fs_{9\pm3}Wo_{40\pm12}$, Fe/Mn=21±6, n=31; kamacite, $Fe_{0.92\pm0.06}Ni_{0.82}$, n=12; tetrataenite $Fe_{0.50\pm0.01}Ni_{0.50}$, n=5; taenite $Fe_{0.74\pm0.11}Ni_{0.26}$, n=6.

Classification: Ordinary chondrite (H4). Weathering grade W1. Shock stage S2.

Specimens: Type specimen, 38 g and a thin section, *ROM*. Main mass, J. Ryan.

Grove Mountains 13001 (GRV 13001) 72°59'08"S, 75°14'18"E

Antarctica
Found: 6 Feb 2014
Classification: HED achondrite (Eucrite)

History: One of 583 meteorites collected by CHINARE during the 2013/2014 field season.

Physical characteristics: (H. Chen, B. Miao, Z. Xia, L. Xie, *GUT*): This achondrite is 75% covered with a shiny black fusion crust, with a total mass of 1299.1 g. The interior is a smoky gray color, showing a partially brecciated texture. Many cracks penetrate the interior of this meteorite. Dimensions: 8.5 × 9.6 × 9.0 cm.

Petrography: (H. Chen, B. Miao, Z. Xia, L. Xie, *GUT*): Breccia containing a variety of basaltic lithologies, generally plagioclase-rich, with lath-like plagioclase typically 0.1-0.5 mm long, and some pyroxene laths up to 1.0 mm. A silica phase is commonly present. A macroscopically dark gray, fine-grained clast (mean grain size 20-50 μm) with equilibrated metamorphic texture also contains a silica phase. Accessories are ilmenite, troilite and rare iron metal.

Geochemistry: (H. Chen, B. Miao, Z. Xia, L. Xie, *GUT*): Orthopyroxene compositions are $Fs_{58.6-59.7}Wo_{1.61-4.70}$, median $Fs_{59.3}Wo_{2.9}$, n=15. Clinopyroxene compositions are $Fs_{27.0-58.3}Wo_{7.74-60.6}$, median $Fs_{42.1}Wo_{34.5}$, n=16. Plagioclase: $An_{92.7-96.1}Or_{0.35-0.96}$, median $An_{94.9}Or_{0.64}$, n=8. Bulk analysis of fusion crust by EPMA (wt%): FeO=22.4%, MnO=0.68%, Fe/Mn=32.9. Isotopic data (M.E. Sanborn and Q.-Z. Yin, *UCD*): oxygen, $\Delta^{17}O$=-0.25±0.02; chromium, ε_{Cr}=-0.33±0.09.

Classification: Based on texture, mineral composition and bulk Fe/Mn this is a eucrite (basaltic polymict eucrite).

Grove Mountains 13051 (GRV 13051) 72°59’41"S, 75°14’41"E
Antarctica
Found: 5 Feb 2014
Classification: Carbonaceous chondrite (CM2)

History: One of 583 meteorites collected by CHINARE during the 2013/2014 field season.

Physical characteristics: (Z. Xia, B. Miao, H.chen, L. Huang, *GUT*): This carbonaceous chondrite has no fusion crust and a total mass 3.47 g. The sample is a dark gray-black to black, and has fine-grained matrix with abundant chondrules. Dimensions: 26.9 × 14.3 × 11.8 mm.

Petrography: (L. Huang, B. Miao, Z. Xia,H. Chen, L. Xie, *GUT*): The meteorite has small chondrules (~50-300 μm, ~30 vol%), a few refractory inclusions (~0.3 mm), abundant fine-grained matrix (~70 vol%), and hydrated minerals. Many of the chondrules have igneous rims. It has abundant hydrated minerals such as serpentine; the other major minerals include pyroxene, with a small amount of Ni-rich troilite and chromite.

Geochemistry: (H. Chen, B. Miao, Z. Xia, L. Xie, *GUT*): Olivine $Fa_{11-61.4}$, median $Fa_{21.9.}$

Grove Mountains 13100 (GRV 13100) 72°57’46"S, 75°13’47"E
Antarctica
Found: 16 Jan 2014
Classification: Enstatite chondrite (EH4)

History: One of 583 meteorites collected by CHINARE during the 2013/2014 field season.

Physical characteristics: Total mass: 0.68 g (only 1 piece). Dimensions: 10.92 × 8.02 × 6.34 mm. It has partial fusion crust and a gray surface.

Petrography: This section consists of an aggregate of small chondrules (most less than 0.5 mm), chondrule fragments and pyroxene grains with metal, troilite, niningerite, daubreelite and perryite.

Geochemistry: Enstatite $Fs_{1.52±1.34}Wo$=0.16±0.13, n=39, enstatite compositions are somewhat variable ($Fs_{0.17-6.5}$), with most being Fs_{0-1}; plagioclase $An_{74.34±1.80}Or_{1.14±0.21}$, n=7; metal contains 2.9-3.7 wt% Si.

Classification: Enstatite chondrite (EH4); S2; W2.

Hami 003 42°2’46.2"N, 93°53’14.5"E
Xinjiang, China

Found: 4 May 2013
Classification: Ordinary chondrite (H5)

History: On 4 May 2013, a team including Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi,Peng Wang, Yongwang Lai, Zhipeng Xia found this meteorite ~60 km west of the Kumtag sand dune.
Physical characteristics: total mass 152 g (only 1 piece), no fusion crust, with a gray surface
Petrography: The sections exhibit some chondrules in a matrix of fine-grained silicates, metal and troilite. The meteorite shows a typical chondritic texture. The dominant silicate phases are olivine and pyroxene. The main opaque minerals are Fe-Ni metal (kamacite and taenite) and troilite (FeS). Accessory phases are chromite and apatite.
Geochemistry: Minerals are uniform. Olivine: $Fa_{18.1\pm0.6}$ (n=23); low-Ca pyroxene: $Fs_{16.1\pm0.4}Wo_{1.4\pm0.5}$ (n=19)
Classification: Ordinary chondrite (H5, S2, W1).
Specimens: About 35 g and two thin sections are deposited in *GUT*.

Hami 004 42°2’42.4"N, 93°53’2.47"E
Xinjiang, China
Found: 4 May 2013
Classification: Ordinary chondrite (L5)

History: On 4 May 2013, a team including Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi,Peng Wang, Yongwang Lai, Zhipeng Xia found this meteorite ~60 km west of the Kumtag sand dune.
Physical characteristics: Total mass: 99 g (only 1 piece), lacking fusion crust, with a light black surface
Petrography: The main chondrule types are barred olivine, porphyritic olivine, and porphyritic pyroxene. Fe-Ni alloy and troilite is moderately abundant. Almost 40% of metal and sulfide is oxidized.
Geochemistry: Minerals are uniform. Olivine: $Fa_{21.1\pm1.7}$ (n=20); low-Ca pyroxene: $Fs_{17.5\pm3.0}Wo_{1.2\pm1.1}$ (n=30).
Classification: Ordinary chondrite (L5, S3, W2).
Specimens: About 31 g and two thin sections are deposited in *GUT*.

Hami 005 42°9’8.5"N, 93°26’2.06"E
Xinjiang, China
Found: 6 May 2013
Classification: Ordinary chondrite (H5)

History: On 6 May 2013, a team including Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi,Peng Wang, Yongwang Lai, Zhipeng Xia found this meteorite ~25 km west of the Kumtag sand dune.
Physical characteristics: Total mass: 411 g (only 1 piece), no fusion curst, with a gray surface
Petrography: The meteorite consists mainly of a medium grained, granular aggregate of olivine and low-Ca pyroxene, with minor amounts of Fe-Ni alloy and troilite. The chondrules are moderately abundant and are well defined. The matrix is moderately recrystallized. It has a relatively high abundance of Fe-Ni alloy and troilite.
Geochemistry: Minerals are uniform. Olivine: $Fa_{17.6\pm1.0}$ (n=19); low-Ca pyroxene: $Fs_{15.7\pm1.2}Wo_{1.65\pm0.7}$ (n=21).
Classification: Ordinary chondrite (H5, S3, W3).
Specimens: About 181 g and two thin sections are deposited in *GUT*.

Jezersko 46°22.17’N, 14°32.12’E
Slovenia, Slovenia
Found: 13 Sept 1992
Classification: Ordinary chondrite (H4)

History: An unusual brown stone was found on 13 September 1992 by a mountain hiker Mr. Bozidar Jernej Malovrh while looking for a suitable resting place about 50 m southwest of a mountain hut in the Karavanke mountains, Slovenia. The stony mass was lying on a grassy patch. Because the stone differed in color and weight from the rocks in the vicinity and attracted a magnet, he decided to keep it and stored it at home. After more than 20 years Mr. Malovrh showed the find to his colleague Mr. Davorin Preisinger, who suggested he take it to the *SMNH*.
Physical characteristics: (M. Jersek, *SMNH*): The meteorite is an elongated, roughly prism-shaped single piece with square cross-section, original mass of 1380 g and dimensions of 13 × 8 × 7 cm. One side of the meteorite is rounded and smooth, while the opposite side is more rough and contains 0.2 cm deep pits with a diameter between 0.5 and 2.2 cm (regmaglypts). Fusion crust is mostly well preserved. The average thickness of the fusion crust, including the layer with metal-filled veins, is 0.27 mm, while the average thickness of the outer dendritic precipitate layer is 0.04 mm. In cross-section, the meteorite shows homogeneous distribution of metallic and non-metallic phases, however, two large chondrules up to 5 mm in diameter are visible. A 264.9 g piece was cut from the meteorite and used for chemical analysis, preparation of thin-sections and a polished-section.
Petrography: (M. Miler and M. Gosar, *GeoZS*; B. Ambrozic and B. Mirtic, *NTF*): Chondrules (0.11 to 2.51 mm, average 0.73 mm) relatively well defined but commonly severely fragmented and occupy about 68 vol.% of meteorite. Chondrules include POP, PO and barred olivine-pyroxene textures and rare RP and fine-grained pyroxene chondrules. Shock veins filled with oxidized metal. It consists of about 15 vol.% of olivine and pyroxene and large fields of troilite (8 vol.%) with mean size 195 μm, which are commonly associated with mean 250 μm Fe-Ni metal (7 vol.%) and chromite (1.5 vol.%) with mean size 120 μm and also 0.5 vol.% of phosphates represented by large grains of merrilite (243 μm) and chlorapatite (100 μm). Several plagioclase-chromite associations were found in the matrix. Some chromite-rich chondrules with small euhedral chromite crystals in mesostasis (plagioclase) as well as in pyroxene and olivine were also observed. Metallic Cu occurs as small elongated inclusions in taenite at troilite-taenite boundaries. Troilite is also present within chondrules or forms rims around them.
Geochemistry: (B. Ambrozic, *NTF*; M. Miler, *GeoZS*; S. Sturm, *IJS*): Olivine ($Fa_{19.4\pm0.4}$; N = 142), low-Ca pyroxene ($Fs_{16.7\pm0.3}Wo_{1.2\pm0.3}$; N = 55), high-Ca pyroxene ($Fs_{6\pm1.2}Wo_{45.8\pm1.4}$; N = 30), plagioclase ($Ab_{83\pm1.3}An_{11\pm1.3}Or_{6\pm1.3}$; N = 44), kamacite (Ni=6.6±2.3; N = 51), taenite (Ni=30.7±3.4; N = 35), tetrataenite (Ni=50.1±2.4; N = 8) (all in wt%).
Classification: Ordinary chondrite (H4), shock stage (S3), weathering grade (W2). Petrologic type of this meteorite, compositional homogeneity of olivine and pyroxenes are typical for type 5, however, XRD analysis showed that it contains 34% monoclinic low-Ca pyroxenes, which is characteristic of type 4.
Specimens: The main mass and type specimen (73.5 g) are deposited in the *SMNH*.

Jiddat al Harasis 819 (JaH 819) 19°38.407'N, 55°32.047'E
Al Wusta, Oman
Found: 11 Jan 2012
Classification: Ordinary chondrite (H4, anomalous)
History: Found by Edwin Gnos, Beda Hofmann, Karl Wimmer, Elise Wimmer and Florian Zurfluh during a search for meteorites on January 11, 2012.
Physical characteristics: Single wind-ablated stone of 372.1 g, no fusion crust preserved.
Petrography: (E. Gnos, *MHNGE* and B. Hofmann, *NMBE*) The meteorite contains up to 1.8 mm sized chondrules (average size 0.98±0.40 mm n=14), chondrules are poorly delineated. Petrographic grade 4 based on finely recrystallized glass (plagioclase <2 μm). Shock level S3. Troilite and iron are >95% oxidized (W4).
Geochemistry: (N. Greber, *Bern*) Olivine compositions are $Fa_{13.9\text{-}15.3}$, median $Fa_{14.4}$ (n=26), pyroxene compositions are $Fs_{12.9\text{-}13.7}Wo_{0.4\text{-}1.2}$, median $Fs_{13.2}Wo_{0.7}$ (n=9). The low iron content of olivine is confirmed by XRD ($Fa_{14.8}$). Oxygen isotopes: (R. Greenwood, *OU*) gave $\delta^{18}O$=5.77, $\delta^{17}O$=3.65, $\Delta^{17}O$= 0.653 (all per mil).

Classification: Significantly lower Fe content in olivine and pyroxene than in normal H chondrites, larger chondrule size, oxygen isotopes comparable to LL. Based on chemical similarity with H chondrites this meteorite is classified as anomalous H chondrite (H4-an).
Specimens: All at *NMBE*.

Jiddat al Harasis 845 (JaH 845) 19° 59.178’ N, 56° 25.279’ E
Al Wusta, Oman
Found: 2004
Classification: Mesosiderite (group C2)
History: Three rusty pieces, totaling 119.1 g were found by John Blennert in Oman in 2004.
Physical characteristics: The stone is dark and weathered with patches of caliche. A few large, green pyroxene crystals visible on the surface. Fusion crust is absent. Sawn surface shows scattered large pyroxene crystals (to 4 mm) and one 10 mm × 4 mm shard of olivine. Metal (before weathering) and troilite ~20% of rock.
Petrography: Thin section shows cataclastic texture with silicates dominated by pyroxene (~90%) and ~10% Ca-plagioclase. Poikilitic minerals and textures absent. Moderate recrystallization at pyroxene grain margins. Section contains the same olivine shard as the polished hand specimen, which is enclosed by a reaction rim dominated by pyroxene. Metal is heavily weathered (80 to 100%) and troilite less so.
Geochemistry: (Y. Osawa, D. Dunlap, J. Connell, and L. Garvie, *ASU*) EMPA. Low Ca-pyroxene $Fs_{29.5\pm1.3}Wo_{2.8\pm0.6}$, FeO/MnO = 30.61, n=11; diopside, $Fs_{13.9}Wo_{43.7}$, FeO/MnO = 21.67, n=1; olivine shard $Fa_{35.6\pm0.25}$, FeO/MnO = 54.31, n=2; and plagioclase $Or_{0.36\pm0.19}Ab_{9.0\pm2.9}$, $An_{91\pm3.0}$, n= 5. Oxygen isotope replicate analyses (R. Tanaka, *OkaU*) of acid washed, bulk sample by laser fluorination gave $\delta^{17}O$ = 1.938 and 1.929, $\delta^{18}O$ = 4.077 and 4.045, and $\Delta^{17}O$ = -0.208 and -0.201.
Classification: Textures and mineralogy suggest C mesosiderite (dominated by low-Ca pyroxene) of textural type 2. Likely paired with JaH 203.
Specimens: 43.2 g and one polished thin section at *ASU*.

Jiddat al Harasis 868 (JaH 868) 19°59’7.5"N, 56°24’59"E
Al Wusta, Oman
Purchased: 2009 Jan 25
Classification: HED achondrite (Diogenite)
Physical characteristics: The small individual lacks any fusion crust and shows a brownish interior.
Petrography: The meteorite displays a cumulate texture of predominantly large orthopyroxene and calcic plagioclase crystals. Accessory minerals include augite, chromite and troilite.
Geochemistry: low-Ca pyroxene: $Fs_{30.4\pm0.2}Wo_{2.5\pm0.2}$ (range $Fs_{30.2\text{-}30.7}Wo_{2.3\text{-}2.7}$, n=13); Ca-pyroxene: $Fs_{24.9\pm2.6}Wo_{40.3\pm3.5}$ (range $Fs_{22.8\text{-}30.9}Wo_{32.9\text{-}42.7}$, n=10); calcic plagioclase: $An_{88.9\pm0.5}$ (range $An_{88.3\text{-}90.1}$, n=13)

Jiddat al Harasis 869 (JaH 869) 19°58.761’N, 56°25.093’E
Al Wusta, Oman
Found: 2011 Nov 26
Classification: Mesosiderite
Petrography: The meteorite is composed of a FeNi metal-rich portion and a brownish silicate dominated lithology. The latter consists of orthopyroxene, calcic plagioclase, minor merrillite, silica polymorph, troilite and metal (predominantly kamacite) and exhibits triple grain junctions among all phases.
Geochemistry: Low-Ca pyroxene: $Fs_{28.9}Wo_{2.6}$, FeO/MnO=28-32, calcic plagioclase: $An_{91.1\pm3.1}$ ($An_{84\text{-}96}$, n=23)

Jiddat al Harasis 875 (JaH 875) 19°32.42’N, 55°16.07’E
Zufar, Oman
Found: Jan 2013
Classification: Ordinary chondrite (H4)

History: Collected by *SQU-UWO* meteorite research team in January 2013
Physical characteristics: A 123.44g sample supplied by *SQU*, which has a mm thick, dark brown-red fusion crust present on all faces except one. This fusion crust is unique because the regmaglypts are small (<0.5 cm) causing a bumpy and rough surface. There is little alteration except for iron oxidation causing the red color. This rock has already been cut and there is a clean face already present. The sample is also magnetic.
Petrography (P. Hill, *UWO*) The majority of the chondrules are well defined with opaque rims composed of iron-nickel oxide and troilite up to 25 μm thick. Oxidization is prevalent throughout the chondrite causing an overall orange hue. Olivine is more commonly oxidized than the low-Ca pyroxene. A majority of the chondrules are porphyritic olivine-pyroxene but porphyritic olivine and porphyritic pyroxene chondrules also make up significant portion. Radial pyroxene, barred olivine, cryptocrystalline and granular chondrules are present. Generally, the chondrules are less than 500 μm but there are a few chondrules that reach up to 750 μm wide; these are primarily radial pyroxene chondrules. A single Al-rich chondrule was observed, composed primarily of feldspar (predominately albite) but has an euhedral, rectangular inclusion of spinel within it. There is evidence of minor deformation. The matrix is predominately dark due to large amounts of metal, but there is a large recrystallized component within the matrix. Secondary feldspar is common throughout the thin section. A minor amount of Ca-apatite is also present as irregular, anhedral inclusions within chondrules. The Fe-Ni oxides have a network texture, whereas the troilite is present primarily as inclusions within the chondrules and Fe-Ni oxide. EDS revealed isolated grains of euhedral chromite with some possible vanadium and titanium substitution present. All of the Fe-Ni metal has been oxidized within the thin section; there is little evidence of weathering of silicate minerals besides minor sulfate veins. Weathering category W3, shock stage S1.
Geochemistry: Mineral composition and geochemistry (M. Beauchamp, P. Hill, *UWO*) Olivine, $Fa_{17.4\pm0.18}$ (n=29, PMD Fa=0.94); low-Ca pyroxene, $Fs_{15.4\pm0.28}Wo_{1.2\pm0.31}$ (n=14, PMD Fs=2.1). The composition of the high-Ca pyroxene is suggestive of diopside ($Fs_{5.0}Wo_{46.3}$, n=1).
Classification: Ordinary chondrite (H4, S1, W3).
Specimens: 116 g type specimen, including polished thin section, are on deposit at *SQU*.

Jiddat al Harasis 876 (JaH 876) 19°30.26'N, 55°18.47'E
Zufar, Oman
Found: Jan 2013
Classification: Ordinary chondrite (L6)
History: Collected by *SQU-UWO* meteorite research team in January 2013
Physical characteristics: Physical Characteristics: A 481.17 g sample supplied by *SQU*, which has a mm thick dark brown-black fusion crust present on 3 out of 5 faces. There are no remaglypts or contraction cracks present on the fusion crust. Lichen has grown on a portion of the fusion crust and one surface of this chondrite has fractured off and consequently been weathered by terrestrial processes. The fourth face has been cut and polished. The sample is also magnetic.
Petrography (P. Hill, *UWO*) All of the chondrules are poorly defined and >90% lack opaque rims. A majority of coarse grains are olivine and pyroxene. Amongst the coarse olivine and pyroxene grains, there are two large (~2 mm diameter), fragmented radial pyroxene and granular chondrules present. The size of these chondrules is indicative of L or LL group. The mesostasis of RP chondrules is completely recrystallized into anhedral grains of olivine. There is strong evidence of deformation as seen by the high degree of chondrule fragmentation and cratering of the chondrules edges. The matrix has been completely recrystallized with secondary feldspar grains exceeding 50 μm and occurring frequently throughout the thin section. Large grains (~100 μm) of Ca-apatite are also observed between the grains of olivine and pyroxene in a porphyritic chondrule. The Fe-Ni oxides are primarily present as a network texture but coarse irregular grains of oxide are present throughout the thin section. Troilite is present primarily as inclusions within the chondrules and Fe-Ni oxide but many aggregates of oxide and troilite reach up to 100 μm in size. Pentlandite is also present as minor inclusions. Chromite is present as small inclusions within albite rich clasts. All of the Fe-Ni metal has been oxidized within the thin section but there is little

evidence of weathering of silicate minerals besides iron oxidization. Weathering category is W3, shock stage is S4.
Geochemistry: Mineral composition and geochemistry (M. Beauchamp, P. Hill, *UWO*) Olivine, $Fa_{24.7\pm0.88}$ (n=30, PMD Fa=1.7); low-Ca pyroxene, $Fs_{20.8\pm1.00}Wo_{1.5\pm0.25}$ (n=15, PMD Fs=2.4).
Classification: Ordinary chondrite (L6, S4, W3).
Specimens: 1488 g type specimen, including polished thin section, are on deposit at *SQU*.

Jiddat al Harasis 877 (JaH 877) 19°35.73'N, 55°30.16'E
Al Wusta, Oman
Found: January 2013
Classification: Ordinary chondrite (H5)
History: Collected by *SQU-UWO* meteorite research team in January 2013
Physical characteristics: Physical Characteristics: A 626.56 g sample supplied by *SQU*, which has a mm thick, dark brown-black fusion crust present on five out of six faces of the rock. Regmaglypts are infrequent and the surface is fairly smooth. Minor contraction cracks but there are larger cracks due to terrestrial weathering. On the faces covered with a fusion crust, weathering is isolated to rust spots and alteration minerals within fractures of the rock. The face without fusion crust is strongly weathered with large amounts of the iron oxide alteration and terrestrial alteration minerals present on this face. The sample is also magnetic.
Petrography (P. Hill, *UWO*) Many of the chondrules in this chondrite are poorly delineated due to the coarse grained nature of the chondrites' recrystallized matrix. A majority of the chondrules are porphyritic and primarily comprised of olivine; however, low-Ca pyroxene is also abundant. Remnants of radial pyroxene and granular chondrules are present but primarily as fragments. Barred olivine chondrules were observed. The chondrite has undergone a fairly high degree of deformation. In addition to thin fractures that have been infilled with secondary alteration phases, there are few large fractures cutting across the chondrite. The matrix has been completely recrystallized with secondary feldspar common throughout. Secondary feldspar is primarily albite, but Ca and Mg substitution is also observed. Iron-nickel oxides make a series of thin networks throughout the thin section. Troilite is present primarily as anhedral blebs and inclusions that are cut by Fe-Ni oxide. All of the Fe-Ni metal has been oxidized within this thin section but there is little evidence for the weathering of silicates. Weathering category W3 category, shock stage S3.
Geochemistry: Mineral composition and geochemistry (M. Beauchamp, P. Hill, *UWO*) Olivine, $Fa_{18.2\pm0.28}$ (n=28, PMD Fa=1.2); low-Ca pyroxene, $Fs_{16.1\pm0.47}Wo_{1.4\pm0.22}$ (n=15, PMD Fs=2.3).
Classification: Ordinary chondrite (H5, S3, W3).
Specimens: 694 g type specimen, including polished thin section, are on deposit at *SQU*.

Jinju 35°16.8'N, 128°7.4E
Gyeongsangnam-do, South Korea
Fell: 2014 Mar 9
Classification: Ordinary chondrite (H5)
History: A fireball was observed in many places in Korea on 2014 Mar 9, 20:04 (local time) and recorded by numerous car-dashboard cameras. The fireball traveled more than 100 km and disappeared above Gyeonsangnam-do, Jinju area. Many people heard the sonic boom. The next morning a farmer in Jinju found a 9 kg stone at the bottom of his paprika farm (plastic greenhouse). The stone made a hole in the roof of the greenhouse. The second (4.1 kg), third (0.4 kg) and fourth (20.5 kg) stones were found in next few days within 5 km of the first meteorite, bringing the total recovered mass to 34 kg. The stones were brought to either *Seoul-NU* or *KOPRI*, in which they were examined and confirmed as chondrites by Byeon-Gak Choi (*Seoul-NU*) and Jong Ik Lee (*KOPRI*)
Physical characteristics: Four stones are almost completely covered with dark-black fusion crust: their interiors are fresh-looking gray with shiny metal. In the third and fourth stones, found after rain in the area, rusty discoloration is visible along or just beneath the fusion crust.

Petrography: Four stones are identical in their petrological characteristics. The rocks consist of olivine, orthopyroxene, plagioclase, diopside, Fe-Ni metal, troilite and minor amount of chromite and apatite. Excluding porous space, vol.% of Fe-Ni metal is ~7.6 and troilite ~3.5. No fine-grained matrix minerals exist. Minerals are chemically equilibrated. Chondrule-matrix integration varies: some chondrules are poorly delineated, while there are many chondrules with sharp edges. Average chondrule size is ~0.57 mm in diameter (n = 225).
Geochemistry: Olivine $Fa_{18.29\pm0.17}$ (n = 24); orthpyroxene $Fs_{16.18\pm0.19}Wo_{1.34\pm0.21}$ (n = 24); plagioclase $An_{12.48\pm0.57}$ (n = 12); chromite Fe/Fe+Mg = 0.83, Cr/(Cr+Al) = 0.86 in atomic ratio.
Classification: Ordinary chondrite, H5
Specimens: 312 g and a few thin sections are in *Seoul-NU* and *KOPRI* as type specimens.

Kerman 001 30°30.1'N, 58°24.2'E
Kerman, Iran
Found: 2013 Dec 8
Classification: Ordinary chondrite (H5)
History: Mr. Reza Eslami Fetrat, a frequent traveler to the Lut desert, found a single large (17 kg) meteorite in the Kalout region on December 8, 2013. The meteorite was partly buried in sand. The meteorite was loaned to Hassan Mirnejad at *UTehran* for initial examination. Two pieces (21 and 20 g) were given to *UTehran* and *CEREGE* for classification and research.
Physical characteristics: A single rusted and fractured stone
Petrography: Chondrules in recyrstallized matrix. Most metal and sulfide grains are weathered. Veins filled with weathering products crisscross the meteorite.
Geochemistry: Olivine $Fa_{18.4\pm0.2}$ (n=4). Orthopyroxene $Fs_{16.4\pm0.3}Wo_{1.1\pm0.1}$ (n=4). Magnetic susceptibility log $\chi = 4.67$ (χ in 10^{-9} m^3/kg)
Classification: H5
Specimens: 20 g in *CEREGE*, 21 g *UTehran*, main mass with finder

Khawr al Fazra 005 (KaF 005) 19°17.461'N, 50°09.565'E
Ash Sharqiyah, Saudi Arabia
Found: 13 Feb 2013
Classification: Carbonaceous chondrite (CV3)
History: Found by Edwin Gnos, Beda Hofmann and Ayman Majoub during search for meteorites on small patch of desert soil between dunes on February 13, 2013.
Physical characteristics: 20 fragments, maximum size 3.5 cm, combined mass 47.68 g. No fusion crust.
Petrography: (E. Gnos, *MHNGE* and B. Hofmann, *NMBE*) The meteorite consists of up to 2.0 mm sized, glass-containing chondrules (average size 0.95±0.35 mm n=42, maximum size 1.65 mm) constituting approx. 35 vol%, fine-grained convoluted CAIs (0.25- 6.0 mm; approx. 5 vol%), and dark matrix (approx. 60 vol%). Magnetite is abundant, troilite very rare. All fragments are partially covered by soil-derived gypsum.
Geochemistry: (N. Greber, *Bern*) Olivine compositions are $Fa_{0.3\text{-}59.5}$, median $Fa_{32.5}$ (n=10), pyroxene compositions are $Fs_{0.6\text{-}0.9}Wo_{1.0\text{-}44.3}$, median $Fs_{0.7}Wo_{4.0}$ (n=11). Oxygen isotopes: (R. Greenwood, *OU*) gave $\delta^{18}O = 1.77$, $\delta^{17}O = -2.89$, $\Delta^{17}O = -3.81$ (all permil).
Classification: CV3 based on petrography, matrix abundance, mean chondrule size, presence of large CAIs and oxygen isotopes.
Specimens: 15.78 g and one polished thin section at *MHNGE*. Remaining material at *SGS*.

Khawr al Fazra 006 (KaF 006) 19°38.041'N, 50°40.066'E
Ash Sharqiyah, Saudi Arabia
Found: 15 Feb 2013
Classification: Carbonaceous chondrite (CK6)

History: Found by Saud Nasir Al Tamimi during search for meteorites on small patch of desert soil between dunes on Feb. 15, 2013.
Physical characteristics: Dark greenish grey individual of 59.0 g, with minor remaining fusion crust. Cemented dune sand attached.
Petrography: Chondrules (average size 0.87±0.32 mm, n=30, maximum size 1.7 mm) are abundant but poorly delineated in a strongly recrystallized matrix with an average grain size of 50 μm. Feldspar is typically >50 μm in size. Abundant magnetite, sulfides largely weathered. Shock grade S2.
Geochemistry: (N. Greber, *Bern*) chondrule olivine compositions are $Fa_{25.8\text{-}28.3}$, median $Fa_{26.4}$ (n=28), pyroxene compositions are $Fs_{20.4\text{-}25.4}Wo_{0.6\text{-}6.9}$, median $Fs_{23.3}Wo_{1.0}$ (n=5). Matrix olivine has a composition of $Fa_{26.4\pm0.6}$ (n=14). Oxygen isotopes: (R. Greenwood, *OU*) gave $\delta^{18}O$=0.98, $\delta^{17}O$=-3.46, $\Delta^{17}O$= -3.97 (all per mil).
Classification: Based on chondrule size, homogeneous silicate composition and matrix plagioclase size, the meteorite is classified as a CK6 carbonaceous chondrite.
Specimens: 12.1 g and one polished thin section at *MHNGE*. Remaining material at *SGS*.

Khawr al Fazra 008 (KaF 008) 19°26.244'N, 50°48.638'E
Ash Sharqiyah, Saudi Arabia
Found: 15 Feb 2013
Classification: Carbonaceous chondrite (CO3)
History: Found by Edwin Gnos, Beda Hofmann, Ayman Majoub during search for meteorites on small patch of desert soil between dunes on February 15, 2013.
Physical characteristics: Dark brown, wind-polished fragment of 1.15 g.
Petrography: Chondrules (average size 0.21±0.13mm, n=79, maximum size 0.92 mm) constitute approx. 30 % in fine grained matrix (approx. 70%). Abundant iron sulfides (pyrrhotite and pentlandite) and magnetite. Metal droplets in chondrules and matrix. Matrix impregnated by iron hydroxides from terrestrial alteration.
Geochemistry: (N. Greber, *Bern*) Olivine compositions are $Fa_{0.9\text{-}54.5}$, median $Fa_{1.4}$ (n=23), clinopyroxene compositions are $Fs_{0.6\text{-}38.6}Wo_{0.8\text{-}3.2}$, median $Fs_{13.7}Wo_{1.6}$ (n=11) with some diopside $Fs_{1.2\text{-}3.2.6}Wo_{50.9\text{-}53.0}$ (n=3). Oxygen isotopes (R. Greenwood, *OU*): Sample cleaned with HCl yielded $\delta^{18}O$ = -5.39, $\delta^{17}O$ = -9.47, $\Delta^{17}O$ = -6.66 (all per mil).
Classification: Based on mineral compositions, chondrule size and oxygen isotopes this is a CO3 carbonaceous chondrite.
Specimens: All material at *MHNGE*.

Khawr al Fazra 011 (KaF 011) 19°26.246'N, 50°48.647'E
Ash Sharqiyah, Saudi Arabia
Found: 15 Feb 2013
Classification: Enstatite chondrite (E5)
History: Found by Edwin Gnos, Beda Hofmann, Ayman Majoub search for meteorites on small patch of desert soil between dunes on Feb. 15, 2013.
Physical characteristics: Dark brown fragment of 0.59 g, partially sand-encrusted.
Petrography: Chondrules and chondrule fragments (average size 0.37±0.17 mm, n=12, maximum size 0.83 mm) are set in matrix of enstatite and abundant iron (hydr)oxides (alteration products). Enstatite is often idiomorphic towards (former) metal and troilite. Feldspar is typically 10-20 μm in size. No olivine present. Rare graphite. Metal and sulfides are largely weathered, rare metal grains and some troilite are preserved (W3). Shock grade S2.
Geochemistry: (N. Greber, *Bern*) pyroxene compositions are $Fs_{1.0\text{-}5.7}Wo_{0.1\text{-}0.6}$, median $Fs_{1.9}Wo_{0.3}$ (n=14).
Classification: Based on the absence of olivine, pyroxene compositions and the presence of graphite this is an enstatite chondrite.
Specimens: All material at *MHNGE*.

Khawr al Fazra 016 (KaF 016) 19°26.639'N, 50°46.952'E
Ash Sharqiyah, Saudi Arabia
Found: 15 Feb 2013
Classification: Enstatite chondrite (E5)
History: Found by Edwin Gnos, Beda Hofmann, Ayman Majoub search for meteorites on small patch of desert soil between dunes on Feb. 15, 2013.
Physical characteristics: Dark brown fragment of 1.71 g, partially sand-encrusted.
Petrography: Poorly delineated chondrules (average size 0.29±0.10 mm, n=16, maximum size 0.46 mm) are set in matrix of enstatite and abundant iron (hydr)oxides (alteration products). Enstatite is often idiomorphic towards (former) metal and troilite. Feldspar is typically 20-40 μm in size. No olivine present. Common graphite up to 100 μm. Metal and sulfides are largely weathered, troilite is only preserved as inclusions in silicates (W4). Shock grade S2.
Geochemistry: (N. Greber, *Bern*) pyroxene compositions are $Fs_{0.2\text{-}1.6}Wo_{0.3\text{-}0.4}$, median $Fs_{0.5}Wo_{0.4}$ (n=14).
Classification: Based on the absence of olivine, pyroxene compositions and the common occurrence of graphite this is an enstatite chondrite.
Specimens: All material at *MHNGE*.

Khawr al Fazra 017 (KaF 017) 19°26.640'N, 50°46.957'E
Ash Sharqiyah, Saudi Arabia
Found: 15 Feb 2013
Classification: Relict ureilite
History: Found by Edwin Gnos, Beda Hofmann, Ayman Majoub search for meteorites on small patch of desert soil between dunes on Feb. 15, 2013.
Physical characteristics: Sand-nodule of 1.71 g cemented by dark brown, magnetic, Ni-rich Fe-(hydr)oxides, containing millimeter-sized remnants of weathered meteorite.
Petrography: Polished thin section shows terrestrial quartz sand grains cemented by maghemite and Fe-hydroxides. Inclusions up to 500 μm in size consist of pyroxene and feldspar.
Geochemistry: (N. Greber, *Bern*) Ca-poor pyroxene: $Fs_{7.6\text{-}12.2}Wo_{0.6\text{-}6.5}$, median $Fs_{10.4}Wo_{1.9}$, Cr_2O_3 0.65 wt% (n=9). The sand-rich weathering rind has the following composition (XRF): Fe 23.1%, Ni 1.2%.
Classification: Based on the presence of Ni-rich weathering products and remnants of pyroxene, this is a highly weathered meteorite, pyroxene compositions indicate possible pairing with nearby found ureilite Khawr al Fazra 018.
Specimens: All material at *MHNGE*.

Khawr al Fazra 018 (KaF 018) 19°26.637'N, 50°46.956'E
Ash Sharqiyah, Saudi Arabia
Found: 15 Feb 2013
Classification: Ureilite
History: Found by Edwin Gnos, Beda Hofmann, Ayman Majoub search for meteorites on small patch of desert soil between dunes on Feb. 15, 2013.
Physical characteristics: Sand-nodule of 0.86 g cemented by dark brown magnetic, Ni-rich Fe-(hyd)oxides, with remnants of original meteorite up to 3 mm in size.
Petrography: Polished thin section shows terrestrial quartz sand grains cemented by maghemite and Fe-hydroxides. Inclusions of meteoritic remnants up to 3 mm in size consist of olivine, pyroxene, diamond platelets, traces of Fe-metal, troilite.
Geochemistry: (N. Greber, *Bern*) olivine compositions are $Fa_{5.6\text{-}19.6}$, median $Fa_{11.6}$, Cr_2O_3 0.47±0.22 wt% (n=36), Ca-poor pyroxene compositions are $Fs_{13.2\text{-}15.3}Wo_{3.3\text{-}9.1}$, Cr_2O_3 0.86-1.09 wt% (n=3), Ca-rich pyroxene compositions are $Fs_{5.3\text{-}16.4}Wo_{25.7\text{-}33.3}$, median $Fs_{9.8}Wo_{26.7}$, mean Cr_2O_3 1.46±0.56 wt% (n=8). The sand-rich weathering rind has the following composition (XRF): Fe 24.5wt%, Ni 0.7wt%.
Classification: Based on silicate compositions, high Cr content of silicates, and the presence of diamond platelets this is an ureilite.

Specimens: All material at *MHNGE*.

Khawr al Fazra 021 (KaF 021) 19°44.507'N, 50°23.408'E
Ash Sharqiyah, Saudi Arabia
Found: 15 Feb 2013
Classification: HED achondrite (Eucrite)
History: Found by Khalid al Wagdani during a search for meteorites on small patch of desert soil between dunes on February 15, 2013.
Physical characteristics: Fragment of shard-like individual, 0.73 g, without fusion crust.
Petrography: Metamorphosed breccia, consisting of plagioclase (up to 0.6 mm), pyroxene (up to 1.5 mm) displaying shock and/or exsolution lamellae. Accessories are a silica phase, ilmenite, chromite, troilite and iron metal and its alteration products.
Geochemistry: (N. Greber, *Bern*) Orthopyroxene compositions are $Fs_{55.4\text{-}60.0}Wo_{2.0\text{-}4.6}$, median $Fs_{57.8}Wo_{2.7}$ (n=14). Plagioclase compositions are $An_{87.9\text{-}89.7}Or_{0.3\text{-}0.7}$, median $An_{89.3}Wo_{0.3}$ (n=13). Bulk analysis of cut surface by XRF (wt%): Fe 13.9, Mn 0.43 (Fe/Mn 33.5).
Classification: Based on texture, mineral compositions and bulk Fe/Mn ratio this is a eucrite.
Specimens: All material at *MHNGE*.

Križevci 46°02'20"N, 16°35'23"E
Croatia
Fell: 4 Feb 2011
Classification: Ordinary chondrite (H6)
History: This meteorite was tracked as a fireball by the Croatian meteor network on the night of 4 February 2011 and found following a search of the fall area on 20 February 2011. The orbital characteristics have been determined and precise mapping of the morphology of the meteorite used to determine its disintegration characteristics in the atmosphere. The fireball was observed to fragment several times in the photographs which led to predictions of the strewn field just to the east of the town of Križevci and possibly several large pieces to be found. A search was mounted and a single stone was found.
Physical characteristics: Single stone, black fusion crust.
Petrography: (I. Lyon, *UMan*). Abundant Fe/Ni metal grains typically up to 500 μm in size. Absence of chondrules, possibly a few relicts. Silicates typically large 50-200 μm.
Geochemistry: (I. Franchi, *OU*) Oxygen isotopes, $\delta^{17}O = 2.755$, $\delta^{18}O = 3.985$, and $\Delta^{17}O = 0.683$ permil: I. Lyon, *UMan*; EPMA metal grains Ni 5.5, Co 0.5, Fe 94; Ni 49, Co 0, Fe 51 (all wt%)
Classification: K. Korlevic, I. Lyon, *UMan*; Ordinary chondrite (H6)
Specimens: 291 g, single stone. Held by K. Korlovic, *VO*.

Kumtag 014 41°57'30.4"N, 93°13'36.3"E
Xinjiang, China
Found: 5 May 2013
Classification: Ordinary chondrite (L3)
History: On 5 May 2013, a team including Bingkui Miao, Yangting Lin, Shijie Li, Deqiu Dai, Wenjie Shen, Sen Hu, Lei Kesi,Peng Wang, Yongwang Lai, Zhipeng Xia found this meteorite ~5 km west of the Kumtag sand dune.
Physical characteristics: Total mass: 693 g (only 1 piece), no fusion curst, with a gray surface
Petrography: It displays a well-developed chondritic texture with chondrules 0.3 to 1 mm in size. A variety of chondrule types is present. The matrix is opaque. Most minerals show progressive zoning.
Geochemistry: Olivine: $Fa_{26.4\pm11.6}$ (n=66); Pyroxene: $Fs_{21.8\pm7.0}Wo_{3.6\pm5.2}$ (n=57).
Classification: Ordinary chondrite (L3, S1, W2).
Specimens: About 212 g and two thin sections are deposited in *GUT*.

Kuresoi 0°18.000’S, 35°31.735’E
Nakuru County, Kenya
Fell: 27 February 2014
Classification: Ordinary chondrite (L6)
History: Around 7:30 pm, on 27 February 2014, a bright fireball followed by sonic booms was observed by residents across several Rift Valley counties of Kenya. Most reports were from Bomet, Kericho, and Nakuru counties. The event was widely reported in local newspapers, such as the February 28 edition of Nairobi Exposed. A 555 g stone landed next to a house in Kuresoi, Nakuru County, and was immediately picked up. This stone was kept indoors, which accounts for its unweathered condition despite the rainy season from March to May. Paul Ara, from the neighboring town of Kericho, purchased the stone from the anonymous owners in Kuresoi, of which 279 g was subsequently acquired by Michael Farmer.
Physical characteristics: The exterior of the half stone is covered by dull, black fusion crust to 1 mm. Red clayey soil adheres to one side of the half stone. Interior is bright white, speckled with troilite, and crisscrossed by numerous thin shock veins.
Petrography: (L. Garvie, *ASU*) Chondrules difficult to recognize and largely integrated into the matrix. There are a few recognizable BO and RP chondrules. Plagioclase up to 100 μm is abundant. Chromite grains up to 200 μm are anhedral with rounded outlines. Troilite grains to 300 μm are largely single crystals and lack shock lamellae, except where cut by thin shock veins. Fe-Ni metal occur as two grain types: the first is irregularly shaped, up to 500 μm grains of kamacite that are equigranular and polycrystalline; the second is rounded grains up to 100 μm, with tetrataenite rims and cores of dark-etching plessite or acicular kamacite. Several of the latter grains have been cleanly cut and displaced by crosscutting shock veins. Metal grains lack Neumann bands. Native copper is rare: two small (10 μm) grains associated with troilite were found. Opaque, fine-grained melt pockets and veins are common.
Geochemistry: (L. Garvie, *ASU*) Olivine $Fa_{24.9\pm0.5}$, FeO/MnO=49.1±1.9, n=14. Ca-poor pyroxene $Fs_{21.2\pm1.1}Wo_{1.5\pm0.2}$, n=10. Ca-rich pyroxene, two analyses, $Fs_{7.0}Wo_{45.9}$ and $Fs_{8.0}Wo_{44.4.}$ Feldspar $An_{10.3\pm0.2}Or_{5.1\pm0.2}$, n=4.
Classification: L6, W0. Low shock based on the lack of Neumann bands in the kamacite and shock lamellae in the troilite.
Specimens: 23.55 g and one polished mount at *ASU*. *Farmer* and Paul Ara hold the rest of the material.

Lake Los Angeles 34°38.847’N, 117°48.661’W
California, United States
Found: 2013 Nov 30
Classification: Ordinary chondrite (H6)
History: Found by Stephen Poterala while meteorite hunting at the southern edge of a sand dune.
Physical characteristics: 92 mm × 70 mm × 57 mm weathered fractured fragmented specimen with a dark brown appearance. Fractures 1 mm wide exhibit embedded terrestrial sand grands.
Petrography: Plagioclase grains are greater or equal to 50 μm across.
Geochemistry: (A. Rubin, *UCLA*) EMPA. Olivine $Fa_{18.9\pm0.4}$, n=11; low-Ca pyroxene $Fs_{16.7\pm0.2}Wo_{1.6\pm0.1}$, n=6.
Specimens: Type specimen and one thin section on deposit, *UCLA*

Lake Los Angeles (b) 34°38.430’N, 117°48.079’W
Los Angeles County, California, United States
Found: 2014 Jan 5
Classification: Ordinary chondrite (L6)
History: Found by Stephen Poterala while he was meteorite hunting along the southeastern edge of a sand dune boundary between sand dunes and interdune mud flats.
Physical characteristics: A single stone measuring 82 × 50 × 37 mm with a complete, lightly weathered fusion crust. One edge of the stone is a smooth oriented surface.

Geochemistry: (A. Rubin, *UCLA*) EMPA Olivine: $Fa_{24.7\pm0.2}$ (n=9) Low-Ca pyx: $Fs_{20.6\pm0.2}Wo_{1.5\pm0.3}$ (n=9) Ca-pyx: $Fs_{8.2}Wo_{44.3}$ (n=3)
Specimens: Type specimen, thin section on deposit, *UCLA*

Last Stand Lake 007 (LSL 007) 37°58.0758'N, 116°01.967'W
Nye County, Nevada, United States
Found: 25 Jun 2011
Classification: Ordinary chondrite (H4)
History: Meteorite was spotted by Bryan Couch by eye at about 3 m distance while meteorite hunting at Last Stand Lake (dry) with a small group of hunters.
Physical characteristics: 36 × 13 × 13 mm fragment with a dark brown appearance, slightly oriented with rollover, no apparent fractures. Exhibits both primary and secondary crust.
Petrography: (A. Rubin, *UCLA*) The rock contains some low-Ca pyroxene grains in chondrules with polysynthetic twins indicating it is type-4.
Geochemistry: Olivine $Fa_{17.6\pm0.3}$, n=10; low Ca-pyroxene $Fs_{15.7}Wo_{1.7}$, n=10.
Specimens: Type specimen, 2 thin sections and polished mount on deposit, *UCLA*

Los Vientos 051 (LoV 051) ~24°41'S, ~69°46'W
Antofagasta, Chile
Found: 2010 Sep 30
Classification: Carbonaceous chondrite (C3, ungrouped)
History: A single stone was found in the Atacama desert in September 2010 by E. Christensen and A. Serio.
Physical characteristics: A flat rusted stone with caliche on the bottom side. Cut face shows chondrules, some armored with metal and sulfides, set in a brownish matrix.
Petrography: (J. Gattacceca. *CEREGE*) Chondrules, mainly of type I, up to 2.5 mm (average diameter 940±280 μm) make up ~50% of the meteorite. Metal blebs up to 1 mm in diameter are found in and around the chondrules and in the matrix.
Geochemistry: Olivine $Fa_{13.1\pm1.4}$, PMD=8%, n=31, FeO/MnO=57.6, Cr_2O_3=0.10± 0.17 wt.%; orthopyroxene $Fs_{9.2\pm3.3}Wo_{1.1\pm0.6}$, Fs PMD=32%, n=9, FeO/MnO=38.7. Some chondrules contain plagioclase $An_{92.9}Ab_{7.1}Or_{0.1.}$ Oxygen isotopic composition (J. Gattacceca, C. Sonzogni, *CEREGE*) is $\delta^{17}O$ = -4.90 ‰, $\delta^{18}O$ = -1.24 ‰, $\Delta^{17}O$ = -4.25‰ (analysis of one acid-washed 1.5 mg bulk sample). Magnetic susceptibility log χ =5.24.
Classification: Carbonaceous chondrite. Texture and chondrule size resembles CR chondrite, however mineral composition and oxygen isotopes indicate C3-ung. Minor weathering.
Specimens: 15 g and a polished section at *CEREGE*. Main mass with Eric Christensen.

Los Vientos 073 (LoV 073) ~24°41'S, ~69°46'W
Antofagasta, Chile
Found: 2009 Dec
Classification: Ordinary chondrite (H3)
History: Found by Michael Warner in December 2009.
Physical characteristics: A single crusted stone. Cut surface reveals abundant chondrules set in a dark matrix and a 5 mm large igneous inclusion.
Petrography: Well delineated chondrules. Mean apparent chondrule size 480±200 μm (n=24).
Geochemistry: Olivine $Fa_{15.5\pm7.0}$ ($Fa_{3.1\text{-}23.1}$, PMD=37%, n=8), Cr_2O_3 0.05±0.06 wt%. Los-Ca pyroxene $Fs_{12.7\pm5.7}$ ($Fs_{1.3\text{-}17.2}$, PMD=40%, n=8). Olivine in large igneous inclusion $Fa_{16.2.}$ Magnetic susceptibility log χ =5.11 (χ in nm^3/kg).
Specimens: 6.5 g and a polished section in *CEREGE*. Main mass with Michael Warner.

Lut 002 30°17'26"N, 59°23'55"E

Kerman, Iran
Found: 2013 Feb 8
Classification: Ordinary chondrite (H4)

History: A single stone found during an expedition in the Lut desert of Iran, on sand dunes known to locals as Rig-e Yalan. A 42.3 g end piece was donated to *Cascadia* on May 1, 2013.

Physical characteristics: Physical: Cut face shows a reddish-brown to dark gray interior with numerous small chondrules and two large chondrules. Exterior is covered by a dark brown weathering patina.

Petrography: (M. Hutson and A. Ruzicka, *Cascadia*) In thin section, the specimen shows numerous small chondrules (typically <0.5 mm diameter) surrounded by a mixture of weathering products (iron oxides and calcium sulfate), troilite and finer-grained silicates. About 80-90% of the metal and sulfide have been replaced by weathering products. Devitrified glass is present in the mesostases of some chondrules.

Geochemistry: BSE imaging shows that the meteorite is equilibrated. Compositions of measured phases in the host meteorite are consistent with an H chondrite, and include olivine $Fa_{17.0\pm0.3}$ (N=10), and low-Ca pyroxene $Wo_{1.2\pm0.2}Fs_{14.9\pm0.2}En_{83.9\pm0.3}$ (N=10).

Classification: H4 chondrite based on texture and mineral chemistry.

Specimens: A 38.7 g end piece, one polished thin section, and a stub are on deposit at *Cascadia*. Mr. Maziar Nazari and Mr. Kiyan Babazadeh hold the main mass (PO Box 17665-414, Tehran, Iran).

Lut 003 30°16’21"N, 59°21’23"E
Kerman, Iran
Found: 2013 Mar 21
Classification: Ordinary chondrite (L3)

History: A single stone found during an expedition in the Lut desert of Iran, on sand dunes known to locals as Rig-e Yalan. Two pieces totalling 25.8 g were donated to *Cascadia* on May 1, 2013.

Physical characteristics: Physical: Cut face shows a medium to dark brown interior with very little visible metal or sulfide. A few lighter colored chondrules are visible in hand specimen. White secondary mineralization is visible in one fracture. Exterior is covered by a dark brown weathering patina cut across by dark-colored fractures.

Petrography: (M. Hutson and A. Ruzicka, *Cascadia*). The meteorite is heavily brecciated on the scale of individual chondrules; clearly defined chondrules are relatively rare. Finer-grained areas consist of smaller chondrule and mineral fragments. Abundant low-calcium clinopyroxene is easily observed in cross-polarized light. The meteorite is crossed by numerous weathering veins. In thin section, approximately 60-70% of the metal and troilite has been converted to weathering product. Total opaques (weathering product + troilite + rare metal) comprise between 5 to 10% of the meteorite. Diameters of 31 chondrules/chondrule fragments average 620 μm.

Geochemistry: Compositions of measured phases are variable, and include olivine $Fa_{18.7\pm8.2}$ (median $Fa_{19.7}$) (N=25), and low-Ca pyroxene $Wo_{1.1\pm0.65}Fs_{16.1\pm6.1}En_{82.8\pm6.4}$ (N=16).

Classification: A fragmental L3 chondrite is suggested by texture, mineral chemistry, chondrule size, and abundance of opaque minerals.

Specimens: Two pieces (19.0 and 3.8 g), one polished thin section, and a stub are on deposit at *Cascadia*. Mr. Maziar Nazari and Mr. Kiyan Babazadeh hold the main mass (PO Box 17665-414, Tehran, Iran).

Lut 004 30°16’23"N, 59°21’36"E
Kerman, Iran
Found: 2013 Mar 21
Classification: Ordinary chondrite (H3)

History: A single stone found during an expedition in the Lut desert of Iran, on sand dunes known to locals as Rig-e Yalan. Two pieces totalling 34.5 g were donated to *Cascadia* on May 1, 2013.

Physical characteristics: Physical: Cut face shows a medium to dark brown interior with numerous distinct chondrules. Remnant metal and sulfide is unevenly distributed in hand specimen; more weathered areas are somewhat porous. Exterior is covered by a dark brown weathering patina.
Petrography: (M. Hutson and A. Ruzicka, *Cascadia*) In thin section the specimen shows tightly packed chondrules of typical 0.2-0.5 mm diameter (average 0.4±0.2, N=69 chondrules) with only a little intervening opaque matrix. The matrix is the fine-grained matrix typical of type 3 ordinary chondrites. Metal, weathered metal, and sulfide together comprise approx. 15 vol% of the thin section. Approximately 85-95% of the metal and troilite have been replaced during weathering.
Geochemistry: BSE imaging shows that the meteorite is highly unequilibrated. Compositions of major phases show a wide spread in values, and include olivine $Fa_{21.8\pm8.7}$ (median Fa=26.4, N=44), and low-Ca pyroxene $Wo_{1.1\pm1.2}Fs_{12.7\pm10.2}En_{86.2\pm10.5}$ (N=25). A silica polymorph phase was observed in two chondrules.
Classification: H3 chondrite implied by metal content and chondrule size, estimated low subtype (<3.6) based on BSE imaging and compositional spread.
Specimens: Two pieces (31.1 and 0.2 g), one polished thin section, and a stub are on deposit at *Cascadia*. Mr. Maziar Nazari and Mr. Kiyan Babazadeh hold the main mass (PO Box 17665-414, Tehran, Iran).

Lut 005 30°14’55"N, 59°18’12"E
Kerman, Iran
Found: 2013 Feb 8
Classification: Ordinary chondrite (LL3)
History: Found during an expedition in the Lut desert of eastern Iran, on large sand dunes known to locals as Rig-e Yalan, together with 91 other pieces totaling 2142 g of possibly related meteorites on the same day in a 50 m^2 area. Multiple small pieces of a single individual totaling 39.2 g were donated to *Cascadia* on May 1, 2013.
Physical characteristics: Physical: Mainly reddish to dark gray pieces covered by weathering patinas.
Petrography: (A. Ruzicka and M. Hutson, *Cascadia*) In thin section the specimen shows tightly packed chondrules of typical 0.5-1 mm diameter with only a little intervening opaque matrix. The matrix is distinctive in containing albite crystals intergrown with Fe-rich olivine. A metal-poor igneous textured inclusion up to 8 mm across is present. Metal, weathered metal, and sulfide together compose <5 vol% of the thin section. Approximately 85-90% of the opaque minerals have been replaced during weathering.
Geochemistry: Compositions of all measured phases in the host meteorite are variable, and include olivine $Fa_{24.6\pm5.1}$ (median $Fa_{26.2}$) (N=116), low-Ca pyroxene $Wo_{1.1\pm1.1}Fs_{18.7\pm9.2}En_{80.2\pm9.4}$ (N=86), high-Ca pyroxene $Wo_{28.7\pm20.7}Fs_{2.7\pm2.0}En_{49.6\pm12.2}$ (N=8), and feldspar $Ab_{78\pm30}Or_{3\pm3}An_{19\pm31}$ (N=18).
Classification: LL3 chondrite implied by low metal content and phase composition, estimated subtype 3.7-3.8.
Specimens: 30.3 g in eight pieces, 4.4 g of smaller fragments, one polished thin section, and a stub are on deposit at *Cascadia*. Mr. Maziar Nazari and Mr. Kiyan Babazadeh hold the main mass (PO Box 17665-414, Tehran, Iran).

Lut 006 30°14’55"N, 59°18’12"E
Kerman, Iran
Found: 2013 Feb 8
Classification: Ordinary chondrite (LL3)
History: Found during an expedition in the Lut desert of Iran, on sand dunes known to locals as Rig-e Yalan, together with 91 other pieces totaling 2142 g of possibly related meteorites on the same day in a 50 m2 area. Two pieces totaling 20.1 grams and fragments totaling 0.2 g from a single individual were donated to *Cascadia* on May 1, 2013.
Physical characteristics: Physical: Cut face shows a medium to dark brown interior with numerous distinct chondrules. Only a slight amount of metal and sulfide is visible in hand specimen; more weathered areas are somewhat porous. Exterior is covered by a dark brown weathering patina.

Petrography: (M. Hutson and A. Ruzicka, *Cascadia*) In thin section the specimen shows tightly packed somewhat oblate chondrules of typical 0.5-1 mm diameter (average 0.8±0.4, N=85 chondrules) with only a little intervening opaque matrix. The matrix is distinctive in containing euhedral to subhedral albite crystals intergrown with Fe-rich olivine. Metal, weathered metal, and sulfide together comprise approx. 4.7 vol% of the thin section. Approximately 60-65% of the metal and troilite in the thin section have been replaced during weathering.
Geochemistry: Compositions of measured phases are variable, and include olivine $Fa_{23.7\pm7.0}$ (median $Fa_{26.2}$) (N=35), and low-Ca pyroxene $Wo_{2.2\pm1.3}Fs_{20.3\pm8.2}En_{77.4\pm9.5}$ (N=18).
Classification: LL3 chondrite implied by metal content and chondrule size. Paired with Lut 005 based on distinctive matrix texture, chemistry, opaque mineral abundance, overall appearance, and find location.
Specimens: 17.0 g in three pieces, 0.2 g of smaller fragments, one polished thin section, and a stub with >0.1 g of mass are on deposit at *Cascadia*. Mr. Maziar Nazari and Mr. Kiyan Babazadeh hold the main mass (PO Box 17665-414, Tehran, Iran).

Lut 007 30°14’55"N, 59°18’12"E
Kerman, Iran
Found: 2013 Feb 8
Classification: Ordinary chondrite (LL3)
History: Found during an expedition in the Lut desert of Iran, on sand dunes known to locals as Rig-e Yalan, together with 91 other pieces totaling 2142 g of possibly related meteorites on the same day in a 50 m^2 area. Two pieces totaling 28.3 g from a single individual were donated to *Cascadia* on May 1, 2013.
Physical characteristics: Physical: Cut face shows a medium to dark brown interior with numerous distinct chondrules. Only a slight amount of metal and sulfide is visible in hand specimen; more weathered areas are somewhat porous. Exterior is covered by a dark brown weathering patina.
Petrography: (M. Hutson and A. Ruzicka, *Cascadia*) In thin section the specimen shows tightly packed somewhat oblate chondrules of typical 0.5-1 mm diameter (average 0.9±0.5, N=49 chondrules) with only a little intervening opaque matrix. The matrix is distinctive in containing euhedral to subhedral albite crystals intergrown with Fe-rich olivine. Metal, weathered metal, and sulfide together comprise approx. 4.9 vol% of the thin section. Approximately 80-85% of the metal and sulfide in the thin section have been replaced during weathering.
Geochemistry: Compositions of measured phases are variable, and include olivine $Fa_{23.9\pm5.8}$ (median $Fa_{26.2}$) (N=37), and low-Ca pyroxene $Wo_{0.6\pm0.4}Fs_{18.2\pm7.8}En_{81.2\pm8.1}$ (N=18).
Classification: LL3 chondrite implied by metal content and chondrule size. Paired with Lut 005 based on distinctive matrix texture, chemistry, opaque abundance, overall appearance, and find location.
Specimens: A 20.5 g piece, one polished thin section, and a stub are on deposit at *Cascadia*. Mr. Maziar Nazari and Mr. Kiyan Babazadeh hold the main mass (PO Box 17665-414, Tehran, Iran).

Machtenstein 48°17.043’N, 11°18.810’E
Bayern, Germany
Found: 1956
Classification: Ordinary chondrite (H5)
History: Found by a landowner during farming in his field in 1956 (or some years later) near Machtenstein. Because of its unusual appearance, the stone was kept by the finder in his farm house. In 1982 the stone was given to a friend, who preserved it for several decades, until it was rediscovered and recognized as a meteorite in 2014.
Physical characteristics: Total mass 1422 g, type spec 21.7 g, one polished thin section, one polished thick section, one thick section with raw sawed surface, density 3.39±0.05 g/cm^3, fusion crust absent due to weathering.
Petrography: R. Hochleitner (*MSCM*): Size of chondrules 0.2 to 1 mm; shock stage S2, uneven darkening of olivines; recrystallized matrix is mostly hypidiomorphic, grains 0.01 to 0.5 mm, dominant matrix minerals olivine and pyroxene; feldspar grains up to 50 µm, metal; kamacite and taenite up to 50

wt% Ni, Co in kamacite 0.46±0.1. Metal (esp. kamacite) altered to goethite/limonite up to 40%. Massive veining of iron oxides in cracks is visible; the outer parts are heavily weathered, with up to 70% altered kamacite.
Geochemistry: Dominant minerals are olivine, orthopyroxene, kamacite, troilite, taenite, feldspar, olivine $Fa_{18.7}$, orthopyroxene $Fs_{16.5}Wo_{0.01}$, kamacite 7.0±0.23 wt% Ni, 0.46±0.1 wt% Co.
Classification: Ordinary chondrite, H5, S2, W2/3.
Specimens: Type specimen, one polished thin section, one polished thick section, and one EMP sample are deposited in MSC). One specimen of 11.4 g, *Heinlein*.

Mount DeWitt 12007 (DEW 12007) 77°14.153'S, 158°2.218'E
Antarctica
Found: 2013 Jan 3
Classification: Lunar meteorite
History: A single unweathered stone was found on a blue ice patch during the XXVIII PNRA expedition, 2012-2013 (in collaboration with KOREAMET). Nine additional distinct meteorites were found in the same icefield.
Physical characteristics: Fresh, oblate (7 × 3 × 3 cm) stone of 94.2 g. 7% of the external surface is covered by a dark brown vesicular fusion crust. The remaining surface shows abundant mm-sized white and pale gray clasts embedded in a dark gray fine-grained matrix.
Petrography: (A. Collareta and L. Folco, *DST-PI*) Breccia consisting of numerous crystal fragments (pyroxene, plagioclase, olivine, silica polymorphs), plagioclase-rich clasts, gabbroic clasts, impact melt particles, rare basaltic and mingled breccia clasts. Clasts are embedded in a very fine crystal-rich matrix, which contains vesicular glassy veins and agglutinates. Main minerals are plagioclase, pyroxene (pigeonite and augite), olivine, Ti-bearing chromite, Cr-bearing ulvöspinel, ilmenite, troilite, minor silica polymorphs, baddeleyite, tranquillityite, and tiny FeNi-metal grains.
Geochemistry: (M. Gemelli, M. D'Orazio, A. Collareta, *DST-PI*) Pigeonite $Fs_{42.3±10.7}Wo_{13.5±3.5}$, Fe/Mn=63±11, n=19; augite $Fs_{41.1±12.3}Wo_{28.8±4.6}$, Fe/Mn=66±9, n=14, plagioclase $An_{92.1±3.6}Ab_{7.6±3.5}Or_{0.3±0.1}$, n=13, fayalitic olivine $Fa_{90.6±2.0}$, Fe/Mn=90±2, n=4, forsteritic olivine $Fa_{41.5±6.0}$, Fe/Mn=94±2, n=3. All analyses by EPMA. Bulk Fe/Mn = 65 by HHXRF. Oxygen isotopes done by laser fluorination (A. Pack, *UGött*): $\delta^{18}O = 6.05$, $\delta^{17}O = 3.13$, $\Delta^{17}O = -0.071$ (all permil).
Classification: Lunar (mingled regolithic breccia)
Specimens: 47.5 g endcut (type specimen) at *MNA-SI*, 46.7 g endcut at *KOPRI*.

Northwest Africa 590 (NWA 590)
(Northwest Africa)
Purchased: 2000
Classification: Ordinary chondrite (H5)
History: One subrounded stone containing desert patina weighing 280 g was found and sold to Michael Cottingham in Morocco. Thomas Webb acquired the sample in November 2000.
Physical characteristics: The stone is orange and has a subrounded shape. There is no relict fusion crust remaining on the exterior. The cut face of the interior of the stone is mottled tan and dark orange and shows unweathered flakes of metal.
Petrography: (A. Love, *App*): Sample displays recrystallized chondritic texture composed of relict, well-defined chondrules and fragments with an average diameter of 459 μm (116-1826 μm) set within a crystalline matrix. Some chondrules are deformed into elongate shapes but do not share a common orientation.
Geochemistry: (A. Love, *App*) Olivine $Fa_{18.1±0.3}$, N=15; Low Ca pyroxene $Fs_{17.0±0.5}Wo_{2.2±0.7}$, N=12.
Classification: Ordinary chondrite (H5, S2, W2)
Specimens: A 20.94 g type specimen and 1 polished thin section are on deposit at *App*.

Northwest Africa 596 (NWA 596)

(Northwest Africa)
Purchased: 2000
Classification: Ordinary chondrite (H5)

History: One subrounded stone containing desert patina and weighing 136 g was found and sold to Michael Cottingham in Morocco. Thomas *Webb* acquired the sample in November, 2000.
Physical characteristics: The stone is orange and has an angular to subrounded shape. There is no relict fusion crust remaining on the exterior. The cut face of the interior of the stone is mottled tan and dark orange and shows unweathered flakes of metal.
Petrography: Description and classification (A. Love, *App*): Sample displays recrystallized chondritic texture composed of relict, well-defined chondrules and fragments with an average diameter of 495 μm (72-1787 μm) set within a crystalline matrix. Sample is crosscut by subparallel fractures. Some chondrules are deformed into elongate shapes and share a weak orientation subparallel to fracture sets.
Geochemistry: (A.Love, *App*) $Fa_{18.6\pm0.2}$, n=20; low Ca pyroxene $Fs_{16.5\pm0.2}Wo_{1.9\pm0.6}$, n=12.
Classification: Ordinary Chondrite (H5, S2, W2)
Specimens: 20.05 g and 2 polished thin sections are on deposit at *App*.

Northwest Africa 601 (NWA 601)
Northwest Africa
Purchased: 2000
Classification: Ordinary chondrite (LL6)

History: One flattened 210 g stone containing desert patina was found and sold to Michael Cottingham in Morocco. Thomas Webb acquired the sample in November of 2000.
Petrography: Description and classification (A. Love, *App*): Sample is mottled orange and displays chondritic texture composed of indistinct chondrules in recrystallized matrix. Relict chondrules have an average diameter 1484 μm, (one polysomatic barred olivine chondrule is 7.16 mm in diameter) set within a recrystallized matrix with minimally weathered, irregular-shaped grains of FeNi and FeS.
Geochemistry: (A.Love, *App*) Olivine and pyroxene nearly uniform in composition. Olivine $Fa_{28.9\pm0.5}$, n=20; low Ca pyroxene $Fs_{21.8\pm0.7}Wo_{2.5\pm0.2}$, n=10; Ca-rich pyroxene $Fs_{8.7\pm1.2}Wo_{50.2\pm0.6}$, n=5.
Classification: Ordinary Chondrite (LL6, S3, W2)
Specimens: 21.2 g and 1 polished thin section are on deposit at *App*.

Northwest Africa 618 (NWA 618)
Northwest Africa
Purchased: 2000
Classification: Ordinary chondrite (H3-5)

History: One flattened 126.1 g stone containing weathered fusion crust and desert patina was found and sold to Michael Cottingham in Morocco. Thomas Webb acquired the sample in November 2000.
Physical characteristics: Dark orangish brown desert patina covers relict fusion crust, which covers ~45% of the oriented, flattened stone. Rollover lipping and minimal bubbling are displayed on the trailing edge of the specimen.
Petrography: Description and classification (A. Love, *App*): Sample is mottled orange, crosscut by a series of subparallel arcuate fractures and fine metallic shock veins, which separate roughly parallel regions of well-defined chondrules (average diameter 433 μm) and regions which display recrystallized chondritic texture composed of indistinct chondrules in recrystallized matrix with minimally weathered, irregular-shaped grains of FeNi and FeS. The sample does not appear to be brecciated, however arcuate fractures may obscure boundaries between clasts. Regions with unequilibrated material contain some zoned olivine, twinned grains of clinoenstatite and porphyritic chondrules with turbid mesostasis. CL observations show parallel regions containing less equilibrated material and equilibrated material segregated by arcuate metallic shock veins.

Geochemistry: (A.Love, *App*) Unequilibrated regions: Olivine $Fa_{13.6\pm7.4}$ ($Fa_{2.31\text{-}25.84}$ N=24); Low Ca pyroxene $Fs_{12.9\pm4.9}$ ($Fs_{3.39\text{-}18.4}$ N=19), Equilibrated regions: Olivine $Fa_{21.1\pm0.3}$, N=12; Low Ca pyroxene $Fs_{18.1\pm0.7}$, N=7.
Classification: Based on chemistry and CL signatures this is an ordinary chondrite (H3-5, S3, W2).
Specimens: 21.05g and 2 polished thin sections are on deposit at *App*

Northwest Africa 649 (NWA 649)
(Northwest Africa)
Purchased: 2000
Classification: Ordinary chondrite (L6)
History: One stone weighing 1690 g was found in Morocco in 2000. Thomas Webb acquired 508 g of the sample from Michael Cottingham in 2000.
Physical characteristics: Stone is dark brown in color and has an oblate shape. The sample lacks fusion crust, but shows shallow regmaglypts and a dark desert patina.
Petrography: Description and classification (A. Love, *App*): Sample displays recrystallized chondritic texture composed of indistinct, chondrules (avg. diam. 1371 μm, N=11) and fragments in a recrystallized matrix. Sample contains minimally weathered FeNi and FeS metal occurring as discrete grains.
Geochemistry: (A.Love, *App*) Olivine $Fa_{24.3\pm0.8}$, n=12; low Ca pyroxene $Fs_{21.4\pm0.4}Wo_{2.4\pm0.8}$, N=10.
Classification: Ordinary Chondrite (L6 S3 W2)
Specimens: 20.17 g and 1 polished thin section are on deposit at *App*

Northwest Africa 692 (NWA 692)
(Northwest Africa)
Purchased: 2000
Classification: Ordinary chondrite (H5)
History: 1 stone weighing 478 g was purchased in Erfoud, Morocco, in 2000. Thomas Webb acquired the sample from Michael Cottingham in 2000.
Physical characteristics: Stone is brownish-orange in color and has an angular shape. The sample lacks fusion crust, but has shallow regmaglypts.
Petrography: Description and classification (Anthony Love, *App*): Sample displays recrystallized chondritic texture composed of distinct chondrules (avg. dia. 489 μm, n=62) and fragments in a recrystallized matrix.
Geochemistry: (A. Love, *App*) Olivine $Fa_{18.1\pm0.2}$, n=16; low Ca pyroxene $Fs_{16.9\pm0.1}Wo_{1.5\pm0.7}$, n=12.
Classification: Ordinary Chondrite (H5 S3 W3)
Specimens: 23.94 g and 1 polished thin section are on deposit at *App*

Northwest Africa 697 (NWA 697)
(Northwest Africa)
Purchased: 2000
Classification: Ordinary chondrite (H6)
History: One stone weighing 686 g was found in Morocco in 2000. Thomas Webb acquired the sample from Michael Cottingham in 2000.
Physical characteristics: Stone is dark brown in color and has a flattened oblate shape. The sample lacks fusion crust, but shows shallow regmaglypts.
Petrography: Description and classification (A. Love, *App*): Sample displays recrystallized chondritic texture composed of indistinct, chondrules and fragments in a recrystallized matrix. Sample contains minimally weathered Fe-Ni and FeS metal occurring as discrete grains.in a recrystallized matrix.
Geochemistry: (A. Love, *App*) Olivine $Fa_{18.7\pm0.4}$, N=14; low Ca pyroxene $Fs_{17.6\pm0.3}Wo_{2.1\pm0.9}$, N=12.
Classification: Ordinary chondrite (H6 S3 W2)
Specimens: 20.05 g and 1 polished thin section are on deposit at *App*

Northwest Africa 699 (NWA 699)
(Northwest Africa)
Purchased: 2000
Classification: Ordinary chondrite (H5)
History: 1 stone weighing 858 g was found in Morocco in 2000. Thomas *Webb* acquired the sample from Michael Cottingham in a meteorite prospector in 2000.
Physical characteristics: Stone has an orange patina and rounded to equant shape. The sample lacks fusion crust, but shows well developed regmaglypts.
Petrography: Description and classification (A. Love, *App*): Sample displays recrystallized chondritic texture composed of distinct 576 μm (mean diameter) chondrules and fragments in a recrystallized matrix. Sample contains minimally weathered Fe-Ni and FeS metal occurring as discrete grains.
Geochemistry: (A. Love, *App*) Olivine $Fa_{18.3\pm0.5}$, n=12, low Ca pyroxene $Fs_{17.0\pm0.4}Wo_{0.7\pm0.2}$, n=12.
Classification: Ordinary Chondrite (H5 S3 W2)
Specimens: 29.08 g and 1 polished thin section are on deposit at *App*

Northwest Africa 1165 (NWA 1165)
(Northwest Africa)
Purchased: 2001
Classification: Ordinary chondrite (H, melt breccia)
Petrography: The meteorite is a breccia consisting of chondritic fragments intermingled with melted and completely recrystallized lithologies. In the latter Fe-sulfide droplets are abundant. Chondritic fragments are of type H5 with plagioclase grain-sizes of about 20 μm; shock stage of those fragments is S4.

Northwest Africa 5343 (NWA 5343)
(Northwest Africa)
Purchased: 2007
Classification: Carbonaceous chondrite (CK3)
Petrography: The meteorite consists of sharply defined chondrules (all POP type and ~0.1-2 mm in diameter) set into abundant, unrecrystallized matrix. Two CAIs were found in the section studied. Compositionally unequilibrated olivine and orthopyroxene are the dominant silicates. Minor silicates are feldspar and Ca-rich pyroxene. Opaque phases include Cr-bearing magnetite and Ni-bearing pyrrhotite; FeNi metal was not detected.

Northwest Africa 5582 (NWA 5582)
(Northwest Africa)
Purchased: 2008
Classification: HED achondrite (Eucrite)
Petrography: The eucrite is a fine-grained breccia with lithic and mineral fragments set into a cataclastic matrix. Basaltic fragments dominate over melt clasts; mineral clasts are plagioclase and exsolved pyroxene. Minor phases include chromite and SiO_2 polymorphs. Pyroxene show pronounced undulatory extinction due to shock.
Geochemistry: low-Ca pyroxene: $Fs_{54.9\pm1.2}Wo_{5.2\pm1.5}$ ($Fs_{52.7\text{-}57}Wo_{3.3\text{-}8.1}$, FeO/MnO=31-37, n=16); Ca-pyroxene: $Fs_{27.9\pm2.9}Wo_{38\pm2.3}$ ($Fs_{23.2\text{-}32\text{-}4}Wo_{34.5\text{-}41.9}$, FeO/MnO=32-36, n=15); calcic plagioclase: $An_{87.8\pm0.8}$ ($An_{86.1\text{-}89.1}$, n=20)

Northwest Africa 5586 (NWA 5586)
(Northwest Africa)
Purchased: 2008
Classification: HED achondrite (Eucrite)

Petrography: Eucritic breccia composed of basaltic fragments, impact melt clasts, and mineral fragments (dominantly pyroxene and calcic plagioclase) set in a fine-grained matrix. Pyroxene has fine exsolution lamellae. Minor phases include silica polymorphs, chromite, and rare FeNi metal.
Geochemistry: low-Ca pyroxene: $Fs_{55.2\pm0.8}Wo_{5.4\pm1.6}$ ($Fs_{53.3-56.7}Wo_{2.8-8.2}$, FeO/MnO=31-35, n=14); Ca-pyroxene: $Fs_{25\pm1.2}Wo_{41.6\pm1.2}$ ($Fs_{23.1-28.1}Wo_{38.8-43.2}$, FeO/MnO=25-31, n=18); calcic plagioclase: $An_{88.7\pm2}$ ($An_{85.3-95}$, n=17)

Northwest Africa 5587 (NWA 5587)
(Northwest Africa)
Purchased: 2008
Classification: Ureilite
Petrography: The meteorite is composed of coarse-grained (up to 2 mm) olivine and pigeonite. Olivine shows reduced rims; pigeonite is compositionally zoned, i.e. Mg-rich cores and Fe-rich rims. Carbon is present as graphite.
Geochemistry: reduced olivine rims: $Fa_{6.6-14.1}$; Cr_2O_3 in olivine: about 0.5 wt%

Northwest Africa 5588 (NWA 5588)
(Northwest Africa)
Purchased: 2008
Classification: Ureilite
Petrography: The meteorite displays a typical cumulate texture of 0.5 to 1 mm olivine and orthopyroxene grains. Olivine shows characteristic reduced rims. Carbon is present as graphite.
Geochemistry: Reduced olivine rims: $Fa_{2.3-10.8}$; Cr_2O_3 in olivine: about 0.6 wt%

Northwest Africa 5943 (NWA 5943)
Tinedjad area, Morocco
Found: August 2009
Classification: Carbonaceous chondrite (CV3)
Physical characteristics: One dark stone weighing 228.9 g.
Petrography: Chondrules are abundant (60–80%), with sizes ranging from ~50 μm to 1.5 mm. Type II chondrules are scarce. Fe-diffusion is visible at borders in olivine grains in Type I chondrules. Matrix is dominated by Fe-rich olivine (up to 20 μm long). CAIs have sizes ranging from few hundred μm to several mm.
Geochemistry: Olivine in matrix $Fa_{49.5\pm3.4}$ (NiO=0.12±0.05 wt%). In Type I chondrules: olivine $Fa_{0.3-35.1}$ and Ca-poor pyroxene $Fs_{1.5\pm0.2}Wo_{0.7\pm0.5.}$

Northwest Africa 6218 (NWA 6218)
Erfoud, Morocco
Found: Apr 2010
Classification: Rumuruti chondrite (R5)
Physical characteristics: Fresh stone with well-preserved fusion crust. Chondrules are abundant (40–50%).
Petrography: Chondrules have sizes ranging from 100 μm to 2 mm. They are chemically equilibrated and often rimmed by opaque phases. Matrix is recrystallized and mainly composed of olivine, plagioclase, pyroxene, sulfides, and chromite.
Geochemistry: Olivine $Fa_{40.1\pm0.4}$ (Fe/Mn=87); Ca-poor pyroxene $Fs_{31.5\pm0.3}Wo_{1.5\pm0.8}$ (Fe/Mn=48); Ca-rich pyroxene $Fs_{13.4}Wo_{43.8}$ (Fe/Mn=37).
Classification: R5, likely paired with NWA 6220.

Northwest Africa 6220 (NWA 6220)
Erfoud, Morocco

Found: Apr 2010
Classification: Rumuruti chondrite (R5)
Physical characteristics: Three fresh fragments of a single stone with well preserved fusion crusts. Cut surfaces reveal numerous chondrules (40–50%).
Petrography: Chondrules have sizes ranging from 200 ?m to 2 mm.They are chemically equilibrated and often rimmed by opaque phases. Matrix is recrystallized and mainly composed of olivine, plagioclase, pyroxene, sulfides, and chromite.
Geochemistry: Olivine $Fa_{39.9\pm0.3}$ (Fe/Mn=83); Ca-poor pyroxene $Fs_{31.2\pm0.5}Wo_{0.3\pm0.3}$ (Fe/Mn=59); Ca-rich pyroxene $Fs_{11.7\pm0.3}Wo_{45.0\pm0.1}$ (Fe/Mn=43).
Classification: Likely paired with NWA 6218.

Northwest Africa 6432 (NWA 6432)
(Northwest Africa)
Purchased: 2009 Feb
Classification: Ordinary chondrite (L5)
History: Purchased by Blaine Reed in February 2009 from a Moroccan dealer at the Tucson Gem and Mineral Show.
Petrography: (A. Irving and S. Kuehner, *UWS*) Sparse chondrules are set in a recrystallized matrix. Minerals are olivine, orthopyroxene, augite, sodic plagioclase, chromite, altered kamacite and troilite.
Geochemistry: Olivine ($Fa_{25.3\text{-}25.4}$), orthopyroxene ($Fs_{20.3\text{-}20.4}Wo_{2.1\text{-}2.2}$), augite ($Fs_{7.1\text{-}7.2}Wo_{44.8\text{-}44.4}$).
Classification: Ordinary chondrite (L5).
Specimens: Type specimen plus one polished thick section are at *PSF*; main mass with *Reed*.

Northwest Africa 6434 (NWA 6434)
(Northwest Africa)
Purchased: 2009
Classification: H6-an
History: Purchased by B. Reed in Tucson, 2009.
Physical characteristics: Eight pieces, identical in appearance, with dark brown weathered exterior. Saw cut reveals fine-grained metal/sulfide set in a dark brown matrix, faint chondrules barely detectable.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount reveals an equilibrated ordinary chondrite texture, a few chondrules (up to 400 μm) with indistinct boundaries, plagioclase up to 100 μm. Numerous oxide veins; abundant kamacite and troilite; chromite present.
Geochemistry: (C. Agee, N. Muttik, *UNM*) Olivine $Fa_{19.2\pm0.2}$, Fe/Mn=40±2, n=7; low-Ca pyroxene $Fs_{12.3\pm0.3}Wo_{1.4\pm0.2}$, Fe/Mn=23±1, n=7; plagioclase $An_{12.3\pm0.3}Ab_{82.3\pm0.8}Or_{5.4\pm0.8}$, n=4. Fs is slightly lower than the main correlation trend for Fa vs Fs for H chondrites, thus classified as H6-an (cf. Figures).
Classification: Ordinary chondrite (H6, W3, S3)
Specimens: 20.0 g including a probe mount on deposit at *UNM*, *Reed* holds the main mass.

Northwest Africa 6469 (NWA 6469)
(Northwest Africa)
Purchased: 2010 Aug
Classification: Primitive achondrite (Lodranite)
Petrography: 85-90 vol.% coarse-grained aggregate (grain size 0.5-3 mm) of olivine and pyroxenes. The remaining material consists of fine-grained (20-200 μm) FeNi, sulfide, chromite, and pyroxene.
Geochemistry: Olivine $Fa_{10.6\pm0.2}$, n=9; augite $Fs_{3.5\pm0.2}Wo_{47.5\pm0.7}$, n=5; low-Ca pyroxene $Fs_{9.6\pm0.2}Wo_{2.1\pm0.6}$, n=5.

Northwest Africa 6699 (NWA 6699)
(Northwest Africa)
Purchased: 2011 Jan

Classification: Ordinary chondrite (L, melt rock)
Petrography: Very fine grained with some relict chondrule remnants and dispersed larger, irregular grains of stained metal. Olivine, orthopyroxene, subcalcic augite, sodic plagioclase, kamacite and troilite.
Geochemistry: Olivine $Fa_{23.5-25.6}$, orthopyroxene $Fs_{17.9-18.7}Wo_{1.8-2.8}$, subcalcic augite $Fs_{14.3-14.7}Wo_{31.6-29.6}$.
Classification: Ordinary chondrite, L melt rock. Both olivine and orthopyroxene can show some compositional variation, which may be inherited from the precursor chondritic protolith and not homogenized during the brief duration of the shock melting process.

Northwest Africa 6718 (NWA 6718)
(Northwest Africa)
Purchased: 2011 Feb
Classification: Rumuruti chondrite (R4)
Petrography: (A. Irving and S. Kuehner, *UWS*) Breccia composed of chondrite clasts and chondrules in a finer grained matrix. Portions of the specimen are unaltered, but other regions contain orange hydroxides after primary metal grains. Olivine, orthopyroxene, clinopyroxene, sodic plagioclase, Ti-chromite and altered kamacite.
Geochemistry: Olivine $Fa_{38.5-38.6}$; a few relict magnesian olivine cores ($Fa_{6.5}$, $Fa_{13.5}$); orthopyroxene $Fs_{4.9}Wo_{0.5}$, $Fs_{18.9}Wo_{1.3}$; clinopyroxene $Fs_{10.0-11.2}Wo_{45.9-45.6}$ (Cr_2O_3 = 0.7-1.1 wt.%). The orthopyroxenes analyzed include both relict magnesian cores and more ferroan rims.
Classification: R chondrite breccia, R4.

Northwest Africa 6742 (NWA 6742)
(Northwest Africa)
Purchased: 2008 Jun 22
Classification: Ordinary chondrite (LL3.7)
Petrography: (K.Metzler, *IfP*) Unbrecciated chondrite consisting of about 90 vol% chondrules, 5 vol% interchondrule sulfide/metal and 5 vol% fine-grained interchondrule matrix. It is characterized by a close-fit texture of deformed and indented chondrules. The mean apparent chondrule size is about 1.3 mm. This rock is an example of "cluster chondrites" described in Metzler (2012). Possibly paired with NWA 5205 and NWA 5421.
Geochemistry: Mineral compositions and geochemistry: Measurement of randomly chosen olivine and pyroxene grains revealed $Fa_{23.1\pm5.0}$ (4-30); n=72 and $Fs_{14.7\pm6.7}$ (3-28); n=50, respectively. Oxygen istotopes (A. Pack, *UGött*): acid-washed bulk sample analyzed by laser fluorination gave $\delta^{18}O$=6.36, $\delta^{17}O$=4.24, $\Delta^{17}O$=0.90

Northwest Africa 6939 (NWA 6939)
(Northwest Africa)
Purchased: 2011 Jun 17
Classification: Ureilite
Petrography: Coarse-grained ultramafic rock consisting of olivine and pyroxene crystals up to 5 mm. Subtle alignment of grains is visible. Reverse zoning of olivine grains with Mg-rich zones at the margins and along cracks. Metal is concentrated along grain boundaries and mostly oxidized by terrestrial weathering.

Northwest Africa 6940 (NWA 6940)
(Northwest Africa)
Purchased: 2011 Jun 17
Classification: Ordinary chondrite (L5)
Petrography: L5 chondrite clasts up to several cm with interstitial crystallized melt. The melt is clast-rich, containing mineral and small chondrite clasts. Most metal and sulfide in clasts and melt is terrestrially oxidized.

Classification: L chondritic melt breccia

Northwest Africa 7030 (NWA 7030)
(Northwest Africa)
Purchased: 2011 Oct
Classification: Ordinary chondrite (LL7)
History: Purchased by *GHupé* in October 2011 from a dealer in Zagora, Morocco.
Physical characteristics: A fresh stone (224 g) covered by black, glossy fusion crust, except at one end where the slightly stained, greenish-gray interior is visible. There are two distinct lithologies present and the minor lithology is distinctly green in color.
Petrography: (A. Irving and S. Kuehner, *UWS*) The major lithology consists of an aggregate of olivine, clinopyroxene, sodic plagioclase, chromite, troilite and taenite. A subordinate lithology is a very fresh, medium-grained, igneous-textured achondrite composed mostly of olivine and orthopyroxene with ~8 vol.% intercumulus potassium feldspar, albitic plagioclase (some with exsolved K-feldspar lamellae), clinopyroxene, and accessory taenite, troilite, chromite and kamacite. The latter lithology contains much less troilite than the major lithology.
Geochemistry: Olivine ($Fa_{29.1\text{-}29.3}$, N = 4), orthopyroxene ($Fs_{23.4\text{-}23.7}Wo_{3.7\text{-}2.8}$), clinopyroxene ($Fs_{11.6\text{-}12.6}Wo_{39.8\text{-}39.2}$), plagioclase ($An_{12.6\text{-}13.9}Or_{2.2\text{-}2.3}$). Oxygen isotopes (R. Tanaka, *OkaU*): analyses of acid-washed subsamples by laser fluorination gave (all in per mil) $\delta^{17}O$ = 4.414, 4.357, $\delta^{18}O$ = 6.235, 6.059, $\Delta^{17}O$ = 1.129, 1.164 (for a TFL slope of 0.527). Bulk composition (R. Conrey, *WSU*): analysis of clean wire-saw cutting dust representative of the entire specimen by X-ray fuorescence spectrometry gave (in wt.%) SiO_2 = 39.7, TiO_2 = 0.11, Al_2O_3 = 2.6, Cr_2O_3 = 0.56, FeO = 23.11, MnO = 0.35, MgO = 25.9, CaO = 1.92, Na_2O = 1.0, K_2O = 0.23, P_2O_5 = 0.18.
Classification: Ordinary chondrite (LL7, potassic). There are no chondrules evident in either lithology of this unusual specimen; however, its oxygen isotopic composition and bulk major element composition establish an affinity with LL chondrites. The relatively high abundance of K-feldspar in the green pyroxene-rich lithology is an anomalous feature.
Specimens: 20.1 g and one large polished thin section are at *UWB*. The remaining material is held by GHupé.

Northwest Africa 7300 (NWA 7300)
(Northwest Africa)
Found: 2009
Classification: HED achondrite (Eucrite)
Petrography: Polymict, cumulate eucrite of mostly coarse-grained basaltic clasts (up to few mm in size). Clasts has ophitic texture and consist of elongated feldspar (200–600 μm long) and granular pyroxene. Groundmass is composed of pyroxene (pigeonitic compositions with exsolution lamellae of augite), feldspar, chromite, ilmenite, and rare Fe-rich olivine.
Geochemistry: Average compositions: Ca-poor pyroxene, $Fs_{48.9\pm15.5}Wo_{2.3\pm1.6}$; pigeonite, $Fs_{53.8\pm3.2}Wo_{14.3\pm3.8}$; augite, $Fs_{32.7\pm9.2}Wo_{36.2\pm8.6}$; feldspar, $An_{90.1\pm2.3}$ ($An_{85.2–92.5}$); chromite, Cr/Cr+Al = 0.71.

Northwest Africa 7302 (NWA 7302)
Morocco
Found: 2009
Classification: Carbonaceous chondrite (CK5)
Petrography: Largely recrystallized matrix dominated by olivine and feldspar. Chondrules are poorly defined and chemically equilibrated with the host matrix. CAIs are visible to the naked eye and some of them have sizes up to few millimeters. Olivine grains in matrix contain porosity and inclusions of opaque minerals (Cr-bearing magnetite and Ni-rich sulfides).
Geochemistry: Olivine ($Fa_{34.1\pm0.3}$, NiO up to 0.40 wt%), Ca-poor pyroxene ($Fs_{27.5\pm1.3}Wo_{0.7\pm0.3}$), Ca-rich pyroxene ($Fs_{13.2\pm0.1}Wo_{47.3\pm0.2}$)

Northwest Africa 7398 (NWA 7398)
(Northwest Africa)
Purchased: 2012 Jun
Classification: HED achondrite (Diogenite, polymict)
History: Purchased by Darryl Pitt in June 2012 from a dealer in Erfoud, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fresh breccia composed mainly of diogenitic debris (from several different protoliths) with sparse basaltic eucrite clasts. There are at least three types of orthopyroxene, olivine, Al-bearing chromite, troilite, stained Ni-poor metal, exsolved pigeonite, calcic plagioclase, and silica (in eucrite clasts).
Geochemistry: Diogenitic orthopyroxene ($Fs_{21.9}Wo_{2.3}$; $Fs_{23.5}Wo_{2.7}$; $Fs_{28.5}Wo_{4.3}$; FeO/MnO = 27-31, N = 3), olivine ($Fa_{44.3}$; FeO/MnO = 51), orthopyroxene host ($Fs_{60.4\text{-}60.7}Wo_{4.4\text{-}4.3}$; FeO/MnO = 32), exsolution lamellae $Fs_{29.7\text{-}31.3}Wo_{40.1\text{-}39.7}$; FeO/MnO = 31-33).
Classification: Diogenite (polymict breccia).
Specimens: 20.2 g and one polished thin section at *UWB*. *DPitt* holds the main mass.

Northwest Africa 7470 (NWA 7470)
(Northwest Africa)
Purchased: 2009 Sep
Classification: HED achondrite (Eucrite, monomict)
History: Purchased by Andrew Abraham in September 2009 from a Moroccan dealer at the Denver Mineral Show.
Physical characteristics: A complete stone (107 g) coated by black fusion crust. The interior consists of closely packed, angular, pale-gray clasts.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental breccia composed of eucrite clasts and related crystal debris. Minerals are exsolved pigeonite, calcic plagioclase, silica polymorph, ilmenite, chromite, Ti-chromite and troilite. Some pyroxene and plagioclase is intergrown in a symplectitic texture.
Geochemistry: Host orthopyroxene ($Fs_{62.3\text{-}63.0}Wo_{2.0\text{-}2.1}$; FeO/MnO = 32-33, N = 3), clinopyroxene exsolution lamellae ($Fs_{26.6\text{-}27.6}Wo_{44.1\text{-}44.3}$; FeO/MnO = 34-36).
Classification: Eucrite (monomict breccia).
Specimens: A total of 20.8 g of material is on deposit at *UWB*. A. Abraham holds the main mass.

Northwest Africa 7541 (NWA 7541)
(Northwest Africa)
Purchased: 2010
Classification: Ordinary chondrite (L3-6)
Physical characteristics: Single angular stone of medium brown color without fusion crust. One dark melt-rock clast with a size 3.5 cm protrudes from the interior
Petrography: (K. Metzler, *IfP*) Well preserved chondrules (apparent sizes mainly between 300 and 800 µm) and metal grains set in a fine-grained clastic matrix. Several chondrules and mineral fragments show relict igneous zoning in olivine and pyroxene crystals. One chondritic clast of type L6 was observed. The large melt rock clast consists of crystallized melt, intermixed with olivine and pyroxene fragments

Northwest Africa 7634 (NWA 7634)
(Northwest Africa)
Purchased: 2012 Nov
Classification: Carbonaceous chondrite (CO3)
History: Purchased by J. Utas in November 2012 from a dealer in Zagora, Morocco.
Physical characteristics: A single stone (866 g) with ablated fusion crust on its exterior and a very fine grained, deep-brown interior.

Petrography: (A. Irving and S. Kuehner, *UWS*) Fine-grained assemblage of small, rounded and broken chondrules (maximum size 0.7 mm, but mostly much smaller), angular mineral grains and fairly abundant tiny CAIs in a dusty matrix rich in ferroan olivine with accessory kamacite, taenite and troilite. Minerals in CAI include Mg-spinel, Fe-rich spinel, perovskite, Al-rich diopside, gehlenite and monticellite.
Geochemistry: Olivine ($Fa_{1.9\text{-}66.8}$; Cr_2O_3 in ferroan olivine = 0.0.11-0.35 wt.%, mean = 0.16 wt.%, sd = 0.08 wt.%, N = 10), orthopyroxene ($Fs_{1.7\text{-}6.6}Wo_{3.0\text{-}1.1}$), diopside ($Fs_{1.6}Wo_{44.6}$; $Fs_{3.9}Wo_{51.0}$). Oxygen isotopes (K. Ziegler, *UNM*): analyses of acid-washed subsamples by laser fluorination gave, respectively, $\delta^{17}O$ = -4.886, -5.597; $\delta^{18}O$ = -5.220, -5.794; $\Delta^{17}O$ = -7.800, -8.749 (all per mil).
Classification: Carbonaceous chondrite (CO3). This specimen is unusually fine grained and unusually rich in CAI fragments. Its O isotopic composition plots down and to the left of the main field for CO chondrites on an $\delta^{18}O$ vs. $\delta^{17}O$ diagram. Its O isotopes may be anomalous or may extend the range for whole rock CO chondrites measured so far.
Specimens: A total of 27 g of material and one polished mount are on deposit at *UWB*. The main mass is held by J. and P. Utas.

Northwest Africa 7639 (NWA 7639)
(Northwest Africa)
Purchased: 2008
Classification: HED achondrite (Diogenite)
History: Purchased by Philip Mani from a Moroccan dealer in 2008.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental breccia composed mainly of large angular grains of orthopyroxene and olivine within a finer grained fragmental matrix containing the same minerals plus chromite, anorthite, clinopyroxene and troilite. Some polymineralic clasts contain olivine and plagioclase in contact with orthopyroxene, and in one there is a symplectitic intergrowth of chromite in orthopyroxene. The overall proportions of minerals are estimated to be ~80 vol.% orthopyroxene with ~15 vol.% olivine and ~5 vol.% plagioclase and others.
Geochemistry: Orthopyroxene ($Fs_{23.3\text{-}24.6}Wo_{1.8}$; FeO/MnO = 26-27), olivine ($Fa_{28.7\text{-}28.8}$; FeO/MnO = 45-48), clinopyroxene ($Fs_{7.5\text{-}8.0}Wo_{46.5\text{-}45.8}$; FeO/MnO = 16-17).
Classification: Diogenite (monomict breccia). The relative proportions of olivine and plagioclase indicate that this specimen can be termed an olivine orthopyroxenitic diogenite.
Specimens: 41.1 g of material and one polished thin section are on deposit at *UWB*. *PMani* holds the main mass.

Northwest Africa 7642 (NWA 7642)
(Northwest Africa)
Purchased: 2012 Dec
Classification: HED achondrite (Eucrite, monomict)
History: Purchased by Darryl Pitt in December 2012 from a dealer in Erfoud, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Apparently monomict breccia composed of basaltic eucrite clasts plus related crystal debris. Lithic clasts exhibit variable degree of recrystallization, with finer grained domains. Minerals are orthopyroxene, discrete subcalcic augite, pigeonite, calcic plagioclase, silica polymorph, ilmenite, troilite, Ni-free metal, and rare zircon.
Geochemistry: Orthopyroxene (core $Fs_{45.1}Wo_{1.7}$, FeO/MnO = 36; rim $Fs_{54.1\text{-}54.3}Wo_{2.7\text{-}4.3}$, FeO/MnO = 31-34), subcalcic augite ($Fs_{27.7\text{-}28.7}Wo_{39.3\text{-}36.7}$, FeO/MnO = 29-32), pigeonite ($Fs_{41.9}Wo_{21.9}$, FeO/MnO = 32).
Classification: Eucrite (monomict breccia).
Specimens: 22.3 g of material and one polished thin section are on deposit at *UWB*. *DPitt* holds the main mass.

Northwest Africa 7643 (NWA 7643)
(Northwest Africa)
Purchased: 2012 Dec

Classification: HED achondrite (Eucrite)
History: Purchased by *DPitt* in December 2012 from a dealer in Erfoud, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Relatively coarse grained igneous aggregate of polycrystalline calcic plagioclase and exsolved pigeonite with accessory ilmenite and troilite. Not only has the plagioclase experienced moderate shock, the specimen is also cross-cut by dark brown, glassy shock melt veinlets.
Geochemistry: Host orthopyroxene ($Fs_{59.9\text{-}60.6}Wo_{2.1\text{-}2.4}$; FeO/MnO = 29-31), clinopyroxene exsolution lamellae ($Fs_{26.3\text{-}26.7}Wo_{42.8\text{-}42.7}$; FeO/MnO = 29).
Classification: Eucrite (unbrecciated, shocked).
Specimens: 29.1 g of material and one polished thin section are on deposit at *UWB*. *DPitt* holds the main mass.

Northwest Africa 7644 (NWA 7644)
(Northwest Africa)
Purchased: 2012 Dec
Classification: HED achondrite (Eucrite, unbrecciated)
History: Purchased by *DPitt* in December 2012 from a dealer in Erfoud, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fresh unbrecciated, coarse grained, gabbroic assemblage of exsolved pigeonite, calcic plagioclase, silica polymorph, Ti-chromite, ilmenite and troilite.
Geochemistry: Host orthopyroxene ($Fs_{57.2\text{-}57.3}Wo_{5.4}$; FeO/MnO = 29-30), clinopyroxene exsolution lamellae ($Fs_{28.5\text{-}28.9}Wo_{41.2\text{-}40.7}$; FeO/MnO = 29).
Classification: Eucrite (gabbroic, unbrecciated).
Specimens: 20.5 g of material and one polished thin section are on deposit at *UWB*. *DPitt* holds the main mass.

Northwest Africa 7645 (NWA 7645)
(Northwest Africa)
Purchased: 2012 Dec
Classification: HED achondrite (Eucrite, polymict)
History: Purchased by *DPitt* in December 2012 from a dealer in Erfoud, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Polymict fragmental breccia dominated by mineral debris with rare lithic clasts. Minerals are exsolved pigeonite, calcic plagioclase, silica polymorph, troilite, chromite, ilmenite, Ni-free metal, and sparse diogenitic orthopyroxene.
Geochemistry: Host orthopyroxene ($Fs_{59.6}Wo_{1.6}$; FeO/MnO = 31), clinopyroxene exsolution lamellae ($Fs_{24.1\text{-}26.8}Wo_{44.7\text{-}43.7}$; FeO/MnO = 28-34), diogenitic orthopyroxene ($Fs_{31.4}Wo_{1.3}$; FeO/MnO = 27).
Classification: Eucrite (polymict breccia).
Specimens: 8.7 g of material and one polished thin section are on deposit at *UWB*. *DPitt* holds the main mass.

Northwest Africa 7647 (NWA 7647)
(Northwest Africa)
Purchased: 2012 Dec
Classification: HED achondrite (Eucrite, polymict)
History: Purchased by *DPitt* in December 2012 from a dealer in Erfoud, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Polymict fragmental breccia composed mainly of eucritic crystal debris with sparse lithic eucrite clasts (recrystallized to fine grained and very fine grained aggregates). Minerals include two different types of exsolved pigeonite, calcic plagioclase, silica polymorph, fayalite, Ti-chromite, ilmenite and rare kamacite.
Geochemistry: Pigeonite 1: host orthopyroxene ($Fs_{59.3}Wo_{4.3}$; FeO/MnO = 31), clinopyroxene exsolution lamellae ($Fs_{26.6}Wo_{43.0}$; FeO/MnO = 29). Pigeonite 2: host orthopyroxene ($Fs_{38.9}Wo_{2.2}$; FeO/MnO = 31), clinopyroxene exsolution lamellae ($Fs_{14.8}Wo_{44.4}$; FeO/MnO = 25).

Classification: Eucrite (polymict breccia).
Specimens: 4.7 g of material and one polished thin section are on deposit at *UWB*. *DPitt* holds the main mass.

Northwest Africa 7660 (NWA 7660)
Morocco
Purchased: Oct 2011
Classification: Ordinary chondrite (LL, melt rock)
Petrography: (C.A. Lorenz, *Vernad*) The meteorite is fine- to medium-grained with a poikilitic, partly recrystallized texture. The rock is dominated by olivine and orthopyroxene, with minor feldspar and numerous inclusions of FeNi metal, troilite and pentlandite. Accessory phases are clinopyroxene and Ca-phosphate.
Geochemistry: (N.N. Kononkova, *Vernad*): olivine $Fa_{30.7}$ (Fe/Mn = 96); pyroxene $Fs_{25.1}$ $Wo_{3.6}$ (Fe/Mn = 55); feldspar $Ab_{73.0}An_{24.7}$; FeNi metal Ni = 66.43, Co = 1.97 (all in wt%). Oxygen isotopic composition by laser fluorination (I.A. Franchi, *OU*) $\delta^{17}O = 3.874$; $\delta^{18}O = 4.964$, $\Delta^{17}O = 1.293$ (all per mil).
Classification: LL-melt rock is based on very fine-grained poikilitic aggregate of olivine, orthopyroxene and plagioclase 5-50 μm, which is inconsistent with typically coarser-grained LL7. Fe/Mn in olivine and pyroxene is anomalously high for LL. Ni in metal (awaruite), is similar to that in Parambu (LL5).

Northwest Africa 7665 (NWA 7665)
(Northwest Africa)
Purchased: 2012 Dec
Classification: HED achondrite (Diogenite, polymict)
History: Purchased in Temara, Morocco by Adam Aaronson in December 2012.
Petrography: (A. Irving and S. Kuehner, *UWS*) Complex breccia composed mostly of debris from several different olivine-bearing diogenite lithologies plus eucrite debris. There are several compositions of orthopyroxene and olivine present, along with exsolved pigeonite, anorthite, silica polymorph, chromite, troilite (some in symplectitic intergrowths with orthopyroxene) and stained kamacite (in composite grains up to 0.6 mm across with troilite).
Geochemistry: Orthopyroxene ($Fs_{24.6}Wo_{2.6}$; $Fs_{35.3}Wo_{3.6}$; FeO/MnO = 27), olivine ($Fa_{10.2}$; $Fa_{24.9}$; $Fa_{37.5}$; FeO/MnO = 47).
Classification: Diogenite (polymict breccia).
Specimens: 5.6 g of material and one polished thin section are on deposit at *UWB*. *Aaronson* holds the main mass.

Northwest Africa 7669 (NWA 7669)
(Northwest Africa)
Purchased: 2012 Dec
Classification: Ordinary chondrite (LL3)
History: Purchased by A. Aaronson in Temara, Morocco, in December 2012.
Petrography: (A. Irving and S. Kuehner, *UWS*) Well-developed, relatively large and closely packed chondrules. Olivine, orthopyroxene, subcalcic augite, augite, sodic plagioclase, chromite, kamacite and troilite. Chondrules are 0.5-3.0 mm, mean 2 mm, in diameter.
Geochemistry: Olivine ($Fa_{0.6-52.0}$; Cr_2O_3 in ferroan olivine = 0.03-0.27 wt.%, mean = 0.10 wt.%, sd = 0.09 wt.% , N = 7), orthopyroxene ($Fs_{0.9-9.4}Wo_{0.8-0.4}$, N = 3), subcalcic augite ($Fs_{17.9}Wo_{25.8}$), augite ($Fs_{16.6}Wo_{44.4}$).
Classification: Ordinary chondrite (LL3).
Specimens: A total of 20.2 g of material and one polished thin section are on deposit at *UWB*. *Aaronson* holds the main mass.

Northwest Africa 7670 (NWA 7670)

(Northwest Africa)
Purchased: 2012 Dec
Classification: Carbonaceous chondrite (CM2)
History: Purchased in Temara, Morocco by Adam Aaronson in August 2012.
Physical characteristics: Exceptionally fresh, black specimen (18.9 g) with thin vesicular fusion crust.
Petrography: (A. Irving and S. Kuehner, *UWS*) Composed of separated, small chondrules (0.2 to 0.5 mm), zoned angular olivine grains and sporadic fine-grained CAIs in a black, fine-grained matrix containing cronstedtite, pentlandite, chromite, and schreibersite. Merrillite was found in one chondrule. Minerals identified in small CAI include hibonite with perovskite (mantled by andradite and diopside), spinel with forsterite, and rare tiny grains of ruthenium (possibly refractory metal grains from CAI) were identified by EDX.
Geochemistry: Olivine ($Fa_{0.9\text{-}52.8}$), orthopyroxene ($Fs_{1.0}Wo_{3.1}$), subcalcic augite ($Fs_{1.7}Wo_{37.6}$).
Classification: Carbonaceous chondrite (CM2).
Specimens: A total of 20.2 g of material and one polished thin section are on deposit at *UWB*. *Aaronson* holds the main mass.

Northwest Africa 7672 (NWA 7672)
(Northwest Africa)
Purchased: 2013 Feb
Classification: HED achondrite (Diogenite)
History: Purchased by *GHupé* in February 2013 from a dealer at the Tucson Gem and Mineral Show.
Petrography: (A. Irving and S. Kuehner, *UWS*) Cataclastic texture; pyroxene exhibits undulose extinction. Composed predominantly of orthopyroxene with accessory clinopyroxene, anorthite, chromite, Ni-free metal, and troilite.
Geochemistry: Orthopyroxene ($Fs_{33.5\text{-}33.8}Wo_{2.9\text{-}2.8}$; FeO/MnO = 30-32), clinopyroxene ($Fs_{13.9\text{-}14.0}Wo_{43.7\pm0.0}$; FeO/MnO = 23-24).
Classification: Diogenite.
Specimens: A total of 7.3 g of material and one polished thin section are on deposit at *UWB*. *Aaronson* holds the main mass.

Northwest Africa 7673 (NWA 7673)
(Northwest Africa)
Purchased: 2012 Dec
Classification: Ordinary chondrite (L3)
History: Purchased by Adam Aaronson in Temara, Morocco, in December 2012.
Petrography: (A. Irving and S. Kuehner, *UWS*) Well developed, closely packed, medium-sized chondrules. Olivine, orthopyroxene, subcalcic augite, augite, sodic plagioclase, chromite, altered kamacite and troilite. Chondrule diameters are 0.4-2.6 mm, mean 1.8 mm.
Geochemistry: Olivine ($Fa_{16.2\text{-}28.9}$); mean Cr_2O_3 in ferroan olivine = 0.02 wt.%, sd = 0.02 wt.%, N = 7), orthopyroxene ($Fs_{5.5\text{-}15.3}Wo_{0.3\text{-}3.2}$, N = 3), subcalcic augite ($Fs_{13.6}Wo_{35.9}$), augite ($Fs_{3.4\text{-}5.3}Wo_{40.1\text{-}44.0}$). The maximum Fa is only 28.9, so this is not an LL (despite the the presence of some large chondrules).
Classification: Ordinary chondrite (L3).
Specimens: A total of 20.6 g of material and one polished thin section are on deposit at *UWB*. *Aaronson* holds the main mass.

Northwest Africa 7676 (NWA 7676)
(Northwest Africa)
Purchased: 2012 Feb
Classification: Ordinary chondrite (LL3)
History: Purchased by E. Twelker in February 2012 from a Moroccan dealer at the Tucson Gem and Mineral Show.

Petrography: (A. Irving and S. Kuehner, *UWS*) Relatively fresh specimen composed of closely packed, well-formed chondrules (0.3-2.7 mm, mean 1.8 mm in diameter) with a relatively low content of metal (some fresh and some partially altered). Olivine, orthopyroxene, clinopyroxene, sodic plagioclase, chromite, altered kamacite and troilite.
Geochemistry: Olivine ($Fa_{0.2-89.6}$; Cr_2O_3 in ferroan olivine 0.02-0.11 wt.%, mean 0.05 wt.%, s.d. 0.03 wt.%, N = 9), orthopyroxene ($Fs_{2.4-22.1}Wo_{0.3-0.9}$, N = 3), clinopyroxene ($Fs_{3.9-8.9}Wo_{40.7-45.2}$).
Classification: Ordinary chondrite (LL3).
Specimens: A total of 30.8 g of material and one polished thin section are on deposit at *UWB. Twelker* holds the main mass.

Northwest Africa 7718 (NWA 7718)
(Northwest Africa)
Purchased: 2012 Dec
Classification: Carbonaceous chondrite (CV3)
History: Purchased in Temara, Morocco by A. Aaronson in August 2012.
Petrography: (A. Irving and S. Kuehner, *UWS*). It contains chondrule from 0.6 to 1.5 mm (some containing grains of troilite and taenite) and sparse small CAIs in a fairly uniform brown, ferroan matrix. Olivine, orthopyroxene, subcalcic augite, diopside and very rare kamacite. A CAI contains gehlenite+perovskite+spinel, and one other object consists of diopside+pleonaste+perovskite.
Geochemistry: Olivine ($Fa_{0.6-56.6}$; Cr_2O_3 in ferroan olivine = 0.05-0.47 wt.%, mean = 0.20 wt.%, sd = 0.18 wt.%, N = 8), orthopyroxene ($Fs_{0.6-1.1}Wo_{1.0}$), subcalcic augite ($Fs_{3.8}Wo_{35.2}$), diopside ($Fs_{1.1}Wo_{51.3}$).
Classification: Carbonaceous chondrite (CV3).
Specimens: A total of 26.8 g of material and one polished thin section are on deposit at *UWB. Aaronson* holds the main mass.

Northwest Africa 7719 (NWA 7719)
(Northwest Africa)
Purchased: 2012 Dec
Classification: Carbonaceous chondrite (CV3)
History: Purchased in Temara, Morocco by Adam Aaronson in August 2012.
Petrography: (A. Irving and S. Kuehner, *UWS*) Separated, chondrules (from 0.3 to 1.5 mm) and small, fine-grained CAIs in a light-brown, fine-grained ferroan matrix. Olivine, orthopyroxene, clinopyroxene are present but no metal was found. Fragments of CAI consist separately of hibonite, spinel, and andradite rimmed by clinopyroxene.
Geochemistry: Olivine ($Fa_{0.4-56.8}$; Cr_2O_3 in ferroan olivine = 0.09-0.33 wt.%, mean = 0.16 wt.%, sd = 0.09 wt.%, N = 9), orthopyroxene ($Fs_{1.2-2.6}Wo_{0.8-0.4}$), clinopyroxene ($Fs_{0.6-0.8}Wo_{44.6-41.7}$).
Classification: Carbonaceous chondrite (CV3).
Specimens: A total of 20.3 g of material and one polished thin section are on deposit at *UWB. Aaronson* holds the main mass.

Northwest Africa 7725 (NWA 7725)
(Northwest Africa)
Purchased: 2012 Dec
Classification: Ordinary chondrite (L3)
History: Purchased by A. Aaronson in Temara, Morocco, in December 2012.
Petrography: (A. Irving and S. Kuehner, *UWS*) Well developed, closely packed, medium-sized chondrules. Olivine, orthopyroxene, subcalcic augite, alkali-rich glass, altered kamacite, taenite and troilite. Chondrules diameters are 0.2-3.0 mm, mean 1.2 mm.
Geochemistry: Olivine ($Fa_{0.5-34.3}$; Cr_2O_3 in ferroan olivine = 0.04-0.37 wt.%, mean = 0.11 wt.%, sd = 0.13 wt.%, N = 7), orthopyroxene ($Fs_{1.0-24.6}Wo_{0.9-1.0}$, N = 3), subcalcic augite ($Fs_{5.4-12.5}Wo_{34.9-29.4}$). The maximum Fa is only 34.3, so this cannot be an LL (despite the presence of some large chondrules).

Classification: Ordinary chondrite (L3).
Specimens: A total of 20.1 g of material and one polished thin section are on deposit at *UWB*. *Aaronson* holds the main mass.

Northwest Africa 7726 (NWA 7726)
(Northwest Africa)
Purchased: 2012 Dec
Classification: Ordinary chondrite (L3)
History: Purchased by A. Aaronson in Temara, Morocco, in December 2012.
Petrography: (A. Irving and S. Kuehner, *UWS*) Well developed, closely packed, relatively small chondrules within a sparse matrix. Olivine, orthopyroxene, subcalcic augite, diopside, altered kamacite, taenite and troilite. Some chondrules (diameters are 0.4-1.6 mm) contain interstitial alkalic glass, and some orthopyroxene-phyric chondrules contain interstitial silica polymorph.
Geochemistry: Olivine ($Fa_{0.4\text{-}66.3}$; Cr_2O_3 in ferroan olivine = 0.09-0.23 wt.%, mean = 0.15 wt.%, sd = 0.05 wt.%, N = 7), orthopyroxene ($Fs_{4.1\text{-}20.9}Wo_{0.7\text{-}1.2}$, N = 3), subcalcic augite ($Fs_{25.4}Wo_{31.1}$), diopside ($Fs_{1.9}Wo_{46.8}$).
Classification: Ordinary chondrite (L3).
Specimens: A total of 20.8 g of material and one polished thin section are on deposit at *UWB*. *Aaronson* holds the main mass.

Northwest Africa 7727 (NWA 7727)
(Northwest Africa)
Purchased: 2012 Dec
Classification: Ordinary chondrite (L3)
History: Purchased in Temara, Morocco by Adam Aaronson in August 2012.
Petrography: (A. Irving and S. Kuehner, *UWS*) Well-developed, separated, small to medium-sized chondrules within a fine-grained ferroan matrix. Olivine, orthopyroxene, subcalcic augite, sparse troilite and rare altered kamacite. Plagioclase is apparently absent.
Geochemistry: Olivine ($Fa_{2.9\text{-}33.8}$; Cr_2O_3 in ferroan olivine = 0.02-0.09 wt.%, mean = 0.06 wt.%, sd = 0.02 wt.%, N = 7), orthopyroxene ($Fs_{2.6\text{-}22.0}Wo_{0.4\text{-}0.5}$; $Fs_{57.1}Wo_{3.0}$), subcalcic augite ($Fs_{11.8\text{-}13.6}Wo_{32.0\text{-}30.8}$).
Classification: There are no CAI and chondrule sizes are 0.5 to 2 mm, so this is an ordinary chondrite (L3).
Specimens: A total of 20.2 g of material and one polished thin section are on deposit at *UWB*. *Aaronson* holds the main mass.

Northwest Africa 7811 (NWA 7811)
(Northwest Africa)
Purchased: 2011
Classification: HED achondrite (Eucrite, polymict)
History: Purchased by J. Redelsperger in 2011 from a dealer in Agadir, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fresh fragmental breccia composed mainly of crystal debris from several different basaltic eucrite and gabbroic eucrite protoliths (with some polymineralic clasts of same), plus sparse clasts of diogenite and diogenitic orthopyroxene. Minerals include exsolved pigeonite, orthopyroxene, clinopyroxene, calcic plagioclase, silica polymorph, ilmenite, troilite, chromite, and fayalite.
Geochemistry: Diogenitic orthopyroxene ($Fs_{24.1}Wo_{1.5}$; FeO/MnO = 34), orthopyroxene ($Fs_{49.9}Wo_{2.5}$; FeO/MnO = 31), clinopyroxene ($Fs_{20.8\text{-}25.8}Wo_{45.1\text{-}44.6}$; FeO/MnO = 32-35), host orthopyroxene ($Fs_{61.6}Wo_{1.8}$; FeO/MnO = 34), clinopyroxene exsolution lamellae ($Fs_{21.6}Wo_{43.8}$; FeO/MnO = 34), olivine ($Fa_{92.7}$).
Classification: Eucrite (polymict breccia).
Specimens: 19.1 g of material and one polished thin section are on deposit at *UWB*. J. Redelsperger holds the main mass.

Northwest Africa 7813 (NWA 7813)
(Northwest Africa)
Purchased: 2013 Jan
Classification: Ordinary chondrite (L3)
History: Purchased by M. Cimala from a Moroccan dealer in January 2013.
Petrography: (A. Irving and S. Kuehner, *UWS*) Closely packed and well-formed chondrules (0.5-1.9 mm in diameter). Minerals are olivine, orthopyroxene, clinopyroxene, sodic plagioclase, altered kamacite, troilite, chromite and taenite.
Geochemistry: Olivine ($Fa_{1.8\text{-}29.5}$; Cr_2O_3 content in ferroan olivine = 0.03 ± 0.01 wt.%, N = 5), orthopyroxene ($Fs_{2.8\text{-}19.6}Wo_{0.3\text{-}1.8}$, N = 3), clinopyroxene ($Fs_{3.1\text{-}5.9}Wo_{38.7\text{-}45.7}$).
Classification: Ordinary chondrite (L3).
Specimens: A total of 24 g of material and one polished thin section are on deposit at *UWB*. M. Cimala holds the main mass.

Northwest Africa 7814 (NWA 7814)
(Northwest Africa)
Purchased: 2013 Feb
Classification: Ordinary chondrite (LL3)
History: Purchased by M. Cimala from a Moroccan dealer in February 2013.
Petrography: (A. Irving and S. Kuehner, *UWS*) Closely packed, mostly medium-sized (some larger) and well-formed chondrules (0.7-2.8 mm, mean diameter 1.7 mm). Minerals are olivine, orthopyroxene, subcalcic augite, augite, sodic plagioclase, troilite, chromite and altered kamacite.
Geochemistry: Olivine ($Fa_{0.6\text{-}51.8}$; Cr_2O_3 in ferroan olivine = 0.05-0.13 wt.%, mean 0.08 wt.%, s.d. = 0.03 wt.%, N = 8), orthopyroxene ($Fs_{0.7\text{-}21.3}Wo_{0.5\text{-}0.8}$, N = 3), subcalcic augite ($Fs_{20.1}Wo_{26.7}$), augite ($Fs_{13.8}Wo_{37.8}$).
Classification: Ordinary chondrite (LL3).
Specimens: A total of 20.1 g of material and one polished thin section are on deposit at *UWB*. M. Cimala holds the main mass.

Northwest Africa 7819 (NWA 7819)
(Northwest Africa)
Purchased: 2013 Feb
Classification: Carbonaceous chondrite (CO3)
History: Purchased by *GHupé* in February 2013 from a dealer at the Tucson Gem and Mineral Show.
Petrography: (A. Irving and S. Kuehner, *UWS*) Composed of very small, well-formed chondrules (0.2-0.7mm)and rare, small, fine grained CAIs in a deep brown, very fine grained matrix. Olivine, orthopyroxene, subcalcic augite and augite.
Geochemistry: Olivine ($Fa_{0.3\text{-}52.8}$; Cr_2O_3 in ferroan olivine = 0.09-0.15 wt.%, mean 0.11 wt.%, s.d. 0.02 wt.%, N = 7), orthopyroxene ($Fs_{0.7\text{-}1.4}Wo_{0.9\text{-}3.5}$), subcalcic augite ($Fs_{1.0}Wo_{33.7}$), augite ($Fs_{0.8\text{-}1.7}Wo_{41.7\text{-}40.1}$; $Fs_{25.4}Wo_{49.0}$).
Classification: Carbonaceous chondrite (CO3).
Specimens: A total of 20.2 g of material and one polished thin section are on deposit at *UWB*. *GHupé* holds the main mass.

Northwest Africa 7823 (NWA 7823)
(Northwest Africa)
Purchased: 2013 Feb
Classification: Ordinary chondrite (L3)
History: Purchased by M. Bandli in February 2013 from a Moroccan dealer at the Tucson Gem and Mineral Show.

Petrography: (A. Irving and S. Kuehner, *UWS*) Fairly closely packed, well formed, medium-sized chondrules (diameters range from 0.4 to 2.0 mm). Olivine, orthopyroxene, pigeonite, subcalcic augite, sodic plagioclase, chromite, troilite and altered kamacite.
Geochemistry: Olivine ($Fa_{0.3-42.9}$; Cr_2O_3 in ferroan examples 0.05-0.13 wt.%, mean 0.09 wt.%, sd 0.03 wt.%, N =7), orthopyroxene ($Fs_{1.8-24.8}Wo_{0.7-1.7}$, N = 3), pigeonite ($Fs_{24.8}Wo_{5.2}$), subcalcic augite ($Fs_{14.1}Wo_{31.2}$).
Classification: Ordinary chondrite (L3).
Specimens: A total of 20.1 g of material and one polished thin section are on deposit at *UWB*. M. Bandli holds the main mass.

Northwest Africa 7829 (NWA 7829)
(Northwest Africa)
Purchased: 2013 Mar
Classification: Rumuruti chondrite (R3)
History: Purchased in Ouarzazate, Morocco in March 2013 by M. Aid.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fresh unequilibrated specimen composed of separated, well-formed, medium-sized chondrules in a matrix relatively rich in sulfides and lacking metal. Olivine, orthopyroxene, subcalcic augite, augite, intermediate plagioclase, pentlandite, Ni-bearing troilite and Ni-free troilite. Rare sodalite occurs intergrown with olivine, subcalcic augite and chromite.
Geochemistry: Olivine ($Fa_{4.9-40.2}$), orthopyroxene ($Fs_{5.0-27.0}Wo_{0.5-1.7}$), subcalcic augite ($Fs_{13.7}Wo_{35.4}$), augite ($Fs_{10.1}Wo_{45.7}$).
Classification: R3 chondrite.
Specimens: A total of 20.1 g of material and one polished thin section are on deposit at *UWB*. M. Aid holds the main mass.

Northwest Africa 7831 (NWA 7831) 27.307°N, 12.083°W
Saguia el Hamra, Western Sahara
Found: 2013 Mar
Classification: HED achondrite (Diogenite)
History: Found buried in the ground near Chouichiyat on March 3, 2013, and excavated by a team of local people.
Physical characteristics: A single large mass (at least 20 kg) composed of yellow-green crystalline material with pale orange weathering products along numerous fractures. Much of the material disintegrated into fragments upon excavation.
Petrography: (A. Irving and S. Kuehner, *UWS*) The specimen is composed almost entirely of translucent, yellow-green orthopyroxene with very sparse, tiny included grains of Ni-free metal, troilite, chromite, anorthite, silica polymorph and clinopyroxene. Secondary pale orange, clay-like deposits from terrestrial weathering are present along thin fractures.
Geochemistry: Orthopyroxene ($Fs_{28.1-28.3}Wo_{3.0-3.3}$; FeO/MnO = 29-31), clinopyroxene ($Fs_{10.9}Wo_{43.1}$, FeO/MnO = 26). Oxygen isotopes (K. Ziegler, *UNM*): analyses of acid-washed orthopyroxene by laser fluorination gave, respectively, $\delta^{17}O$ = 1.677, 1.793, 1.810; $\delta^{18}O$ = 3.680, 3.879, 3.875; $\Delta^{17}O$ = -0.266, -0.255, -0.236 per mil.
Specimens: 44.5 g of material is on deposit at *UWB*. The remainder is held by several anonymous collectors.

Northwest Africa 7833 (NWA 7833)
(Northwest Africa)
Purchased: 2012 Jan
Classification: Ordinary chondrite (L3)
History: Purchased by S. Haddany in Rissani, Morocco in January 2012.

Petrography: (A. Irving and S. Kuehner, *UWS*) Well-formed chondrules are set in a sparse, fine grained, almost opaque matrix. Olivine, orthopyroxene, subcalcic augite, augite, sodic plagioclase, chromite, troilite and stained kamacite. Chondrule diameter range: 0.6-1.8 mm.
Geochemistry: Olivine ($Fa_{1.1-31.7}$; Cr_2O_3 in ferroan olivine 0.04-0.15 wt.%, mean 0.07 wt.%, sd 0.04 wt.%, N = 8), orthopyroxene ($Fs_{5.5-21.6}Wo_{0.3-0.8}$, N = 3), subcalcic augite ($Fs_{38.3}Wo_{29.6}$), augite ($Fs_{17.2}Wo_{40.7}$).
Classification: Ordinary chondrite (L3, shock darkened).
Specimens: A total of 20.1 g of material and one polished thin section are on deposit at *UWB*. S. Haddany holds the main mass.

Northwest Africa 7835 (NWA 7835)
(Northwest Africa)
Purchased: 2013 Nov
Classification: Ungrouped achondrite
History: Purchased by S. Ralew in November 2013 from a dealer in Zagora, Morocco.
Physical characteristics: A very fresh stone (56 g) coated in black, glossy fusion crust, which upon cutting was seen to be composed mostly of gray pyroxene and pale yellow olivine with very little metal or sulfide.
Petrography: (A. Irving and S. Kuehner, *UWS*) This specimen is composed predominantly of large grains (up to 6 mm) of olivine and compositionally-zoned orthopyroxene with minor clinopyroxene, chromite, rare taenite and troilite in a sparse, interstitial matrix of vesicular, feldspathic glass charged with angular fragments of the constituent minerals. No chondrules are present.
Geochemistry: Olivine ($Fa_{23.7-24.6}$; FeO/MnO = 57-60, N = 4), orthopyroxene ($Fs_{19.5-20.4}Wo_{1.4-1.6}$; more magnesian cores $Fs_{15.0-15.8}Wo_{0.8-0.7}$; FeO/MnO = 33-37), clinopyroxene ($Fs_{7.2}Wo_{45.0}$; FeO/MnO = 24). Oxygen isotopes (K. Ziegler, *UNM*): analyses of random multiple subsamples of the specimen (after acid washing) by laser fluorination gave (all in per mil) $\delta^{17}O$ = 3.190, 1.971, 2.309, 1.889, $\delta^{18}O$ = 5.042, 3.709, 4.044, 3.870, $\Delta^{17}O$ = 0.528, 0.013, 0.174, -0.154 (for a TFL slope of 0.528). Bulk composition (R. Conrey, *WSU*; G. Chen, *UAb*): analyses of representative, clean bulk cutting dust by X-ray fuorescence spectrometry and ICPMS gave (in wt.%) SiO_2 = 42.9, TiO_2 = 0.16, Al_2O_3 = 2.6, Cr_2O_3 = 0.45, FeO = 17.9, MnO = 0.33, MgO = 29.9, CaO = 1.7, Na_2O = 0.85, K_2O = 0.13, P_2O_5 = 0.05; (in ppm) La = 0.45, Ce = 1.23, Nd = 0.89, Sm = 0.28, Eu = 0.10, Gd = 0.37 Dy = 0.39, Er = 0.24, Yb = 0.23, Lu = 0.04, Hf = 0.31.
Classification: Ungrouped achondrite. This unusual specimen appears to have some affinities to ordinary chondrites, yet chondrules are absent and there is hardly any metal present (and no kamacite). The bulk major and trace elements are broadly chondritic, yet only one out of four subsamples analyzed for oxygen isotopes plots near the trends for any typical ordinary chondrites (namely H chondrites). However, the compositions of the mafic minerals are inconsistent with those of H chondrites and more similar to those of L chondrites. Three other oxygen isotope analyses conducted on acid-washed subsamples of this very fresh specimen plot close to the TFL. The overall texture is that of a melt-matrix fragmental breccia, which could explain the range of $\Delta^{17}O$ values, although no foreign clasts were observed in the polished section.
Specimens: 11.9 g and one large polished thin section are at *UWB*. The remaining material is held by *Ralew*.

Northwest Africa 7836 (NWA 7836)
(Northwest Africa)
Found: 2011 Jun
Classification: HED achondrite (Eucrite)
History: Found in Morocco in June 2011 and purchased by *GHupé* from a Moroccan dealer at the Tucson Gem and Mineral Show in February 2013.

Physical characteristics: A single, relatively coarse grained stone (240 g) with a weathered brownish exterior. The fresh interior consists of irregularly distributed grains of brown and black pyroxene and grayish white plagioclase.
Petrography: (A. Irving and S. Kuehner, *UWS*) Composed predominantly of fairly coarse grained, unexsolved, partially shock-darkened pigeonite and highly recrystallized anorthite (consisting of very fine polygonal subgrains) with accessory silica polymorph, troilite (some as myriad blebs in pigeonite), chromite and Ni-free metal. This specimen has experienced significantly more shock than typical eucrites (estimated at stage S5).
Geochemistry: Pigeonite ($Fs_{44.0-45.0}Wo_{11.4-12.5}$; FeO/MnO = 26-31).
Classification: Eucrite (gabbroic, shocked).
Specimens: A 26.8 g type specimen is housed at *UCLA* and a polished thin section prepared from additional material is at *UWB*. *GHupé* holds the main mass.

Northwest Africa 7890 (NWA 7890)
(Northwest Africa)
Purchased: 2013 Feb
Classification: Martian meteorite (Shergottite)
History: Purchased by A. Debienne in February 2013 from a dealer in Agadir, Morocco, then purchased entirely by *PSF*.
Physical characteristics: A single stone (5.1 g) lacking fusion crust.
Petrography: (A. Irving and S. Kuehner, *UWS*) Medium-grained (up to 3m m) ophitic assemblage of complexly zoned clinopyroxene and lath-like maskelynite with accessory ulvöspinel, ilmenite, phosphates and pyrrhotite. Ulvöspinel contains sparse melt inclusions composed of Si-rich glass with merrillite daughter crystals.
Geochemistry: Pigeonite ($Fs_{56.1-57.7}Wo_{13.7-13.5}$, FeO/MnO = 38), augite ($Fs_{24.1-39.8}Wo_{32.7-33.4}$; FeO/MnO = 28-39), plagioclase ($An_{54.0-56.6}Or_{0.9-0.8}$).
Classification: Martian (shergottite, basaltic). Paired with NWA 2975 and other stones.
Specimens: The whole stone is at *PSF*.

Northwest Africa 7911 (NWA 7911)
(Northwest Africa)
Purchased: 2002
Classification: Ordinary chondrite (L4)
History: This sample was part of a collection of unidentified NWA samples purchased by the *AMNH*.
Physical characteristics: The meteorite has a small amount of fusion crust. Some fusion crust was removed by weathering and some surfaces appear to have desert varnish.
Petrography: The meteorite has numerous sharply bound chondrules and re-crystallized matrix. Average chondrule size is ~500 μm (n=25).
Geochemistry: Olivine $Fa_{25.7\pm1.5}$, n=22; pyroxene $Fs_{19.6\pm2.6}Wo_{1.4}$, n=19.
Classification: Meteorite is an ordinary chondrite, L4. Weathering grade is W1, shock stage is S2.

Northwest Africa 7949 (NWA 7949)
(Northwest Africa)
Purchased: 2013 May
Classification: Carbonaceous chondrite (CO3)
History: Purchased by *Aaronson* in Temara, Morocco in May 2013.
Petrography: (A. Irving and S. Kuehner, *UWS*) Small (0.1-0.4 mm), well-formed chondrules plus sparse mineral fragments and fine grained, amoeboid CAI occur in a fine-grained matrix containing stained kamacite.
Geochemistry: Olivine ($Fa_{0.7-40.4}$, N = 9; Cr_2O_3 in ferroan examples is 0.06-0.11 wt.%, mean 0.08 wt.%, s.d. 0.02 wt.%, N = 7), orthopyroxene ($Fs_{1.0-3.2}Wo_{1.0-1.1}$), augite ($Fs_{1.2-1.6}Wo_{45.2-48.7}$). Oxygen isotopes (D.

Rumble, *CIW*): analyses of acid-washed subsamples gave, respectively $\delta^{17}O$ = -7.85, -6.71; $\delta^{18}O$ = -4.43, -3.43; $\Delta^{17}O$ = -5.515, -4.913 per mil.
Classification: Carbonaceous chondrite (CO3).
Specimens: 20.1 g and one polished thin section are at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 7988 (NWA 7988)
(Northwest Africa)
Purchased: 2013 Jul
Classification: Ordinary chondrite (LL6)
History: Purchased by M. Ouzillou in July 2013 from a dealer in Zagora, Morocco.
Physical characteristics: Very fresh specimen (116 g) with partial black fusion crust composed of darker gray clasts (up to 1.1 cm across) in a lighter gray matrix. Minor terrestrial staining of sulfides locally present.
Petrography: (A. Irving and S. Kuehner, *UWS*; M. Zolensky, *JSC*) Fresh, highly recrystallized breccia. A single identifiable chondrule was found within the thin section. Composed of olivine, clinopyroxene, orthopyroxene, sodic plagioclase, troilite, unaltered Ni-rich metal (taenite) and Ti-bearing chromite (rimmed by ilmenite). Troilite and Ni-rich metal commonly form composite grains, but no kamacite is present.
Geochemistry: Olivine ($Fa_{32.0-32.1}$; FeO/MnO = 60-61), orthopyroxene ($Fs_{24.1-25.5}Wo_{1.7-1.9}$), clinopyroxene ($Fs_{10.4}Wo_{43.2}$), metal (Ni 61.0 wt.%, Fe 37.1 wt.%, Co 1.0 wt.%). Oxygen isotopes (K. Ziegler, *UNM*) Analyses of acid-washed subsamples by laser fluorination gave, respectively (all in per mil) $\delta^{17}O$ = 3.765, 3.873; $\delta^{18}O$ = 4.914, 5.155; $\Delta^{17}O$ = 1.170, 1.151 (for a TFL slope of 0.528).
Classification: Ordinary chondrite (LL6). The major mineral compositions and oxygen isotopes are consistent with an LL chondrite affinity, but the complete lack of kamacite, abundance of troilite, very Ni-rich taenite, and the Ti-rich chromite + ilmenite assemblage are rare features in comparison with typical LL chondrites.
Specimens: 21 g and one polished thin section are at *UWB*. The remainder is held by Mr. M. Ouzillou.

Northwest Africa 7989 (NWA 7989)
(Northwest Africa)
Purchased: 2013 Jul
Classification: HED achondrite (Eucrite, polymict)
History: Purchased in July 2013 by Mendy Ouzillou from a dealer in Morocco.
Physical characteristics: The stone (510 g) lacks fusion crust and has a weathered, brownish exterior; the interior consists of separated white and brownish clasts in a dark matrix.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental breccia composed predominantly of gabbroic eucrite clasts with some diabasic eucrite clasts in a sparse matrix of related debris. The grain size of pyroxene and plagioclase in gabbroic clasts ranges up to 1.4 mm. Primary minerals are exsolved pigeonite (with variable red-brown staining), calcic plagioclase (polycrystalline, birefringent), silica polymorph, ilmenite, Ti-bearing chromite, troilite and Ni-free iron metal; small amounts of secondary barite and calcite terrestrial weathering products are present.
Geochemistry: Orthopyroxene host ($Fs_{60.9-62.3}Wo_{2.1-2.2}$, FeO/MnO = 29-32), clinopyroxene exsolution lamellae ($Fs_{26.9-27.5}Wo_{43.4-42.6}$, FeO/MnO = 29-30), clinopyroxene host ($Fs_{27.4}Wo_{43.3}$, FeO/MnO = 29), orthopyroxene exsolution lamella ($Fs_{63.7}Wo_{3.4}$, FeO/MnO = 35).
Classification: Eucrite (polymict, gabbroic). This material is somewhat heterogeneous, but is notable for the relatively coarse grain size of eucrite clasts, the shocked plagioclase and the variable red-brown color of pyroxene.
Specimens: 21 g of material including one polished thin section at *UWB*. The main mass is held by M. Ouzillou.

Northwest Africa 8011 (NWA 8011)

(Northwest Africa)
Purchased: 2013 Jan
Classification: Ordinary chondrite (LL, melt rock)
History: Purchased by S. Haddany in Erfoud, Morocco, in January 2013.
Physical characteristics: Fresh fine grained gray stone (160 g).
Petrography: (A. Irving and S. Kuehner, *UWS*) Unusual specimen with a relatively fine grained, apparently igneous texture, yet there are rare partial remnant chondrules present in places. Mean grain size is ~0.5 mm, but there are many randomly-oriented, prismatic olivine and pyroxene grains (some up to 1.5 mm long). Accessory minerals are troilite (exhibiting very slight staining), chromite and taenite, but kamacite is evidently absent.
Geochemistry: Olivine ($Fa_{29.2-29.4}$), orthopyroxene ($Fs_{24.5-24.6}Wo_{3.2-4.1}$), subcalcic augite ($Fs_{15.9-18.4}Wo_{31.9-27.0}$).
Classification: Ordinary chondrite (LL, melt rock). This specimen has an anomalous texture, and may represent a coarse grained melt rock related to LL chondrites.
Specimens: 20.1 g including one polished thin section at *UWB*. The remainder is held by Mr. S. Haddany.

Northwest Africa 8015 (NWA 8015)
(Northwest Africa)
Purchased: 2012 Jun
Classification: Ordinary chondrite (L5, melt breccia)
History: Purchased by F. Kuntz in June 2013 at the Ensisheim Show.
Physical characteristics: The specimen (1513 g) is composed of rounded, pale orange clasts in a black, very fine-grained matrix containing wispy grains of fresh metal.
Petrography: (A. Irving and S. Kuehner, *UWS*) This is a typical L5 melt breccia composed of about equal proportions of L5 chondrite clasts (S2, W1) and quenched (impact) melted matrix of very fine grained silicates with irregular, shred-like grains of metal.
Geochemistry: Olivine ($Fa_{24.7-25.2}$), orthopyroxene ($Fs_{20.6-20.7}Wo_{1.3-1.6}$), augite ($Fs_{7.6-7.9}Wo_{43.8-43.3}$).
Classification: Ordinary chondrite (L5 melt breccia).
Specimens: 20.1 g including one polished thick section at *UWB*. The remainder is held by *Kuntz*.

Northwest Africa 8026 (NWA 8026)
(Northwest Africa)
Purchased: 2003
Classification: Carbonaceous chondrite (CV3)
Petrography: The sample consists of relatively large chondrules and CAIs set in a fine-grained matrix. Chondrules in the section studied are up to 3500 μm in diameter, with the largest showing distinct igneous rims. A variety of textures are displayed by the chondrules, including porphyritic olivine, porphyritic olivine and pyroxene, granular, barred olivine and microcrystalline types. CAIs in the section studied are up to 4 mm in long dimension. Well-developed accretionary rims are present on both CAIs and chondrules. The amount of matrix present in the section studied is approximately 30 to 40%.
Geochemistry: The oxygen isotope composition of the sample plots close to the CCAM line and is consistent with it being a member of the CV group. $\delta^{17}O$ = -2.04‰ $\delta^{18}O$ = 2.22‰ $\Delta^{17}O$= -3.20‰.

Northwest Africa 8027 (NWA 8027)
(Northwest Africa)
Purchased: 2003
Classification: HED achondrite (Howardite)
Petrography: The sample is highly brecciated and consists of a diverse range of angular to sub-rounded gabbroic and diogenitic clasts set in a clastic, relatively coarse-grained matrix. Clast sizes vary from ~100 μm to ~2000 μm in the thin section studied and display a wide range of textures, including equigranular,

spherulitic and micro-crystalline types. The matrix consists of angular grains up to ~100 μm diameter. The matrix is dominated by angular grains of plagioclase, orthopyroxene, pigeonite and subcalcic augite. Plagioclase in the sample is in the range $An_{79-93.}$ Pyroxene in the sample is in the range $Wo_{1.1}En_{78.5}Fs_{20.4}$ to $Wo_{24.1}En_{34.8}Fs_{41.1}$ The sample contains greater than 10% magnesian orthopyroxene and is therefore a howardite based on the classification scheme of Delaney et al. (1983).
Geochemistry: The oxygen isotope composition of the sample is consistent with it being a member of the HED suite: $\delta^{17}O = 1.68‰$ $\delta^{18}O = 3.68‰$ $\Delta^{17}O = -0.23‰$

Northwest Africa 8033 (NWA 8033)
(Northwest Africa)
Purchased: 2012
Classification: Ordinary chondrite (L4)
History: Purchased by T. Boswell in 2012 from a dealer in Midelt, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Dispersed but well-formed, medium-sized chondrules and moderately abundant altered metal. Olivine, orthopyroxene (with prominent Mg-rich cores), subcalcic augite, sodic plagioclase, chromite, altered kamacite and troilite.
Geochemistry: Olivine ($Fa_{22.0-22.3}$), orthopyroxene ($Fs_{15.5}Wo_{0.6}$; prominent cores $Fs_{10.0-10.3}Wo_{0.5-0.7}$), subcalcic augite ($Fs_{5.3}Wo_{33.2}$; $Fs_{15.0}Wo_{29.7}$).
Classification: Ordinary chondrite (L4). Olivines in this specimen are equilibrated, but pyroxenes are not.
Specimens: 21.5 g and one polished thin section are at *UWB*. The remainder is held by T. Boswell.

Northwest Africa 8036 (NWA 8036)
(Northwest Africa)
Purchased: 2013 Aug
Classification: HED achondrite (Eucrite, polymict)
History: Purchased by *GHupé* in August 2013 from a dealer in Erfoud, Morocco.
Physical characteristics: A group of 21 similar stones (total weight 1612 g) exhibiting weathered exterior surfaces and interiors characterized by separated white clasts with some brown staining in a dark matrix. *GHupé* has cut every stone and carefully examined their interiors as well as exteriors; together with A. Irving it was concluded they were the same material (and the same as the type specimen)
Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental breccia composed of small gabbroic eucrite clasts and matrix of related debris, with rare clasts of diogenitic orthopyroxene. Primary minerals are exsolved pigeonite (with variable red-brown staining), calcic plagioclase (polycrystalline, birefringent), silica polymorph, ilmenite, Ti-bearing chromite and troilite; secondary barite and calcite are present.
Geochemistry: Orthopyroxene host ($Fs_{58.2}Wo_{3.9}$, FeO/MnO =30), clinopyroxene exsolution lamella ($Fs_{28.4}Wo_{41.4}$, FeO/MnO = 30), diogenitic orthopyroxene ($Fs_{17.0}Wo_{1.1}$, FeO/MnO =29; $Fs_{35.4}Wo_{1.2}$, FeO/MnO = 38).
Classification: Eucrite (polymict, gabbroic). Based on primary textures, shock features and style of weathering, these stones are likely paired with NWA 7989.
Specimens: A total of 25.2 g including one polished thin section at *UWB*. The remaining material is held by *GHupé*.

Northwest Africa 8041 (NWA 8041)
(Northwest Africa)
Purchased: 2013 Feb
Classification: Ordinary chondrite (LL3-5)
History: Purchased by E. Twelker in February 2013 from a Moroccan dealer at the Tucson Gem and Mineral Show.
Petrography: (A. Irving and S. Kuehner, *UWS*) Genomict breccia consisting of multiple related components: some large, well-formed, isolated chondrules, LL4 chondrite clasts, LL5 chondrite clasts, finely recrystallized LL7 chondrite clasts, black shock-darkened clasts, and scattered large grains (up to 3

mm) of troilite. Olivine, orthopyroxene, clinopyroxene, sodic plagioclase, altered kamacite, taenite, chromite and troilite.
Geochemistry: Olivine ($Fa_{29.6-32.1}$; rare magnesian grains $Fa_{10.9}$; Cr_2O_3 in ferroan olivine 0.03-0.06 wt.%, N = 5), orthopyroxene ($Fs_{23.7-24.9}Wo_{2.3-2.1}$; $Fs_{6.8}Wo_{0.3}$), clinopyroxene ($Fs_{10.2-11.8}Wo_{43.9-42.1}$).
Classification: Ordinary chondrite (LL3-5).
Specimens: 26.9 g and one polished thin section are at *UWB*. The remainder is held by *Twelker*.

Northwest Africa 8046 (NWA 8046)
(Northwest Africa)
Purchased: 2012 Dec
Classification: Lunar meteorite (feldspathic breccia)
History: Purchased by Michael Hankey in December 2012 from a dealer in Zagora, Morocco.
Physical characteristics: A single 47.3 g stone lacking fusion crust with visible whitish clasts.
Petrography: (A. Irving and S. Kuehner, *UWS*) Breccia consisting of numerous mineral fragments in a finer-grained matrix. Minerals are anorthite, olivine, unexsolved pigeonite, subcalcic augite, exsolved pigeonite, fayalite, silica polymorph, ilmenite and rare kamacite.
Geochemistry: Olivine ($Fa_{31.0-48.4}$, FeO/MnO = 80-97), low-Ca pyroxene ($Fs_{58.9}Wo_{4.7}$, FeO/MnO = 59), subcalcic augite ($Fs_{11.3}Wo_{26.9}$, FeO/MnO = 37), orthopyroxene host ($Fs_{53.4}Wo_{4.0}$, FeO/MnO = 53), clinopyroxene exsolution lamellae ($Fs_{27.7}Wo_{39.8}$, FeO/MnO = 52). Bulk composition (R. Korotev, *WUSL*): INAA of subsamples gave mean abundances (in wt.%) FeO 4.4, Na_2O 0.32, and (in ppm) Sc 7.9, La 1.8, Sm 0.77, Eu 0.76, Yb 0.59, Th 0.2.
Classification: Lunar (feldspathic fragmental breccia).
Specimens: 10.1 g (including a polished end-cut specimen, a slice and a polished mount) are at *UWB*. The remainder is held by Mr. M. Hankey.

Northwest Africa 8048 (NWA 8048)
(Northwest Africa)
Purchased: 2013 Aug
Classification: HED achondrite (Eucrite)
History: Purchased in August 2013 by Aras Jonikas from a dealer in Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) The specimen consists of a large fine-grained, granulitic eucrite clast with attached basaltic eucrite material. Both lithologies are composed of exsolved pigeonite and calcic plagioclase with accessory ilmenite, silica polymorph, troilite and Ni-poor metal.
Geochemistry: Pyroxene in the granulitic portion consists of exsolution lamellae of augite ($Fs_{27.3-28.2}Wo_{42.7-41.9}$; FeO/MnO = 29-32) within host orthopyroxene ($Fs_{61.5-61.9}Wo_{3.1-2.1}$; FeO/MnO = 30-31); in the coarser, ophitic material augite lamellae are $Fs_{26.7}Wo_{42.3}$ (FeO/MnO = 29) and host orthopyroxene is $Fs_{58.0}Wo_{4.3}$ (FeO/MnO = 32).
Classification: Eucrite.
Specimens: 22.2 g including a polished thick section at *UWB*. The remainder is held by Mr. A. Jonikas.

Northwest Africa 8049 (NWA 8049)
(Northwest Africa)
Purchased: 2013 Aug
Classification: Ureilite
History: Purchased in August 2013 by Aras Jonikas from a dealer in Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular aggregate of zoned olivine and pigeonite. Olivine rims are much more magnesian than cores and contain fine inclusions of iron metal.
Geochemistry: Olivine (cores $Fa_{16.0}$, Cr_2O_3 = 0.8 wt.%; rims $Fa_{2.5}$, Cr_2O_3 = 0.7 wt.%), pigeonite ($Fs_{13.0-13.4}Wo_{7.3-7.4}$).
Classification: Ureilite.
Specimens: 24.4 g including a polished thin section at *UWB*. The remainder is held by Mr. A. Jonikas.

Northwest Africa 8052 (NWA 8052)
(Northwest Africa)
Purchased: 2013 Apr
Classification: Ureilite
History: Purchased in April 2013 by Andreas Gren from a dealer in Sidi Ifni, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular aggregate of olivine and pigeonite. Olivine grains have unusually thick, dark reduced rims consisting of dispersed Fe metal plus very magnesian olivine.
Geochemistry: Olivine (cores $Fa_{23.5\text{-}23.6}$ cores, rims $Fa_{2.2}$), pigeonite ($Fs_{19.3\text{-}19.4}Wo_{7.3\text{-}7.9}$).
Classification: Ureilite.
Specimens: 21 g including a polished thick section at *UWB*. The remainder is held by *Gren*.

Northwest Africa 8055 (NWA 8055)
(Northwest Africa)
Purchased: 2013 Sep
Classification: Lunar meteorite (feldspathic breccia)
History: Purportedly found near Boujdour and purchased in Agadir, Morocco, by Adam Aaronson in September 2013.
Physical characteristics: A single stone (98 g) broken into three pieces that fit together. Small white clasts are visible in a dark gray matrix.
Petrography: (A. Irving and S. Kuehner, *UWS*) Breccia consisting of numerous mineral fragments and rare ophitic-textured, basalt clasts in a finer grained matrix. Minerals are anorthite, olivine, unexsolved pigeonite, subcalcic augite, augite, exsolved pigeonite, ilmenite, Ti-rich chromite, troilite, and rare kamacite and barite. Sparse clasts composed of intergrown fayalite+hedenbergite+silica polymorph are present.
Geochemistry: Olivine ($Fa_{19.8\text{-}38.8}$, FeO/MnO = 86-105), pigeonite ($Fs_{47.0}Wo_{19.6}$, FeO/MnO = 59), subcalcic augite ($Fs_{39.9}Wo_{33.2}$, FeO/MnO = 58), augite ($Fs_{52.0}Wo_{41.9}$, FeO/MnO = 74). Bulk composition (R. Korotev, *WUSL*) INAA of subsamples gave (in wt.%) FeO 5.9, Na_2O 0.42, and (in ppm) Sc 14.8, La 1.9, Sm 0.98, Eu 0.93, Yb 1.0, Th 0.2.
Classification: Lunar (feldspathic fragmental breccia).
Specimens: 19.6 g (including a polished end-cut specimen and a polished mount) are at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8056 (NWA 8056)
(Northwest Africa)
Purchased: 2013 Aug
Classification: HED achondrite (Eucrite)
History: Two very similar stones (960g, 600 g) were purchased together in Temara, Morocco, by A. Aaronson, who provided portions of both stones as type material.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental breccia composed predominantly of gabbroic eucrite clasts in a sparse matrix of related debris. Minerals are exsolved pigeonite (with variable red-brown staining), calcic plagioclase (polycrystalline, birefringent), silica polymorph, ilmenite, Ti-rich chromite, Ti-poor chromite, troilite and minor secondary barite.
Geochemistry: Orthopyroxene host ($Fs_{60.1\text{-}62.3}Wo_{3.6\text{-}1.9}$, FeO/MnO =29-31), clinopyroxene exsolution lamellae ($Fs_{26.7\text{-}27.5}Wo_{43.4\text{-}42.0}$, FeO/MnO = 27-31).
Classification: Eucrite (polymict, gabbroic). Based on primary textures, shock features and style of weathering, this material is likely paired with NWA 7989 and NWA 8036.
Specimens: A total of 20.1 g including one polished thin section at *UWB*. The remaining material is held by *Aaronson*.

Northwest Africa 8057 (NWA 8057)
(Northwest Africa)
Purchased: 2013 Sep
Classification: HED achondrite (Diogenite)
History: Purchased in September 2013 by Gary Fujihara from a dealer in Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Very fresh fragmental breccia consisting of closely-packed angular mineral clasts with very little matrix. The predominant mineral is orthopyroxene accompanied by ~10 vol.% olivine and accessory Cr-rich chromite, anorthite, Ni-free metal, silica polymorph, and sparse clasts composed of orthopyroxene+chromite symplectitic intergrowths.
Geochemistry: Orthopyroxene ($Fs_{19.6-21.3}Wo_{1.7-2.4}$; FeO/MnO = 27-29), olivine ($Fa_{24.6-25.4}$; FeO/MnO = 46).
Classification: Diogenite breccia.
Specimens: 20.1 g including a polished thin section at *UWB*. The remainder is held by Mr. G. Fujihara.

Northwest Africa 8058 (NWA 8058)
(Northwest Africa)
Purchased: 2013 Jul
Classification: Ordinary chondrite (L3)
History: Purchased by Gary Fujihara in July 2013 from a Moroccan dealer.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fairly closely packed, medium-sized (0.6-3.1 mm, mean 1.7±1.0 mm) chondrules are set in a black matrix. Minerals are olivine, orthopyroxene, subcalcic augite, augite, sodic plagioclase, chromite, stained kamacite and troilite.
Geochemistry: Olivine ($Fa_{0.7-47.5}$, N = 10; Cr_2O_3 in ferroan examples is 0.04-0.32 wt.%, mean 0.11 wt.%, s.d. 0.10 wt.%, N = 8), orthopyroxene ($Fs_{4.4-31.4}Wo_{0.4-1.9}$, N=3), subcalcic augite ($Fs_{13.1}Wo_{28.5}$; $Fs_{25.0}Wo_{36.6}$), augite ($Fs_{11.4}Wo_{41.5}$).
Classification: Ordinary chondrite (L3). Estimation of subtype is 3.4 based on histograms of Cr_2O_3 distribution in ferroan olivine given in Fig. 4 of Grossman and Brearley (2005).
Specimens: 7.2 g including one polished thin section at *UWB*. The remainder is held by G. Fujihara.

Northwest Africa 8118 (NWA 8118)
(Northwest Africa)
Purchased: 2013 Sep
Classification: Primitive achondrite (Lodranite)
History: Purchased in September 2013 by Sergey Vasiliev and Marc Jost from a dealer in Ouarzazate, Morocco.
Physical characteristics: A single breccia stone (955 g) containing prominent green clinopyroxene grains and stained kamacite.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental breccia composed of mineral clasts (up to 2.8 mm) of olivine, orthopyroxene, polysynthetically-twinned clinopyroxene, troilite, stained metal, Cr-rich chromite, rare merrillite, and some composite metal grains consisting of finely intergrown kamacite+taenite+plessite).
Geochemistry: Olivine ($Fa_{11.6-11.8}$; FeO/MnO = 22-27), orthopyroxene ($Fs_{10.4-12.0}Wo_{2.7-1.7}$; FeO/MnO = 14-15), clinopyroxene ($Fs_{4.4-5.1}Wo_{44.3-43.1}$; FeO/MnO = 10-12).
Classification: Lodranite breccia.
Specimens: 27 g including a polished thin section at *UWB*. The remainder is held jointly by Mr. S. Vasiliev and Mr. M. Jost.

Northwest Africa 8119 (NWA 8119)
(Northwest Africa)
Purchased: 2013 Feb
Classification: HED achondrite (Diogenite)

History: Purchased in February 2013 by Sergey Vasiliev and Marc Jost from a dealer in Ouarzazate, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Larger polycrystalline and smaller mineral clasts of predominantly orthopyroxene with subordinate olivine, clinopyroxene, chromite and altered metal. The specimen is stained brown as a result of terrestrial weathering of minor metal.
Geochemistry: Orthopyroxene ($Fs_{23.6-25.6}Wo_{1.9-1.3}$; FeO/MnO = 27-29), olivine ($Fa_{31.1-31.6}$; FeO/MnO = 46-47), clinopyroxene ($Fs_{9.1}Wo_{45.4}$; FeO/MnO = 20).
Classification: Diogenite.
Specimens: 24.3 g including a polished thin section at *UWB*. The remainder is held jointly by Mr. S. Vasiliev and Mr. M. Jost.

Northwest Africa 8120 (NWA 8120)
(Northwest Africa)
Purchased: 2013 Feb
Classification: HED achondrite (Eucrite)
History: Purchased in February 2013 by Sergey Vasiliev and Marc Jost from a dealer in Ouarzazate, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Monomict basaltic eucrite breccia with some cross-cutting black, glassy shock veins. Exsolved pigeonite, calcic plagioclase, silica polymorph, ilmenite, Ti-chromite, troilite and stained Ni-free metal.
Geochemistry: Orthopyroxene host ($Fs_{60.3-60.5}Wo_{1.9-2.1}$; FeO/MnO = 30-32), clinopyroxene exsolution lamellae ($Fs_{26.2-27.1}Wo_{43.4-42.7}$; FeO/MnO = 28-29).
Classification: Eucrite (monomict breccia).
Specimens: 23.4 g including a polished thin section at *UWB*. The remainder is held jointly by Mr. S. Vasiliev and Mr. M. Jost.

Northwest Africa 8121 (NWA 8121)
(Northwest Africa)
Purchased: 2013 Feb
Classification: Ordinary chondrite (L3)
History: Purchased by Sergey Vasiliev and Marc Jost in February 2013 from a dealer in Erfoud, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Well-formed, closely-packed, medium- to large-sized (0.5-5.5 mm, mean 2.2±0.6 mm) chondrules. One large genomict chondrite clast with similar characteristics was found. Minerals are olivine, orthopyroxene, subcalcic augite, augite, sodic plagioclase, chromite, altered kamacite and troilite.
Geochemistry: Olivine ($Fa_{0.4-50.4}$, N = 9; Cr_2O_3 in ferroan examples is 0.04-0.12 wt.%, mean 0.07 wt.%, s.d. 0.04 wt.%, N = 7), orthopyroxene ($Fs_{2.1-24.9}Wo_{1.0-1.6}$, N= 3), subcalcic augite ($Fs_{4.7}Wo_{37.4}$), augite ($Fs_{9.7}Wo_{42.2}$).
Classification: Ordinary chondrite L. Estimation of subtype 3.5 based on histograms of Cr_2O_3 distribution in ferroan olivine given in Fig. 4 of Grossman and Brearley (2005).
Specimens: 39.2 g including one polished thin section at *UWB*. The remainder is held jointly by S. Vasiliev and M. Jost.

Northwest Africa 8122 (NWA 8122)
(Northwest Africa)
Purchased: 2013 Feb
Classification: Ordinary chondrite (L3)
History: Purchased by Sergey Vasiliev and Marc Jost in February 2013 from a dealer in Rissani, Morocco.

Petrography: (A. Irving and S. Kuehner, *UWS*) Well-formed, medium-sized (0.6-2.3 mm, mean 1.5±0.7 mm), closely-packed chondrules in a sparse matrix. Minerals are olivine , orthopyroxene, pigeonite, subcalcic augite, sodic plagioclase, chromite, altered kamacite and troilite.
Geochemistry: Olivine ($Fa_{0.6-41.1}$, N = 9; Cr_2O_3 in ferroan examples is 0.09-0.33 wt.%, mean 0.21 wt.%, s.d. 0.09 wt.%, N = 7), orthopyroxene ($Fs_{2.8-30.5}Wo_{0.2-1.8}$, N = 3), pigeonite ($Fs_{10.4}Wo_{17.0}$), subcalcic augite ($Fs_{19.3}Wo_{28.8}$).
Classification: Ordinary chondrite L3. Estimation of subtype 3.3 based on histograms of Cr_2O_3 distribution in ferroan olivine given in Fig. 4 of Grossman and Brearley (2005).
Specimens: 20.2 g including one polished thin section at *UWB*. The remainder is held jointly by S. Vasiliev and M. Jost.

Northwest Africa 8127 (NWA 8127)
(Northwest Africa)
Purchased: 2012 Mar
Classification: Lunar meteorite (gabbro)
History: Purchased by Marc Jost in March 2012 in Brugg, Switzerland from a Moroccan dealer.
Physical characteristics: Fresh, pale green stone (529 g) with cross-cutting thin, black shock veins. Apple green clinopyroxene and glassy maskelynite grains are visible.
Petrography: (A. Irving and S. Kuehner, *UWS*) Equigranular igneous rock (mean grain size 0.8 mm) consisting of smaller grains of olivine, Ti-bearing chromite and ilmenite (with associated baddeleyite) poikilitically enclosed in clinopyroxene (some containing fine, subparallel exsolution lamellae), with interstitial anorthitic plagioclase. Most plagioclase has been converted to maskelynite, but some grains have patchy birefringence.
Geochemistry: Olivine ($Fa_{30.0-32.1}$, FeO/MnO = 90-91), pigeonite ($Fs_{21.4-25.1}Wo_{10.6-9.8}$, FeO/MnO = 46-54), subcalcic augite ($Fs_{14.5-15.4}Wo_{32.6-30.5}$, FeO/MnO = 39-42). Bulk composition (R. Korotev, *WUSL*) INAA of subsamples gave (in wt.%) FeO 18.2, Na_2O 0.11, and (in ppm) Sc 29.2, La 4.7, Sm 2.59, Eu 0.21, Yb 2.24, Th 0.56.
Classification: Lunar (olivine gabbro). This specimen is paired with NWA 6950 and the gabbroic lithology in NWA 773 and paired stones.
Specimens: 23.7 g, one polished thin section and a polished mount are at *UWB*. The main mass is held by Space Jewels Switzerland.

Northwest Africa 8129 (NWA 8129)
(Northwest Africa)
Purchased: 2013 Sep
Classification: Ordinary chondrite (H4)
History: Purchased by S. Vasiliev from a dealer in Midelt, Morocco, in September 2013.
Petrography: (A. Irving and S. Kuehner, *UWS*) Well-developed, small chondrules (0.2-1.0 mm, mean 0.6 mm) in a relatively coarse grained matrix containing ~15 vol.% stained metal.
Geochemistry: Olivine ($Fa_{15.0-15.3}$), orthopyroxene ($Fs_{13.3-14.8}Wo_{0.4-0.6}$), subcalcic augite ($Fs_{10.8}Wo_{35.5}$; $Fs_{14.1}Wo_{27.1}$).
Classification: Ordinary chondrite (H4).
Specimens: 20.1 g including one polished thin section at *UWB*. The remainder is held by S. Vasiliev.

Northwest Africa 8132 (NWA 8132)
(Northwest Africa)
Purchased: 2013 Oct
Classification: Ureilite
History: Purchased in Temara, Morocco by Adam Aaronson in October 2013.
Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular aggregate of olivine (with reduced, metal-bearing rims) and ~30 vol.% pigeonite.

Geochemistry: Olivine (cores $Fa_{15.5-15.6}$; rims $Fa_{1.9-7.1}$), pigeonite ($Fs_{12.8-13.0}Wo_{10.3-10.1}$).
Classification: Ureilite.
Specimens: 15.8 g including a polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8133 (NWA 8133)
(Northwest Africa)
Purchased: 2013 Oct
Classification: Ordinary chondrite (L3)
History: Purchased by Adam Aaronson in Temara, Morocco in October 2013.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fairly closely-packed, well-formed, medium-sized (0.3-1.6 mm, mean 1.0±0.5 mm) chondrules. Minerals are olivine, orthopyroxene, pigeonite, subcalcic augite, sodic plagioclase, altered kamacite, chromite and troilite.
Geochemistry: Olivine ($Fa_{3.9-31.4}$, N = 9; Cr_2O_3 in ferroan examples = 0.04-0.17 wt.%, mean 0.09 wt.%, sd = 0.05 wt.%, N =7), orthopyroxene ($Fs_{4.1-26.5}Wo_{0.5-3.7}$, N = 3), pigeonite ($Fs_{6.3}Wo_{8.4}$), subcalcic augite ($Fs_{4.5}Wo_{33.1}$).
Classification: Ordinary chondrite L3. Estimation of subtype 3.5 based on histograms of Cr_2O_3 distribution in ferroan olivine given in Fig. 4 of Grossman and Brearley (2005).
Specimens: 21.9 g including one polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8135 (NWA 8135)
(Northwest Africa)
Purchased: 2013 Apr
Classification: Carbonaceous chondrite (CO3)
History: Purchased by F. Kuntz in April 2013 from a dealer in Zagora, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Small chondrules, mineral fragments and fine grained CAI are set in a brown, fine grained matrix.
Geochemistry: Olivine ($Fa_{1.3-43.5}$; Cr_2O_3 in ferroan olivine = 0.07-0.13 wt.%), orthopyroxene ($Fs_{2.0-4.5}Wo_{2.0-2.6}$), subcalcic augite ($Fs_{1.1}Wo_{31.2}$), diopside ($Fs_{0.4}Wo_{49.7}$).
Classification: Carbonaceous chondrite (CO3).
Specimens: 10.35 g including one polished thin section at *PSF*; remainder with *Kuntz*.

Northwest Africa 8136 (NWA 8136)
(Northwest Africa)
Purchased: 2013 Apr
Classification: Ureilite
History: Purchased by F. Kuntz in April 2013 from a dealer in Zagora, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular assemblage of stained olivine and pigeonite; olivine grains have fairly thick, black marginal zones.
Geochemistry: Olivine (cores $Fa_{20.8-20.9}$; rims $Fa_{2.1-5.2}$), pigeonite ($Fs_{17.2-17.3}Wo_{7.6-7.4}$).
Classification: Ureilite.
Specimens: 3.51 g including one polished thin section at *PSF*; remainder with *Kuntz*.

Northwest Africa 8137 (NWA 8137)
(Northwest Africa)
Purchased: 2013 Apr
Classification: Ureilite
History: Purchased by F. Kuntz in April 2013 from a dealer in Zagora, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular assemblage of olivine and polysynthetically twinned pigeonite; reduced margins of olivine grains are accompanied by sporadic, "blobby" patches of black, metal-rich material.
Geochemistry: Olivine (cores $Fa_{16.1-16.2}$; rims $Fa_{1.9-2.7}$), pigeonite ($Fs_{13.7-14.1}Wo_{7.4-7.5}$).

Classification: Ureilite.
Specimens: 11.73 g including one polished thin section at *PSF*; remainder with *Kuntz*.

Northwest Africa 8138 (NWA 8138)
(Northwest Africa)
Purchased: 2013 Apr
Classification: Ordinary chondrite (H6)
History: Purchased by F. Kuntz in April 2013 from a dealer in Zagora, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Relatively fresh specimen containing sparse remnant chondrules and stained, holly-leaf shaped metal grains in a coarse recrystallized matrix. Minerals are olivine, orthopyroxene, augite, sodic plagioclase, chromite, kamacite and troilite.
Geochemistry: Olivine ($Fa_{18.3\text{-}18.4}$), orthopyroxene ($Fs_{16.0\text{-}16.4}Wo_{1.7\text{-}1.8}$), augite ($Fs_{5.5\text{-}5.8}Wo_{45.9\text{-}46.0}$).
Classification: Ordinary chondrite (H6).
Specimens: 14.02 g including one polished thin section at *PSF*; remainder with. *Kuntz*.

Northwest Africa 8169 (NWA 8169)
(Northwest Africa)
Purchased: Feb 2011
Classification: Ordinary chondrite (L6)
History: Purchased from a Moroccan meteorite dealer at the Tucson Gem and Mineral Show, February, 2011.
Physical characteristics: Exterior rust colored with remnant fusion crust. Sawn surface is dark. Metal and troilite to 5 mm. Gray Fe-oxide common. Locally vesicular. Recognizable chondrules are rare, but include RP and BO.
Petrography: Largely recrystallized with sparse chondrules well integrated into the matrix. Common and wide distribution of fine troilite grains. Troilite polycrystalline. Fe-Ni metal ~50% altered. Olivine extensively fractured showing weak mosaicism. Plagioclase with undulatory extinction, commonly >50 μm, some grains to 200 μm. Opaque fine-grained melt pockets and veins common.
Geochemistry: (L. Garvie, *ASU*) $Fa_{24.8\pm0.3}$, FeO/MnO=47.5±2.2, n=6; $Fs_{20.5\pm0.2}Wo_{2.0\pm0.1}$, n=4.
Classification: Ordinary chondrite, L6, S4, W3
Specimens: 39 g and one thin section at *ASU*.

Northwest Africa 8170 (NWA 8170)
Morocco
Purchased: 2013
Classification: HED achondrite (Eucrite, polymict)
History: Purchased from a dealer in Morocco in 2013 by Steve Witt and Smara Addi.
Physical characteristics: Single stone, dark weathered exterior, saw-cut reveals a breccia of light and dark gray clasts.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows a highly brecciated texture with a mix of equilibrated and unequilibrated eucrite clasts. Many pyroxenes with exsolution lamellae, but also numerous pyroxenes with igneous zoning. Some domains with fine-grained cataclastic texture, many fragmental pyroxene and plagioclase grains. Ubiquitous chromite.
Geochemistry: (C. Agee and H. Miley, *UNM*) Augite $Fs_{31.8\pm10.1}Wo_{32.7\pm8.4}$, Fe/Mn=30±2, n=8; pigeonite $Fs_{44.1\pm7.4}Wo_{9.3\pm3.8}$, Fe/Mn=32±1, n=19; low-Ca pyroxene $Fs_{41.0\pm8.3}Wo_{3.6\pm1.9}$, Fe/Mn=31±2, n=27; plagioclase $An_{90.0\pm2.0}Ab_{9.4\pm2.0}Or_{0.7\pm0.1}$, n=7.
Classification: Polymict Eucrite with at least three different eucrite lithologies: 1) unequilibrated eucrite with zoned pyroxenes, 2) cumulate eucrite, 3) basaltic eucrite.
Specimens: 18.3 g including a probe mount on deposit at *UNM*, Steve Witt holds the main mass.

Northwest Africa 8171 (NWA 8171)

(Northwest Africa)
Purchased: June 2013
Classification: Martian meteorite (basaltic breccia)

History: Purchased in June 2013 in Ensisheim, France.

Physical characteristics: Nearly completely black 81.88 g stone with remnants of fusion crust. Light-colored clasts and spheroidal objects in a brecciated matrix.

Petrography: (B. Hofmann, *NMBE*; N. Greber, *Bern*): Breccia consisting of angular mineral grains (up to 2 mm), lithic clasts (often also breccias) and spheroidal objects (1-3 mm diameter) in fine-grained matrix. Minerals observed are pyroxenes, plagioclase, alkali feldspar, magnetite, ilmenite, pyrite (partially altered to goethite).

Geochemistry: Orthopyroxene ($Fs_{21.3-45.6}Wo_{1.9-4.0}$, FeO/MnO = 27-43; n = 13), pigeonite ($Fs_{30.9-37.1}Wo_{6-9}$, FeO/MnO = 34-42; n = 4), augite ($Fs_{8.4-29.7}$, Wo_{38-45}, FeO/MnO = 13-41; n = 8), plagioclase ($An_{1.7-52.7}Or_{1.5-10.5}$; n = 22), alkali feldspar ($An_{4.0}Or_{73.9}$; n = 4). Bulk analysis (XRF, n=6) gives Fe/Mn (wt) = 46.0±3.4, Ni = 510±56 ppm, Cr = 1485±85 ppm. Oxygen isotopes: (R. Greenwood, *OU*) gave $\delta^{18}O$=7.18±0.31, $\delta^{17}O$=4.41±0.16, $\Delta^{17}O$= 0.675±0.001 (mean of 2 analyses, all per mil).

Classification: Martian (basaltic breccia). Closely resembles NWA 7034 and pairings and is very likely paired with these stones.

Specimens: 16.50 g including one polished section at *NMBE*. Remaining material is held by Marc Jost and Beat Booz.

Northwest Africa 8172 (NWA 8172)
(Northwest Africa)
Purchased: 2013 Sep
Classification: Ureilite

History: Purchased in September 2013 by Gary Fujihara from a dealer in Agadir, Morocco.

Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular aggregate of olivine and pigeonite. Grain boundary regions have distinctive dark, reduced, metal-rich zones.

Geochemistry: Olivine (cores $Fa_{24.1}$; reduced rims $Fa_{12.0}$), pigeonite ($Fs_{19.6-19.7}Wo_{7.6-8.0}$).

Classification: Ureilite.

Specimens: 20.4 g including a polished slice at *UWB*. The remainder is held by Mr. G. Fujihara.

Northwest Africa 8173 (NWA 8173)
Northwest Africa
Purchased: 2013 Oct
Classification: Enstatite achondrite

History: Purchased by Gary Fujihara in October 2013 from a Moroccan dealer.

Physical characteristics: The 67.2 g stone is almost entirely coated by dark fusion crust with stained whitish regions clearly visible. The cut interior consists of white regions with fresh metal and other grayish regions with orange staining from weathering of metal.

Petrography: (A. Irving and S. Kuehner, *UWS*) The specimen is composed mainly of stubby, prismatic grains of untwinned, pure enstatite with ~20 vol.% stained, holly-leaf shaped grains of Si-bearing kamacite, and accessory alabandite, daubreelite, alkali feldspar, silica polymorph and minor secondary calcite.

Geochemistry: Enstatite ($Fs_{0.0±0.0}Wo_{0.2-0.3}$, N = 4), metal (Si = 3.6 wt.%, Ni = 6.3 wt.%, Co = 0.4 wt.%, N = 3). Oxygen isotopes (K. Ziegler, *UNM*): analyses of acid-washed subsamples by laser fluorination gave (all in per mil) $\delta^{17}O$ = 2.708, 2.605, 2.400, $\delta^{18}O$ = 5.265, 5.013, 4.600, $\Delta^{17}O$ = -0.072, -0.042, -0.029 (for a TFL slope of 0.528).

Classification: Enstatite achondrite. This specimen is unlike typical aubrites in several respects: the purity of the enstatite is remarkable (even among other known enstatite-rich meteorites), and the metal is both much more abundant and more Si-rich than in aubrites.

Specimens: 13.6 g and two polished thin sections are at *UWB*. The remaining material is held by Mr. G. Fujihara.

Northwest Africa 8174 (NWA 8174)
(Northwest Africa)
Purchased: 2013 Oct
Classification: HED achondrite (Eucrite, polymict)
History: Two very similar stones were purchased together by G. Fujihara (who provided portions of both as type material) in October 2013 from a dealer in Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental breccia composed predominantly of gabbroic eucrite clasts in a sparse matrix of related debris (mostly pyroxene). Minerals are exsolved pigeonite (with variable red-brown staining), calcic plagioclase (polycrystalline, birefringent), silica polymorph, ilmenite, Ti-bearing chromite, troilite and minor secondary barite.
Geochemistry: Orthopyroxene host ($Fs_{60.2-62.8}Wo_{2.6-1.9}$, FeO/MnO =30-32), clinopyroxene exsolution lamellae ($Fs_{28.2-28.3}Wo_{42.3-42.6}$, FeO/MnO = 29-30).
Classification: Eucrite (polymict, gabbroic). Based on primary textures, shock features and style of weathering, this material is likely paired with NWA 7989, NWA 8036 and NWA 8056.
Specimens: A total of 20.1 g including one polished thin section at *UWB*. The remaining material is held by G. Fujihara.

Northwest Africa 8175 (NWA 8175)
Northwest Africa
Purchased: 2013 Dec
Classification: Carbonaceous chondrite (CK4)
History: Purchased by Stefan Ralew in December 2013 from a dealer in Zagora, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fresh specimen composed of separated, well-formed, granular chondrules containing abundant magnetite in a coarser grained, recrystallized matrix. Minerals are olivine , orthopyroxene, subcalcic augite, augite, anorthite, intermediate plagioclase, Cr-magnetite (some slightly altered) and Cr-Ti-magnetite. One very fine-grained CAI was found to be composed of anorthite, Al-Ti-diopside, intergrown ilmenite+magnetite, pleonaste spinel and minor olivine.
Geochemistry: Olivine ($Fa_{30.3-30.9}$, FeO/MnO = 118-120), orthopyroxene ($Fs_{23.2-26.3}Wo_{4.9-0.6}$), subcalcic augite ($Fs_{16.3}Wo_{27.6}$), augite ($Fs_{10.4}Wo_{49.4}$). Oxygen isotopes (K. Ziegler, *UNM*): acid-washed subsamples of a small CAI analyzed by laser fluorination gave, respectively $\delta^{17}O$ -5.132, -11.907, -10.141; $\delta^{18}O$ -0.983, -8.049, -6.383; $\Delta^{17}O$ -4.613, -7.657, -6.771 per mil (for a TFL slope of 0.528).
Classification: Carbonaceous chondrite (CK4).
Specimens: 12.5 g including one polished thin section at *UWB*. The remaining material is held by *Ralew*.

Northwest Africa 8176 (NWA 8176)
(Northwest Africa)
Purchased: 2004 Dec
Classification: HED achondrite (Eucrite, polymict)
History: Purchased in Morocco by Adam Aaronson in December 2004.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental breccia composed of small, angular clasts and related debris. The predominant clast type is intersertal-textured basaltic eucrite; other clast types are variolitic-textured eucrite, microbreccia and rare diogenitic orthopyroxene grains.
Geochemistry: Orthopyroxene host ($Fs_{57.5-58.8}Wo_{4.8-5.2}$; FeO/MnO = 28-34), clinopyroxene exsolution lamellae ($Fs_{27.3-27.6}Wo_{42.3-41.6}$; FeO/MnO = 32-33).
Classification: Eucrite breccia (polymict).
Specimens: 22 g including a polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8177 (NWA 8177)

(Northwest Africa)
Purchased: 2008 Apr
Classification: HED achondrite (Eucrite, monomict)
History: Purchased in Morocco by Adam Aaronson in April 2008.
Petrography: (A. Irving and S. Kuehner, *UWS*) Monomict breccia composed of small basaltic eucrite clasts and related debris; no diogenitic material is present.
Geochemistry: Orthopyroxene host ($Fs_{62.0-62.7}Wo_{2.2-2.5}$; FeO/MnO = 30), clinopyroxene exsolution lamellae ($Fs_{26.7-27.7}Wo_{43.5-41.9}$; FeO/MnO = 29-30).
Classification: Eucrite breccia (monomict).
Specimens: 24 g including a polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8178 (NWA 8178)
(Northwest Africa)
Purchased: 2013 Dec
Classification: HED achondrite (Diogenite)
History: Purchased in Temara, Morocco by Adam Aaronson in December 2013.
Petrography: (A. Irving and S. Kuehner, *UWS*) Matrix-poor breccia composed of closely-packed, angular, mostly monomineralic clasts of orthopyroxene with ~5 vol.% olivine, clinopyroxene, chromite and troilite.
Geochemistry: Orthopyroxene ($Fs_{23.4-25.0}Wo_{2.3-2.4}$; FeO/MnO = 29), olivine ($Fa_{32.9-33.3}$; FeO/MnO = 46-49), clinopyroxene ($Fs_{9.9-10.3}Wo_{43.8}$; FeO/MnO = 21-25).
Classification: Diogenite (monomict breccia).
Specimens: 20.1 g including a polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8179 (NWA 8179)
(Northwest Africa)
Purchased: 2013 Dec
Classification: Ureilite
History: Purchased in Temara, Morocco by Adam Aaronson in December 2013.
Petrography: (A. Irving and S. Kuehner, *UWS*) Relatively coarse-grained, protogranular aggregate of predominantly olivine (with reduced rims containing stained Fe metal) accompanied by minor orthopyroxene and pigeonite.
Geochemistry: Olivine (cores $Fa_{23.8}$, with reduced rims $Fa_{12.5}$; Cr_2O_3 = 0.5 wt.%), orthopyroxene ($Fs_{25.2-25.3}Wo_{2.1-4.5}$), pigeonite ($Fs_{19.0-19.6}Wo_{10.7-11.0}$).
Classification: Ureilite. This specimen is unusual among ureilites in containing orthopyroxene in addition to the typical pigeonitic pyroxene.
Specimens: 20.1 g including a polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8180 (NWA 8180)
(Northwest Africa)
Purchased: 2013 Nov
Classification: HED achondrite (Eucrite)
History: Purchased in Temara, Morocco by A. Aaronson.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental breccia composed predominantly of large gabbroic eucrite clasts in a sparse matrix of related debris. Minerals are exsolved pigeonite (with variable red-brown staining), calcic plagioclase (polycrystalline, birefringent), silica polymorph, ilmenite, Ti-bearing chromite, troilite and minor secondary barite.
Geochemistry: Orthopyroxene host ($Fs_{59.4-59.9}Wo_{4.6-3.6}$, FeO/MnO =28-30), clinopyroxene exsolution lamellae ($Fs_{27.5-29.2}Wo_{42.6-40.1}$, FeO/MnO = 28-31).
Classification: Eucrite (polymict, gabbroic). Based on primary textures, shock features and style of weathering, this material is likely paired with NWA 7989, NWA 8036 and NWA 8056.

Specimens: A total of 23 g including one polished thin section at *UWB*. The remaining material is held by *Aaronson*.

Northwest Africa 8181 (NWA 8181)
Morocco
Purchased: 2013 Jun
Classification: Lunar meteorite (feldspathic breccia)
History: Purchased by Fabien Kuntz in June 2013 from a Moroccan dealer at the Ensisheim Show.
Petrography: (A. Irving and S. Kuehner, *UWS*) Very fine grained breccia composed of small mineral fragments and some very small metal grains irregularly distributed in a partly glassy and vesicular matrix. Minerals are olivine, orthopyroxene, pigeonite, subcalcic augite, anorthite, rutile, kamacite and minor barite.
Geochemistry: Olivine ($Fa_{26.8\text{-}27.6}$; FeO/MnO = 94-99), orthopyroxene ($Fs_{24.0\text{-}27.3}Wo_{4.4\text{-}2.5}$; FeO/MnO = 53-60), subcalcic augite ($Fs_{13.4}Wo_{36.0}$; FeO/MnO = 47), ferropigeonite ($Fs_{58.5}Wo_{7.8}$; FeO/MnO = 64). Bulk composition (R. Korotev, *WUSL*) INAA of subsamples gave the following mean abundances (in wt.%) FeO 6.4, Na_2O 0.53; (in ppm) Sc10.0, Ni 530, La 16.5, Sm 7.35, Eu 1.54, Yb 4.82, Lu 0.671, Hf 5.6, Th 2.3.
Classification: Lunar (feldspathic vitric fragmental breccia). The distinctive texture and bulk composition of this specimen indicates that it is paired with NWA 4936, NWA 5406 and other stones from the Siksou Mountain area in southern Morocco.
Specimens: A 3.7 g specimen with one polished surface is at *UWB*. The main mass is held by *Kuntz*.

Northwest Africa 8182 (NWA 8182)
(Northwest Africa)
Purchased: 2013
Classification: Lunar meteorite (feldspathic breccia)
History: Purchased by Matt Morgan in 2013, reportedly found in Algeria.
Physical characteristics: Single stone, complete, dome shaped, remnants of brown-black fusion crust. Saw cut reveals a range of clast and fragmental feldspar sizes set in dark fine grained matrix, dark gray shock melt veins throughout.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows two main types of breccia: 1) cataclastic breccia with densely packed olivine, pyroxene and plagioclase fragments and abundant vesiculated shock melt veins, 2) feldspathic breccia with primarily fragmental plagioclase set in a very fine-grained matrix. Chromite, ilmenite, zircon, phosphate, silica, and sulfide observed.
Geochemistry: C. Agee and N. Muttik, *UNM*). Olivines are fairly uniformly Mg-rich, olivine $Fa_{36.5\pm7.1}$, Fe/Mn=99±10, n=31. Some plagioclase has relatively high albite content, $An_{93.4\pm2.2}Ab_{6.2\pm1.9}Or_{0.4\pm0.3}$, range $An_{89.1\text{-}96.3}$, n=12. This specimen appears to have three distinct clinopyroxene populations, likely representing at least three lithologic types: 1) Mg-rich clinopyroxene, $Fs_{32.8\pm12.3}Wo_{18.6\pm8.0}$, Fe/Mn=57±9, n=17; 2) Fe-rich clinopyroxene, $Fs_{51.0\pm7.9}Wo_{24.3\pm6.7}$, Fe/Mn=72±5, n=15; 3) hedenberite, $Fs_{53.1}Wo_{41.6}$, Fe/Mn=89 + Fs-rich pigeonite, $Fs_{81.0}Wo_{13.0}$, Fe/Mn=63.
Classification: Achondrite (lunar meteorite). Feldspathic breccia.
Specimens: A total of 3.5 g, including a probe mount, is on deposit at *UNM*, *MtMorgan* holds the main mass.

Northwest Africa 8183 (NWA 8183)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite, LL(L)3.2
History: Purchased October 2013 from a Moroccan meteorite dealer in Erfoud.
Physical characteristics: Single stone, weathered black fusion crust, saw-cut reveals many densely packed chondrules set in an orange-brown matrix.

Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows numerous unequilibrated chondrules, many are porphyritic, apparent mean diameter 623±322 μm, n=22. Abundant opaque matrix, most chondrules with glass or mesostasis. Iron-nickel metal blebs, sulfide and chromite present.
Geochemistry: (C. Agee and N. Muttik, *UNM*) All chondrule olivine $Fa_{16.4\pm9.6}$, range $Fa_{0.4\text{-}36.4}$, n=42; ferroan chondrule olivine $Fa_{17.7\pm8.9}$, Fe/Mn=44±21, Cr_2O_3=0.16±0.09 wt%, CaO=0.14±0.07 wt%, n=37; chondrule low-Ca pyroxene $Fs_{10.7\pm7.6}Wo_{1.2\pm1.4}$, Fe/Mn=21±15, n=22.
Classification: Ordinary chondrite (LL3.2), type 3.2 based on ferroan olivine mean Cr_2O_3 content and sigma from Grossman and Brearley (2005), the ferroan olivine compositions are similar to Y-793596 (LL3.2) reported therein. Weathering grade W1.
Specimens: 21 g including a probe mount on deposit at *UNM*, Mendy Ouzillou and Adam Bates hold the main mass.

Northwest Africa 8184 (NWA 8184)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite (L3.7)
History: Purchased from Aziz Habibi, Erfoud, Morocco, in November 2013.
Physical characteristics: Single stone with sand blasted surface, partly preserved fusion crust. Saw cut reveals numerous chondrules and metal/sulfide grains set in a gray-green groundmass, some oxide staining.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows distinct chondrules, many are porphyritic with igneous zoning and fine-grained plagioclase. Iron-nickel metal and troilite throughout, often rimming chondrules, some Fe-oxide veinlets.
Geochemistry: (C. Agee and H. Miley, *UNM*) Olivine $Fa_{24.1\pm5.3}$, Fe/Mn=57±15, n=31; low-Ca pyroxene $Fs_{14.6\pm5.6}Wo_{1.8\pm2.3}$, Fe/Mn=25±8, n=22; plagioclase $Ab_{63.}$
Classification: Ordinary chondrite (L3.7), type 3.7 based on Fa and Fs mean values and standard deviation. Weathering grade W2, shock stage S2.
Specimens: 29.5 g end piece including a probe mount on deposit at *UNM*, Tomasz Jakubowski holds the main mass.

Northwest Africa 8185 (NWA 8185)
(Northwest Africa)
Purchased: 2009
Classification: Ordinary chondrite (L5)
History: A single desert varnished stone weighing 793 g was found in Morocco and purchased by Blaine Reed at the Tucson Gem and Mineral Show in February 2009
Physical characteristics: Stone is dark-colored, ovoid in shape and devoid of fusion crust.
Petrography: (A. Love, *App*): Sample displays recrystallized chondritic texture composed of densely packed chondrules (average diameter 881 μm) and a ~1.0 cm porphyritic olivine macrochondrule.
Geochemistry: $Fa_{22.4\pm0.9}$, n=12; low Ca pyroxene $Fs_{20.8\pm0.3}Wo_{2.4\pm0.4}$, n=13.
Classification: Ordinary Chondrite (L5) S2 W3
Specimens: 32.56 g and 1 polished thin section are on deposit at *App*.

Northwest Africa 8186 (NWA 8186)
(Northwest Africa)
Purchased: 2013
Classification: Ungrouped achondrite
History: Purchased from a dealer in Morocco in 2013 by Steve Witt and Mr. Smara Addi.

Physical characteristics: Single complete stone, slightly weathered, covered in black fusion crust, saw-cut reveals a fresh, fine-grained mix of green, white, and shiny metallic-luster crystals, also a black shock melt veinlet observed, friable.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows a highly equilibrated texture with numerous triple junction grain boundaries, significant fracturing present suggests high shock level. Olivine (up to 1 mm) is the dominant phase ~80%, plagioclase (up to 200 μm) ~10%, oxides (magnetite, hercynite-spinel, ilmenite; up to 200 μm) ~5%, augite ~3%, Cl-rich apatite ~1%, small amounts of Fe,Ni sulfide (most likely pentlandite), fusion crust (~150 μm thick) shows fine heterogeneous quench crystals of silicates and oxides.
Geochemistry: (C. Agee and H. Miley, *UNM*) Olivine $Fa_{34.8\pm0.4}$, Fe/Mn=129±10, NiO=0.81±0.36 wt%, n=7; augite $Fs_{11.8\pm0.4}Wo_{48.0\pm0.5}$, Fe/Mn=179±72, n=7; plagioclase $An_{52.3\pm4.6}Ab_{45.8\pm4.4}Or_{1.9\pm0.2}$, n=15; magnetite with Cr_2O_3=5.83±0.74, Al_2O_3=3.00±0.36 (wt%), n=8; hercynite-spinel Al_2O_3=51.06±3.70, FeO=33.31±3.98, MgO=8.20±0.58, Cr_2O_3=8.39±0.48 (wt%), n=5; ilmenite TiO_2=30.89, Al_2O_3=4.08, Cr_2O_3=5.93, FeO=54.72, MgO=1.96 (wt%); fusion crust (proxy for bulk composition): SiO_2=40.9±6.1, A_2O_3=2.2±0.9, FeO=24.6±3.3, MgO=28.4±5.8, CaO=2.8±0.8, Na_2O=0.6±0.4 (wt%). Oxygen isotopes (Karen Ziegler, *UNM*) Oxygen isotope values of 3 acid-washed aliquots of bulk sample, 1.5, 1.6, 1.8 mg, gave $\delta^{17}O$ = -4.119, -4.118, -4.378, $\delta^{18}O$ = -0.069, -0.022, -0.176, $\Delta^{17}O$ = -4.083, -4.106, -4.285 (linearized, all permil).
Classification: Achondrite (ungrouped). This is a unique achondrite with oxygen isotopic values identical to some CV/CK carbonaceous chondrites. Oxygen isotopic values are similar to the ungrouped achondrite NWA 7822, however this meteorite has values that are on the CCAM with significantly higher $\delta^{18}O$ than NWA 7822. It does not appear to be paired with NWA 7822 in that it contains no Fe-Ni metal or troilite, but instead has magnetite, hercynite-spinel, ilmenite, Cl-rich apatite, and olivines and pyroxenes with higher Fe/Mn. The lack of Fe-Ni metal, the ubiquity of magnetite, and the high Ni-content of olivine indicates that this meteorite was formed at relatively high fO2 and suggests that it could have been derived from a CK carbonaceous chondrite-like precursor. Low weathering grade.
Specimens: 1.9 g including a probe mount on deposit at *UNM*, Steve Witt holds the main mass.

Northwest Africa 8187 (NWA 8187) 24.767°N, 13.0184°W
Western Sahara
Found: 2013
Classification: HED achondrite (Eucrite, monomict)
History: (H. Chennaoui Aoudjehane) Found in a small depression, late June 2013, by Mohmed and Mahdi Zergou while tending of herd of camels in the Zbayra area, near Guelta Zemmour, about 250 km southwest of Smara. A meteorite hunter Ahmed Akhebbach recognized the stone as a meteorite -- possibly a eucrite, collected the geographic coordinates, purchased it, and Ayoub Oumoussa submitted a deposit piece for classification.
Physical characteristics: Main mass 640 g, totally covered by black fusion crust, except one broken surface, plus smaller pieces found with it: 23 g, 15 g, 3 g. Interior reveals fresh, light gray, very fine-grained groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows a protogranular texture with approximately 50% pyroxene and 50% plagioclase, grain size 10-100 μm, many pyroxenes with exsolution lamellae. Millimeter-sized monomict clasts. Accessory low-Ni iron metal, silica, ilmenite, and troilite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) EMPA. Low Ca-pyroxene $Fs_{59.4\pm2.6}Wo_{5.0\pm2.7}$, Fe/Mn=32±1, n=8; high-Ca pyroxene $Fs_{30.0\pm2.6}Wo_{39.7\pm3.1}$, Fe/Mn=34±2; n=6; plagioclase $Or_{0.6\pm0.1}Ab_{11.3\pm0.7}An_{88.1\pm0.7}$, n=4.
Classification: Achondrite, equilibrated, monomict basaltic eucrite.
Specimens: 23.2 g including a probe mount on deposit at *UNM*, Ahmed Akhebbach and Ayoub Oumoussa jointly hold the main mass.

Northwest Africa 8188 (NWA 8188)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Howardite)
History: Purchased by Jack Schrader from a meteorite dealer in Erfoud, Morocco, 2013.
Physical characteristics: 37 pieces, irregular surface, weathered exterior, saw cut reveals fine-grained dark gray matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows a fragmental breccia with multiple lithologies and a significant amount of shock melt. Fragmental pyroxene, plagioclase, and basaltic clasts range from sub-micron to 200 μm, many domains appear cataclastic. Equilibrated pyroxenes with exolution lamellae are present as are pyroxenes with igneous zoning. One population of pyroxenes is diogenitic, while two other populations are consistent with equilibrated basaltic eucrite and unequilibrated eucrite. Ubiquitous silica and ilmenite.
Geochemistry: (C. Agee and H. Miley, *UNM*) Diogenite pyroxene $Fs_{23.4\pm3.8}Wo_{1.8\pm0.4}$, Fe/Mn=32±3, n=9; unequilibrated eucrite pyroxene $Fs_{40.1\pm8.2}Wo_{4.5\pm1.4}$, Fe/Mn=30±2, n=12; basaltic eucrite pyroxene $Fs_{50.4\pm5.9}Wo_{13.1\pm7.7}$, Fe/Mn=33±2, n=12; plagioclase $Or_{1.1\pm0.7}Ab_{8.8\pm1.8}An_{90.1\pm1.9}$, n=4.
Classification: Howardite based on the presence of approximately 25% diogenitic and 75% eucritic material.
Specimens: 20.0 g including a probe mount on deposit at *UNM*, Jack Schrader holds the main mass.

Northwest Africa 8190 (NWA 8190)
(Northwest Africa)
Purchased: 2007
Classification: Carbonaceous chondrite (CK3)
Physical characteristics: Many pieces with a light brown weathered surface. This zone of severe weathering forms an up to 2 mm thick shell around each sample. Fractured surfaces are dark brown with blurred chondrules up to 3 mm in size. CAIs with sizes up to 8 mm have been observed. Very compact interior without any visible porosity.
Petrography: (K. Metzler, *IfP*) The investigated sample consists of two distinct lithologies with sharp contact. The groundmass of both lithologies shows a fine-grained recrystallized texture, consisting of olivine grains and fewer pyroxene and plagioclase grains with sizes on the order of 50-100 μm. Magnetite and weathered sulfides are concentrated in the interstices and around larger objects like chondrules. Lithology 1 contains only sparse chondrules while lithology 2 contains subequal amounts of matrix and chondrules+CAIs. Many chondrules show rims of weathered opaque phases. Several large chondrules show relict Mg-rich olivine ($Fa_{0.5\text{-}1}$) in the center and Fe-rich olivine at the margin.
Geochemistry: (K. Metzler, *IfP*) The mean composition of olivine (except chondrule cores) is $Fa_{32.8}$ ($Fa_{28\text{-}38}$). Olivine grains contain about 0.5 wt% NiO (0.2-07 wt%). Olivine in chondrule cores is Ni-free and retained its original Mg-rich composition ($Fa_{0.5\text{-}1}$). Low-Ca pyroxene is less abundant, with a range of compositions ($Fs_{2\text{-}27}$). It is rich in Al with a mean concentration of about 4 wt% Al_2O_3. Ca-rich pyroxene also occurs. The compositional range of feldspar is $An_{25.5\text{-}43.5.}$ Magnetite is the most abundant opaque phase, with significant concentrations of elements other than Fe (n=2): MgO 1-1.5 wt%; Al_2O_3 3-3.5 wt%; TiO_2 1 wt%; Cr_2O_3 3.5 wt%; NiO 0.5 wt%. The magnetite composition is characteristic for CK chondrites.
Classification: CK chondrite based on mineral chemistry. Petrologic type (3.9) based on olivine variability (PMD=6)

Northwest Africa 8191 (NWA 8191)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite (L3)

Physical characteristics: Many pieces with clearly visible well-defined chondrules and a brownish wind-ablated surface. No fusion crust was found.
Petrography: (K. Metzler, *IfP*) Ordinary chondrite of low petrologic type consisting of about 80 vol% chondrules of various textural types, set in a fine-grained interchondrule matrix. Agglomeratic and compound chondrules can be observed. The mean apparent chondrule size is 540 μm (300-1000 μm; n=25). Accessory phases are FeNi metal and troilite, mostly residing outside of chondrules.
Geochemistry: (K. Metzler, *IfP*) SEM-EDX. The mean olivine composition is $Fa_{20.0\pm12.5}$ (2.5-44; n=36); the mean low-Ca pyroxene composition is $Fs_{10.1\pm7.9}$ (1-24; n=29)
Classification: L chondrite based on apparent chondrule size. Petrologic type <3.5 based on the variability of olivine composition (PMD >50)

Northwest Africa 8193 (NWA 8193)
(Northwest Africa)
Purchased: 2010
Classification: Ordinary chondrite (LL6)
History: A single desert varnished stone weighing 1.16 kg was found in Morocco and purchased by Blaine Reed at the Tucson Gem and Mineral Show in February of 2010
Physical characteristics: Stone is dark-colored, ovoid in shape and covered with ~60% dark brown fusion crust.
Petrography: Description and classification (A. Love, *App*): Sample is a breccia composed of rounded and angular clasts of recrystallized chondritic material, recrystallized lithic and glassy fragments. Two relict chondrules were observed to have an avg. diameter 813.5 μm.
Geochemistry: (A. Love, *App*) $Fa_{26.8\pm1.1}$, N=17; low Ca pyroxene $Fs_{22.9\pm0.3}Wo_{1.2\pm0.2}$, n=12.
Classification: Ordinary chondrite (LL6 S3 W2)
Specimens: 36.55 g and 1 polished thin section and 2 polished mounts are on deposit at *App*

Northwest Africa 8196 (NWA 8196)
(Northwest Africa)
Purchased: 04/2013
Classification: HED achondrite (Eucrite)
Physical characteristics: The meteorite is partly covered by fusion crust and shows a dark greyish interior.
Petrography: The rock is a coarse-grained basalt with up 1 mm sized calcic plagioclase and exsolved pyroxenes. Minor phases are chromite, FeNi metal and rare SiO_2 polymorphs.
Geochemistry: low-Ca pyroxene: $Fs_{53.3\text{-}59.7}Wo_{1.7\text{-}9.5}$, FeO/MnO=29-32; augite: $Fs_{25\text{-}29.4}Wo_{39.8\text{-}44.6}$, FeO/MnO=28-33; calcic plagioclase: $An_{88\text{-}90.5}$

Northwest Africa 8197 (NWA 8197)
(Northwest Africa)
Purchased: 04/2013
Classification: HED achondrite (Eucrite)
Physical characteristics: The meteorite is partly covered by fusion crust and shows a light grey to sandy interior.
Petrography: It shows a fine-grained texture with pyroxene and plagioclase being the dominant phases. Their grain size ranges from 10-100 μm and many pyroxenes show fine exsolution lamellae. Accessories include SiO_2 polymorphs, ilmenite, and chromite.
Geochemistry: Low-Ca pyroxene $Fs_{58.8\text{-}59.5}Wo_{1.8\text{-}2.6}$, FeO/MnO=31-34; augite $Fs_{24.8\text{-}26.3}Wo_{43.3\text{-}45.1}$, FeO/MnO=28-36; plagioclase $An_{85.1\text{-}89.2}$

Northwest Africa 8205 (NWA 8205)
(Northwest Africa)

Purchased: 2013
Classification: Ureilite
Petrography: The meteorite shows a cumulate texture of blocky, up to 3 mm sized olivine and pigeonite. It contains flaky graphite; olivine displays characteristic reduced rims.
Geochemistry: olivine reduced rims: $Fa_{3.2\text{-}8.5}$

Northwest Africa 8208 (NWA 8208)
(Northwest Africa)
Purchased: 2012
Classification: Carbonaceous chondrite (CV3)
Petrography: The carbonaceous chondrite consists of up to 2 mm sized chondrules and abundant CAIs and olivine amoeboids set into an almost translucent black matrix; metal grains are very rare.

Northwest Africa 8212 (NWA 8212)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite (H, melt rock)
Petrography: Very fine-grained, melt-textured rock composed of sometimes euhedral olivine, orthopyroxene, rare augite, FeNi metal and FeS. Olivine and orthopyroxene show compositional zoning, i.e., Mg-rich core and Fe-rich rim.
Geochemistry: low-Ca pyroxene: $Fs_{17.5\text{-}19.4}Wo_{1.7\text{-}4.6}$; Ca-pyroxene: $Fs_{14.9}Wo_{29.7}$

Northwest Africa 8214 (NWA 8214)
(Northwest Africa)
Purchased: 2013
Classification: Carbonaceous chondrite (CK5)
Petrography: The meteorite shows a grayish-greenish interior and consists of few chondrules and rare CAIs set into a fine-grained matrix. Opaque phases are dominantly Cr-bearing magnetite; FeNi metal is absent.
Geochemistry: magnetite contains up to 4.5 wt% Cr_2O_3

Northwest Africa 8216 (NWA 8216)
(Northwest Africa)
Purchased: 2013 Dec
Classification: Primitive achondrite (Lodranite)
History: Purchased in Temara, Morocco by Adam Aaronson in December 2013.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental breccia composed of closely-packed angular mineral grains within sparse matrix, and characterized by large, green clinopyroxene grains and staining around some metal grains. Minerals are olivine, orthopyroxene, clinopyroxene, chromite, troilite and stained kamacite.
Geochemistry: Olivine ($Fa_{11.4\text{-}11.5}$; FeO/MnO = 23-25), orthopyroxene ($Fs_{10.1\text{-}10.2}Wo_{3.1\text{-}3.8}$; FeO/MnO = 14-15), clinopyroxene ($Fs_{4.5\text{-}4.6}Wo_{43.0\text{-}43.3}$; FeO/MnO = 9-10).
Classification: Lodranite breccia. This material is likely paired with NWA 8118 and NWA 8251.
Specimens: 20.3 g including a polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8219 (NWA 8219)
(Northwest Africa)
Purchased: 2013 Dec
Classification: Ureilite
History: Purchased in Temara, Morocco by Adam Aaronson in December 2013.

Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular aggregate of olivine (with reduced, Fe metal-bearing rims) and pigeonite.
Geochemistry: Olivine (cores $Fa_{25.0}$, Cr_2O_3 = 0.68 wt.%; rims $Fa_{7.6}$), pigeonite ($Fs_{19.2\text{-}19.5}Wo_{11.8\text{-}11.9}$).
Classification: Ureilite.
Specimens: 19.2 g including a polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8222 (NWA 8222)
(Northwest Africa)
Purchased: 2013 Dec
Classification: Lunar meteorite (feldspathic breccia)
History: The stone was purportedly found near Bir Anzarane, and was purchased in Temara, Morocco, by Adam Aaronson in December 2013.
Petrography: (A. Irving and S. Kuehner, *UWS*) Breccia consisting of separated, angular mineral clasts in a finer-grained, vesicular matrix. Minerals are olivine, anorthite, exsolved pigeonite, augite, chromite, ilmenite, troilite and minor pentlandite.
Geochemistry: Olivine ($Fa_{42.5}$; $Fa_{80.6}$; FeO/MnO = 106-134), augite ($Fs_{18.4}Wo_{40.6}$; FeO/MnO = 54), pigeonite consists of host orthopyroxene ($Fs_{50.1\text{-}50.9}Wo_{2.5\text{-}5.1}$; FeO/MnO = 58-64) with exsolution lamellae of augite ($Fs_{38.6}Wo_{41.2}$; FeO/MnO = 67). Bulk composition (R. Korotev, *WUSL*) INAA of subsamples gave the following mean abundances (in wt.%) FeO 3.7, Na_2O 0.37; (in ppm) Sc 7.0, Ni 90, La 1.4, Sm 0.62, Eu 0.82, Yb 0.54, Lu 0.076, Hf 0.43, Th 0.20.
Classification: Lunar (feldspathic fragmental breccia).
Specimens: A 20.1 g specimen with one polished surface is at *UWB*. The main mass is held by *Aaronson*.

Northwest Africa 8224 (NWA 8224)
(Northwest Africa)
Purchased: 2013 Dec
Classification: HED achondrite (Eucrite, polymict)
History: Purchased in Temara, Morocco by Adam Aaronson in December 2013.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fresh fragmental breccia composed of both gabbroic and basaltic eucrite clasts plus related mineral debris, and rare diogenitic orthopyroxene. Minerals are exsolved pigeonite, calcic plagioclase, olivine, fayalite, pigeonite, hedenbergite, silica polymorph, ilmenite, Ti-chromite, troilite and altered Ni-free metal.
Geochemistry: Diogenitic orthopyroxene ($Fs_{27.8}Wo_{3.4}$; FeO/MnO = 27), host orthopyroxene ($Fs_{60.1}Wo_{5.4}$; FeO/MnO = 32), clinopyroxene exsolution lamellae ($Fs_{27.5}Wo_{41.1}$; FeO/MnO = 33), pigeonite ($Fs_{35.6\text{-}35.8}Wo_{10.4\text{-}7.2}$; FeO/MnO = 30), hedenbergite ($Fs_{58.9}Wo_{35.4}$; FeO/MnO = 37), olivine ($Fa_{42.9}$; FeO/MnO = 51), fayalite ($Fa_{78.6}$; FeO/MnO = 42).
Classification: Eucrite, polymict breccia.
Specimens: 4.7 g including a polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8226 (NWA 8226)
(Northwest Africa)
Purchased: 2013 Dec
Classification: Ureilite
History: Purchased in Temara, Morocco by Adam Aaronson in December 2013.
Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular aggregate of olivine (with reduced, Fe metal-bearing rims) and pigeonite.
Geochemistry: Olivine (cores $Fa_{19.4\text{-}20.1}$; Cr_2O_3 = 0.71 wt.%; rims $Fa_{6.4}$), pigeonite ($Fs_{16.7\text{-}17.0}Wo_{9.1\text{-}9.2}$).
Classification: Ureilite.
Specimens: 20.0 g including a polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8229 (NWA 8229)

(Northwest Africa)
Purchased: 2013 Dec
Classification: Ureilite

History: Purchased in Temara, Morocco by Adam Aaronson in December 2013.
Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular aggregate of olivine (with reduced, Fe-metal-bearing rims) and pigeonite.
Geochemistry: Olivine (cores $Fa_{9.8}$; Cr_2O_3 = 0.53 wt.%; rims $Fa_{4.9}$), pigeonite ($Fs_{8.4\text{-}8.6}Wo_{8.1\text{-}8.0}$).
Classification: Ureilite. This specimen is unusually Mg-rich and atypical among ureilites.
Specimens: 23.7 g including a polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8231 (NWA 8231)
(Northwest Africa)
Purchased: Oct. 2005
Classification: Ordinary chondrite (H4-6)

History: A single stone of 356 g, supposedly found south of Zagora, Morocco, was obtained by Edwin Thompson from a trader in October 2005. A 28 g slice and crumbs from this stone were donated by Thompson to *Cascadia* on Dec. 13, 2005, and the remaining available mass (325.1 g in two pieces) was purchased from Patrick Thompson on Aug. 15, 2013.
Physical characteristics: The specimen has a largely fusion crusted surface that appears brown-gray with reddish weathering patches. Cut surfaces show an interior with irregularly-shaped light-colored inclusions and brown-stained host with a breccia texture and some thin shock veins.
Petrography: (K. Armstrong and A. Ruzicka, *Cascadia*) The host has a brecciated, chondritic texture and appears "blackened" in transmitted light caused by the presence of fine-grained troilite and metal and weathering product. Chondrule size is 0.6±0.2 mm (N = 26), with chondrules more distinct in some regions than others. Some feldspar grains are >50 μm across but most feldspar is finer-grained. Larger metal and troilite grains comprise 6.5±0.6 and 5.3±0.3 area% of the host, respectively, determined by pixel counting in reflected light images.
Geochemistry: Mineral compositions and geochemistry: Representative olivine is $Fa_{19.4\pm0.4}$, and Fe/Mn = 38.6±7.5 (N = 37). Low-Ca pyroxene is $Fs_{17.2\pm0.3}Wo_{1.2\pm0.1}$ (N = 25). A small amount of slightly magnesian olivine and pyroxene grains were noted in BSE images.
Classification: Mineral chemistry and textures point to a dominance of H5 material, but the meteorite appears to be an H4-6 breccia based on the presence of some regions with poorly-defined chondrules and coarse feldspar, and the rare occurrence of slightly magnesian olivine and pyroxene grains. The meteorite was extensively shock-blackened.
Specimens: Type specimens at *Cascadia* include the main mass (284.2 g), five separate cut pieces totaling 59.2 g, and a polished thin section and potted butt.

Northwest Africa 8232 (NWA 8232)
(Northwest Africa)
Purchased: Oct. 2005
Classification: Ordinary chondrite (LL5)

History: Edwin Thompson purchased the stone from a Moroccan trader in October 2005 and donated 17.2 g to *Cascadia* on Dec. 13, 2005.
Physical characteristics: Surfaces of the stone have black fusion crust. Cut surfaces show an interior with chondritic texture, gray coloration, minimal rust stains, and small amounts of metal.
Petrography: (K. Armstrong, *Cascadia*) In thin section the specimen shows chondritic texture with somewhat indistinct chondrules and a matrix that is largely transparent in transmitted light. Chondrule size is 1.0±0.4 mm (N=32). Metal and troilite abundances determined by pixel counting in reflected light images are 0.7 and 1.0 area%, respectively.
Geochemistry: Mineral compositions and geochemistry: Olivine $Fa_{29.0\pm0.3}$, Fe/Mn=54.5±6.2 (N=44); low-Ca pyroxene $Fs_{23.9\pm0.21}Wo_{1.54\pm0.3}$, Fe/Mn = 32.6±3.6 (N=20).

Classification: The characteristics of this specimen are consistent with LL5 classification of low weathering and shock grade.
Specimens: 15.9 g in three pieces and a polished thin section are on deposit at *Cascadia*. *Thompson* holds the main mass.

Northwest Africa 8233 (NWA 8233)
(Northwest Africa)
Purchased: Nov 2013
Classification: Ordinary chondrite (H6)
History: 916 g stone purchased by Michael Farmer in Risanni, Morocco, November, 2013.
Physical characteristics: (L. Garvie, *ASU*) Exterior shows patchy, black fusion crust. Interior is vuggy (average 200 to 300 μm), dark greenish, without signs of weathering. Rare chondrules visible, one to 3 mm. Sawn surface shows an even distribution of irregular, small (average 300 μm) kamacite and troilite. No shock veins present.
Petrography: (K. Domanik, *UAz*) SEM examination of a polished mount shows a small number of poorly delineated chondrules in a mostly recrystallized matrix along with abundant metal and troilite. Fine-grained (1-20 μm) plagioclase ubiquitous, some 50-200 μm. Other minerals include olivine, low Ca-pyroxene, high-Ca pyroxene, chromite, Cl-apatite, merrillite, and minor taenite and tetrataenite.
Geochemistry: (K. Domanik U.A.) EPMA. Olivine $Fa_{19.3\pm0.2}$, Fe/Mn=37±2, n=24; low-Ca pyroxene $Fs_{16.9\pm0.2}Wo_{1.4\pm0.2}$, Fe/Mn=21±1, n=21; high-Ca pyroxene $Fs_{6.3\pm0.5}Wo_{45.0\pm1.7}$, Fe/Mn=15±2, n=6; plagioclase $Ab_{83.1\pm1.0}An_{11.6\pm0.5}Or_{5.2\pm 1.0}$, n=10; kamacite Fe=92.21±0.38, Ni=6.56±0.08, Co=0.48± 0.04 wt%, n=7; taenite Fe=69.22±0.36, Ni = 29.41±0.76, Co=0.15±0.03 wt%, n=4; tetrataenite Fe=49.34, Ni=49.64, Co=0.07 wt%, n=1; Troilite Ni = 1.1 wt%, n=2.
Classification: Ordinary chondrite, H6, W1.

Northwest Africa 8234 (NWA 8234)
(Northwest Africa)
Purchased: Nov 2013
Classification: Mesosiderite (group C2)
History: A 906 g stone was purchased by Michael Farmer in Rissani, Morocco, November 2013.
Physical characteristics: (L. Garvie, *ASU*) Sawn surface shows even distribution of irregular kamacite (200 to 1500 μm, some to 1 cm), with pyroxene to 4 cm. Center of one slice contains a 0.5 cm vug with ropey, melted interior. Interior of the stone fresh with minor weathering at the surface of the stone.
Petrography: (K. Domanik, *UAz*) Polished mount shows approximately 50% silicates, 35% metal, 10% troilite, and 5% chromite + phosphate. Silicates are predominantly low-Ca pyroxene (~85% of all silicates). Anorthitic plagioclase occurs as clasts (100-1000 μm) and as small (1-10 μm) patchy inclusions along sutured, low-Ca pyroxene grain boundaries. Olivine is rare (approx. 1-2% of the silicates). Boundaries between pyroxene clasts are well annealed. Distinguishable differences in groupings of mineral clasts are observed on a scale of 4-6 mm and consist of 1) low-Ca pyroxene + coarse-grained (200-2000 μm) metal + coarse-grained (100-1000 μm) troilite; 2) low-Ca pyroxene + coarse-grained metal + large plagioclase clasts + fine grained (<100 μm) troilite; and 3) low-Ca pyroxene + fine grained (<100 μm) olivine + chromite + merrilite + troilite. A 1-mm wide band of more highly shocked material occurs along the outer edge of the sample and is characterized by more finely comminuted breccia fragments cross-cut by Ni-bearing troilite veins running parallel to the edge of the sample. There is recrystallization at pyroxene grain margins and the matrix is also recrystallized.
Geochemistry: (K. Domanik U.A.) EPMA. Low-Ca pyroxene $Fs_{25.5\pm1.0}Wo_{2.2\pm0.4}$, Fe/Mn=26±1, n=22; plagioclase $Ab_{6.6\pm2.0}An_{93.1\pm2.1}Or_{0.3\pm 0.2}$, n=16; olivine $Fa_{28.4\pm2.2}$, Fe/Mn=44±2, n=5; kamacite Fe=92.87±0.46, Ni=5.99±0.30, Co=0.53±0.03 wt%, n=16; taenite Fe=63.66±3.45, Ni=35.79±3.38, Co=0.14±.03 wt%, n=7; Chromite Cr/Cr+Al=67.2±0.5, n=3.
Classification: Stony-iron (mesosiderite). Textures and mineralogy suggest a group C mesosiderite of textural type 2.

Specimens: 20.6 g slice at *ASU*.

Northwest Africa 8235 (NWA 8235)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Eucrite, monomict)
Petrography: The meteorite consists of fine- and coarse-grained basaltic clasts and less abundant dark melt clasts set into a fine-grained clastic groundmass. Mineral fragments are dominantly calcic plagioclase and pyroxene with very fine exsolution lamellae. Minor phases include SiO_2 polymorphs, chromite, and pyrrhotite.
Geochemistry: low-Ca pyroxene: $Fs_{28.6\text{-}48.8}Wo_{4.6\text{-}9.4}$, FeO/MnO=25-31; Ca-pyroxene: $Fs_{31.3\text{-}41.2}Wo_{27\text{-}31}$, FeO/MnO=27-30; calcic plagioclase: $An_{83.4\text{-}93.9}$

Northwest Africa 8239 (NWA 8239)
(Northwest Africa)
Purchased: 2012
Classification: Ordinary chondrite (LL7)
Petrography: The meteorite displays a poikilitic texture of olivine, low-Ca pyroxene, and albitic feldspar. Chondrules are lacking; FeNi metal and FeS occur as single grains.
Geochemistry: Olivine: $Fa_{27.7}$; pyroxene: $Fs_{23.9}Wo_{3.9}$, FeO/MnO: 32-37; feldspar: $An_{20.8\pm1.6}$ (range 16.9-23, n=19)

Northwest Africa 8240 (NWA 8240)
(Northwest Africa)
Purchased: Sept 2013
Classification: Enstatite chondrite (EL6)
Petrography: The meteorite displays a fine-grained, recrystallized texture of predominantly enstatite. Minor phases include alabandite, schreibersite, and daubreelite. No chondrules were found. Metal is completely altered to Fe-oxides and -hydroxides. The presence of alabandite suggests EL classification.

Northwest Africa 8242 (NWA 8242)
(Northwest Africa)
Purchased: Oct 2013
Classification: Carbonaceous chondrite (CK3)
Petrography: Composed of well defined chondrules (500-1000 μm in diameter) set into abundant fine-grained matrix. Feldspar in matrix is albitic (Ab_{64}); magnetite contains about 3 wt% Cr_2O_3; metal is virtually absent.

Northwest Africa 8251 (NWA 8251)
(Northwest Africa)
Purchased: 2013 Dec
Classification: Primitive achondrite (Lodranite)
History: Purchased by Marcin Cimala in December 2013 from a dealer in Ouarzazate, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Matrix-poor breccia composed mainly of angular mineral grains (including bright green clinopyroxene) and sparse stained metal. Minerals are olivine, orthopyroxene, clinopyroxene, stained kamacite, troilite and chromite.
Geochemistry: Olivine ($Fa_{11.7\text{-}11..8}$; FeO/MnO = 27-30), orthopyroxene ($Fs_{10.5\text{-}10.7}Wo_{4.9\text{-}4.0}$; FeO/MnO = 16), clinopyroxene ($Fs_{5.0\text{-}5.7}Wo_{43.8\text{-}44.6}$; FeO/MnO = 10-15). Oxygen isotopes (K. Ziegler, *UNM*): analyses of acid-washed subsamples by laser fluorination gave, respectively $\delta^{17}O$ = 0.345, -0.184, -0.220, $\delta^{18}O$ = 2.428, 2.359, 2.221, $\Delta^{17}O$ = -0.937, -1.430, -1.393 per mil (for a TFL slope of 0.528).
Classification: Lodranite breccia. This material is likely paired with NWA 8118 and NWA 8216.

Specimens: 20.2 g including a polished thin section at *UWB*. The remainder is held by Mr. M. Cimala.

Northwest Africa 8254 (NWA 8254)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Eucrite, brecciated)
History: Purchased in Morocco in 2013 by Hmani Inc.
Petrography: (A. Irving and S. Kuehner, *UWS*) Eucrite breccia containing irregularly distributed, ragged grains of stained kamacite (with minor associated taenite). The predominant clast lithology is basaltic eucrite, but a variety of pyroxenes is present as mineral clasts as well as calcic plagioclase, fayalitic olivine, ilmenite (with inclusions of baddeleyite), Al-bearing chromite and troilite.
Geochemistry: Pigeonite ($Fs_{34.7}Wo_{5.4}$, FeO/MnO = 33; $Fs_{43.5\text{-}47.2}Wo_{27.0\text{-}22.7}$, FeO/MnO = 35-37), subcalcic augite ($Fs_{37.8}Wo_{33.4}$, FeO/MnO = 33), orthopyroxene ($Fs_{62.9}Wo_{4.5}$, FeO/MnO = 35), olivine ($Fa_{83.3\text{-}85.2}$, FeO/MnO = 43-45).
Classification: Eucrite-br, metal-rich.
Specimens: 20.5 g including one polished thin section at *UWB*. The remaining material is held by *Hmani*.

Northwest Africa 8261 (NWA 8261)
(Northwest Africa)
Purchased: 2014 Jan
Classification: HED achondrite (Eucrite, polymict)
History: Purchased by *Kuntz* in January 2014 from a dealer in Erfoud, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Polymict breccia composed predominantly of crystalline debris related to sparse lithic clasts of gabbroic eucrite, along with rare clasts of much finer grained, intersertal-textured eucrite, autolithic breccia clasts (i.e., breccia within breccia), and rare fragments of diogenitic orthopyroxene. Gabbroic eucrite clasts consist of exsolved pigeonite and polycrystalline calcic plagioclase with accessory silica polymorph, ilmenite, chromite, troilite and barite. Isolated grains of olivine, more ferroan augite, and ferroan pigeonite are also present.
Geochemistry: Diogenitic orthopyroxene ($Fs_{23.9}Wo_{2.3}$, FeO/MnO = 27), host orthopyroxene ($Fs_{60.2}Wo_{3.2}$, FeO/MnO = 32), clinopyroxene exsolution lamellae ($Fs_{28.9}Wo_{41.4}$, FeO/MnO = 29), olivine ($Fa_{54.0}$, FeO/MnO = 45), ferroan augite ($Fs_{35.0}Wo_{40.0}$, FeO/MnO = 29), ferroan pigeonite ($Fs_{62.0}Wo_{24.2}$, FeO/MnO = 30).
Classification: Eucrite, polymict breccia.
Specimens: 20.9 g including a polished thin section at *UWB*. The remainder is held by *Kuntz*.

Northwest Africa 8264 (NWA 8264)
(Northwest Africa)
Purchased: 2014 Jan
Classification: HED achondrite (Eucrite)
History: Purchased by F. Kuntz in January 2014 from a dealer in Tagounite, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fresh specimen composed of prismatic phenocrysts of exsolved pigeonite set in an extremely fine grained, quenched matrix containing orthopyroxene, clinopyroxene, calcic plagioclase, silica polymorph, ilmenite, Ti-chromite and troilite.
Geochemistry: Host orthopyroxene ($Fs_{55.8\text{-}57.2}Wo_{2.0\text{-}1.6}$, FeO/MnO = 33-34), clinopyroxene exsolution lamellae ($Fs_{21.9\text{-}23.6}Wo_{45.5\text{-}44.2}$, FeO/MnO = 28-33).
Classification: Eucrite, unbrecciated. This specimen is a texturally-unusual among eucrites in being porphyritic with an extremely fine grained, quenched groundmass.
Specimens: 12.0 g including a polished thin section at *UWB*. The remainder is held by *Kuntz*.

Northwest Africa 8265 (NWA 8265)
(Northwest Africa)

Purchased: 2014 Jan
Classification: HED achondrite (Diogenite)
History: Purchased by F. Kuntz in January 2014 from a dealer in Erfoud, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Very fresh, coarse aggregate of interlocking grains (up to 6 mm) of orthopyroxene with accessory olivine, chromite and troilite.
Geochemistry: Orthopyroxene ($Fs_{25.4\text{-}25.9}Wo_{3.0\text{-}2.9}$, FeO/MnO = 29-32), olivine ($Fa_{25.8\text{-}26.2}$, FeO/MnO = 39-41).
Classification: Diogenite.
Specimens: 22.8 g including a polished thin section at *UWB*. The remainder is held by *Kuntz*.

Northwest Africa 8266 (NWA 8266)
(Northwest Africa)
Purchased: 2014 Jan
Classification: HED achondrite (Eucrite, monomict)
History: Purchased by F. Kuntz in January 2014 from a dealer in Erfoud, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Clasts of basaltic eucrite and related crystalline debris are set in a dark matrix. Minerals are exsolved pigeonite, calcic plagioclase, silica polymorph, fayalitic olivine, ilmenite and troilite.
Geochemistry: Host orthopyroxene ($Fs_{59.5\text{-}60.8}Wo_{3.0\text{-}2.6}$, FeO/MnO = 29), clinopyroxene exsolution lamellae ($Fs_{26.7\text{-}26.8}Wo_{42.7\text{-}42.8}$, FeO/MnO = 27-31), olivine ($Fa_{77.0\text{-}80.1}$, FeO/MnO = 39).
Classification: Eucrite, monomict breccia.
Specimens: 20.8 g including a polished thin section at *UWB*. The remainder is held by *Kuntz*.

Northwest Africa 8268 (NWA 8268)
Northwest Africa
Purchased: 2013 May 12
Classification: Ungrouped achondrite
History: The stone was bought by R. Lenssen from a Moroccan meteorite dealer in Agadir in May 2013.
Physical characteristics: A single cm-sized stone without fusion crust, showing mm-sized bright green crystals and incrustations of soil.
Petrography: (J. Gattacceca, *CEREGE*): Medium-grained plutonic texture. Main minerals are diopside, lobate forsterite, calcic plagioclase. Accessory troilite, rare metal. Spherical vesicles up to 300 μm in diameter are present.
Geochemistry: Clinopyroxene $Fs_{2.4\pm0.0}Wo_{45.3\pm0.2}$, n=3, FeO/MnO=19, Al_2O_3=2.7 wt.%, Cr_2O_3=1.0 wt.%; plagioclase $An_{87.1\pm1.1}Ab_{12.9\pm1.1}Or_{0.1\pm0.0}$, n=4; olivine $Fa_{5.8\pm0.1}$, n=4, FeO/MnO=35, CaO=0.35 wt.%, Cr_2O_3=0.40 wt.%. Magnetic susceptibility log χ = 2.55 (χ in 10-9 m3/kg).
Classification: Achondrite (ungrouped). The texture, mineralogy and geochemistry indicate pairing with NWA 7325 despite a slight discrepancy with the olivine geochemistry.
Specimens: 0.96 g and a polished section at *CEREGE*. Main mass with Rob Lenssen.

Northwest Africa 8269 (NWA 8269)
(Northwest Africa)
Purchased: 2013 Aug
Classification: Ordinary chondrite (H7)
History: Purchased by Alexandre Debienne in August 2013 from a dealer in Erfoud, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Completely recrystallized with triple grain junctions and no chondrules. Olivine, orthopyroxene, augite, sodic plagioclase, merrillite, troilite and abundant kamacite.
Geochemistry: Olivine ($Fa_{19.8\text{-}20.0}$), orthopyroxene ($Fs_{16.5\text{-}16.6}Wo_{1.4\text{-}1.6}$), augite ($Fs_{6.1\text{-}6.5}Wo_{44.7\text{-}44.1}$).
Classification: Ordinary chondrite (H7).
Specimens: 36 g including one polished probe mount at *PSF*; remainder with Mr. A. Debienne.

Northwest Africa 8270 (NWA 8270)
(Northwest Africa)
Purchased: 2013 May
Classification: Ordinary chondrite (H4)
History: Purchased by Alexandre Debienne in May 2013 from a dealer in Agadir, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Well-formed, equilibrated chondrules. Olivine, orthopyroxene, augite, sodic plagioclase, chromite, troilite and altered kamacite.
Geochemistry: Olivine ($Fa_{17.4\text{-}17.6}$), orthopyroxene ($Fs_{14.9\text{-}16.0}Wo_{1.0\text{-}0.9}$), augite ($Fs_{5.1\text{-}5.2}Wo_{47.6\text{-}45.7}$).
Classification: Ordinary chondrite (H4).
Specimens: 21.6 g including one polished thin section at *PSF*; remainder with Mr. A. Debienne.

Northwest Africa 8271 (NWA 8271)
(Northwest Africa)
Purchased: 2013 Aug
Classification: Ordinary chondrite (L5)
History: Purchased by Alexandre Debienne in August 2013 from a dealer in Erfoud, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Sparse chondrules and finely-dispersed, fresh metal in a shock-darkened matrix. Olivine, orthopyroxene, augite, sodic plagioclase, chromite, troilite, kamacite and lawrencite.
Geochemistry: Olivine ($Fa_{24.8\text{-}25.1}$), orthopyroxene ($Fs_{20.3\text{-}20.6}Wo_{1.4\text{-}1.5}$), augite ($Fs_{7.7\text{-}9.5}Wo_{44.3\text{-}42.0}$).
Classification: Ordinary chondrite (L5).
Specimens: 22.2 g including one polished thin section at *PSF*; remainder with Mr. A. Debienne.

Northwest Africa 8273 (NWA 8273)
Morocco
Purchased: Dec 2013
Classification: Ordinary chondrite (LL5)
Classification: Although the sample has lower Fs than one would expect for LL, the rock has olivine well within the LL range, and the mean chondrule diameter is about 600 μm, putting it in the LL range and outside the range of L chondrule sizes. Lack of polysynthetically twinned low-Ca pyroxene grains in chondrules and relatively small plagiocalse grains is consistent with petrologic type 5.

Northwest Africa 8275 (NWA 8275)
Anoual, Morocco
Purchased: 2012 Aug 19
Classification: Ordinary chondrite (LL7)
Physical characteristics: Two partially crusted fresh stones (132 and 242 g) crisscrossed by numerous shock veins. Cut surfaces reveal abundant shock veins and melt pockets.
Petrography: (J. Gattacceca, *CEREGE*) Recrystallized with no visible chondrules. Main minerals are olivine, pyroxene, sodic plagioclase, troilite. Interstitial plagioclase are up to 300 μm. Chromite, phosphate, and FeNi metal are present.
Geochemistry: Olivine $Fa_{32.5\pm0.2}$, orthopyroxene $Fs_{25.9\pm0.1}Wo_{3.6\pm0.6}$, plagioclase $An_{7.7}Ab_{89.5}Or_{2.9}$. Magnetic susceptibility (log χ with χ in 10^{-9} m^3/kg) is 3.77.
Classification: LL7
Specimens: Type specimen (24 g) at *CEREGE*. Main mass with P. Thomas

Northwest Africa 8276 (NWA 8276)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite (L3.00)

History: Adam Bates identified this meteorite from images he received as a possible pairing to NWA 7731, even though they came from a different Moroccan meteorite dealer. Both pieces were then purchased within a few weeks of each other in October 2013. The meteorite dealer claimed both pieces originated in Mauritania.
Physical characteristics: A single stone, broken into two pieces (394 and 395 g) that fit together, >90% black fusion crust with polygonal cracks, light desert weathering, saw-cut reveals many densely packed chondrules of variable size.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows numerous unequilibrated chondrules, apparent mean diameter 496±296 μm (n=122), many with porphyritic, igneous-zoned olivines and pyroxenes, most with glass or mesostasis. Abundant fine-grained matrix throughout.
Geochemistry: (C. Agee, N. Muttik, H. Miley, *UNM*) All chondrule olivine $Fa_{12.2\pm9.3}$, range $Fa_{0.7\text{-}26.3}$, n=67; ferroan olivine $Fa_{17.8\pm5.9}$, Fe/Mn=47±11, Cr_2O_3=0.42±0.10 wt%, range Cr_2O_3=0.29-0.66 wt%, n=44; low-Ca pyroxene $Fs_{13.0\pm8.3}Wo_{1.9\pm2.7}$, Fe/Mn=26±14, n=41. Augite and aluminous diopside present. Mesostasis or glass (n=25) in 10 ferroan porphyritic chondrules Na_2O=6.27±3.20 wt%, K_2O=0.51±0.40 wt%, Na/Al=1.14, K/Al=0.95 (mean values, CI normalized). Fine-grained matrix S=1.7±1.6 wt%, n=17. Oxygen isotopes (Karen Ziegler, *UNM*) Oxygen isotope values of 3 acid-washed aliquots of bulk sample, 1.1, 1.3, 1.4 mg, gave $\delta^{17}O$ = 3.589, 2.734, 2.839, $\delta^{18}O$ = 5.511, 4.643, 4.201, $\Delta^{17}O$ = 0.679, 0.282, 0.621 (linearized, all permil).
Classification: Ordinary chondrite (L3.00), type 3.00 based on ferroan olivine mean Cr_2O_3 content and sigma from Grossman and Brearley (2005) and by the presence of S-rich matrix. Comparison of Cr_2O_3 in ferroan olivines done using the same microprobe and conditions at *UNM* gave: NWA 7731 (L3.00) Cr_2O_3=0.43±0.11 wt%, n=98; Semarkona (LL3.00) Cr_2O_3=0.41±0.09 wt%, n=45. Oxygen isotopes appear to be relatively heterogeneous and fall within the same range of $\delta^{17}O$ and $\delta^{18}O$ as NWA 7731 (Ziegler et al., 2014). Apparent mean chondrule size similar to NWA 7731 (Agee et al., 2013). Weathering grade (W1). Possibly paired with NWA 7731.
Specimens: 20.1 g including a probe mount on deposit at *UNM*, Adam Bates, Mendy Ouzillou, and Darryl Pitt hold the main mass.

Northwest Africa 8277 (NWA 8277)
(Northwest Africa)
Purchased: 2013
Classification: Lunar meteorite
History: Purchased by Adam Aaronson in Morocco, 2013.
Physical characteristics: Single stone, no fusion crust, irregular sandblasted exterior with numerous light- and dark-colored clasts. Saw cut reveals brecciated texture with white feldspar and green-brown pyroxene and olivine grains (up to 3 mm) set in a dark gray-green matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of polished mount shows a fragmental breccia of plagioclase, pyroxene, and olivine grains in a wide range of grain sizes. The groundmass is variable with some domains showing a uniform fine-grained subophitic plagioclase-pyroxene texture, while other domains show densely packed mineral clasts ranging from 10-300 μm. There are several sharp boundaries between the various textural domains, with at least two compositionally distinct olivine populations, and a wide range of pyroxene compositions, indicating multiple lithologies of a mingled fragmental breccia. Accessory ilmenite, silica polymorph, and troilite.
Geochemistry: (C. Agee, *UNM*). Fayalitic olivine grain $Fa_{92.0}$, Fe/Mn=92; forsteritic olivine $Fa_{41.1\pm11.8}$, Fe/Mn=103±8, n=9; pyroxene $Fs_{40.5\pm12.9}Wo_{22.4\pm9.4}$, Fe/Mn=65±9, n=63; plagioclase $An_{90.9\pm7.2}Ab_{8.6\pm6.8}Or_{0.5\pm0.5}$, n=30.
Classification: Achondrite (lunar breccia), comparison of macroscopic and backscatter-electron textures, geochemistry of pyroxenes, olivines, and plagioclase, indicate that this meteorite is likely paired with NWA 7611.
Specimens: A total of 21 g including a probe mount on deposit at *UNM*. *Aaronson* holds the main mass.

Northwest Africa 8287 (NWA 8287)
(Northwest Africa)
Purchased: 2013
Classification: Primitive achondrite (Acapulcoite)
History: Purchased by Brahim Tahiri from a Moroccan meteorite hunter and sent to his partner Sean Tutorow for classification, 2013.
Physical characteristics: Single stone, weathered exterior with dark brown patina. Saw cut reveals abundant metal and sulfide set in a fine-grained silicate groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount. Silicates: ~95% orthopyroxene, ~3% plagioclase, ~2% diopside. Silicate grains 50-200 μm, polygonal texture with 120° triple-junction grain boundaries. Numerous kamacite and troilite domains up to 1000 μm which constitute ~25% of this meteorite. Metal/sulfide veinlets throughout, many on grain boundaries.
Geochemistry: (C. Agee and H. Miley, *UNM*) Orthopyroxene $Fs_{10.6\pm0.1}Wo_{1.7\pm0.3}$, Fe/Mn=14±1, n=7; diopside $Fs_{4.9\pm0.1}Wo_{44.0\pm0.3}$, Fe/Mn=10±1, Cr_2O_3=1.06±0.02 wt%, n=6; plagioclase $Ab_{73.5\pm0.7}An_{23.6\pm0.6}Or_{2.9\pm0.2}$, n=8; kamacite Ni=10.8 wt%. Oxygen isotopes (K. Ziegler, *UNM*) Oxygen isotope values of 4 acid-washed aliquots of bulk sample, 1.5, 1.2, 1.5, 1.0 mg, gave $\delta^{17}O$ = 0.121, 0.236, 0.356, 0.500, $\delta^{18}O$ = 2.330, 2.585, 2.944, 3.200, $\Delta^{17}O$ = -1.109, -1.129, -1.198, -1.190 (linearized, all permil).
Classification: Primitive achondrite (Acapulcoite) based on oxygen isotopes which are coincident with the acapulcoite/lodranite field, distinguished from lodranite type by the modal abundance of plagioclase and the relatively small silicate grain size. This acapulcoite is a highly equilibrated orthopyroxenite and is unique in that olivine is absent.
Specimens: 20.03 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8288 (NWA 8288)
(Northwest Africa)
Purchased: 2013
Classification: Carbonaceous chondrite (CV3)
History: Purchased by Brahim Tahiri from a Moroccan meteorite hunter and sent to his partner Sean Tutorow for classification, 2013.
Physical characteristics: Ten fragments, dark, weathered, irregular exterior, saw cuts reveal many mm-sized chondrules and CAIs set in a dark gray matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows large (>1 mm) unequilibrated chondrules, many are porphyritic, abundant fine grained matrix.
Geochemistry: (C. Agee and H. Miley, *UNM*) Olivine $Fa_{12.4\pm11.7}$, range $Fa_{0.4\text{-}43.4}$, Fe/Mn=93±57, n=32; low-Ca pyroxene $Fs_{3.4.\pm4.1}Wo_{1.9\pm1.4}$, n=7.
Classification: Carbonaceous chondrite (CV3)
Specimens: 20.35 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8289 (NWA 8289)
(Northwest Africa)
Purchased: 2013
Classification: Carbonaceous chondrite (CV3)
History: Purchased by Brahim Tahiri from a Moroccan meteorite hunter and sent to his partner Sean Tutorow for classification, 2013.
Physical characteristics: Single stone, dark, weathered, irregular exterior, some orange oxidation patches, CAIs visible, dark gray matrix, friable.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount many irregular shaped porphryritic chondrules, most chondrules with abundant opaque inclusions, fine-grained matrix makes up about ~50% of this meteorite, ferroan olivines and pyroxenes are rare.

Geochemistry: (C. Agee and H. Miley, *UNM*) Olivine $Fa_{0.9\pm0.6}$, range $Fa_{0.4\text{-}2.0}$, Cr_2O_3=0.24±0.10 (wt%), CaO=0.33±0.12 (wt%), n=9; enstatite $Fs_{1.6\pm0.9}Wo_{0.9\pm0.1}$, n=7; plagioclase $An_{81.2\pm4.1}Ab_{18.6\pm4.1}Or_{0.2\pm0.1}$, n=7; aluminous augite $Fs_{35.5}Wo_{28.3}$, Al_2O_3=18.1 (wt%); spinel Mg#=93; gehlenite-rich melilite observed in CAIs. Oxygen isotopes (K. Ziegler, *UNM*) Oxygen isotope values of 3 acid-washed aliquots of bulk sample, 1.4, 1.1, 2.0 mg, gave $\delta^{17}O$ = -8.484, -4.744, -5.974, $\delta^{18}O$ = -3.877, -0.884, -2.277, $\Delta^{17}O$ = -6.437, -4.277, -4.772 (linearized, all permil).
Classification: Carbonaceous chondrite (CV3)
Specimens: 20.11 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8290 (NWA 8290)
(Northwest Africa)
Purchased: 2013
Classification: Carbonaceous chondrite (CO3.1)
History: Purchased by Brahim Tahiri from a Moroccan meteorite hunter and sent to his partner Sean Tutorow for classification, 2013.
Physical characteristics: Single stone, weathered exterior with small chondrules visible through desert patina, saw cut reveals densely packed chondrules in a dark brown matrix, a few small CAIs visible under low magnification.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows numerous unequilibrated chondrules, many are porphyritic, most 5-200 μm, largest observed 400 μm. Abundant opaque matrix, most chondrules with glass or mesostasis, and metal/sulfide blebs.
Geochemistry: (C. Agee and H. Miley, *UNM*) Olivine range $Fa_{0.3\text{-}48.0}$, n=26; ferroan olivine $Fa_{16.9\pm15.5}$, Fe/Mn=71±46, Cr_2O_3=0.22±0.08 wt%, n=15; olivine in type I chondrules, $Fa_{0.9\pm0.5}$, n=11; low-Ca pyroxene $Fs_{7.3\pm8.0}Wo_{2.0\pm1.3}$, Fe/Mn=43±35, n=12. Oxygen isotopes (K. Ziegler, *UNM*) Oxygen isotope values of 3 acid-washed aliquots of bulk sample, 1.0, 1.2, 1.6 mg, gave $\delta^{17}O$ = -5.494, -6.824, -6.784, $\delta^{18}O$ = -2.175, -3.510, -3.418, $\Delta^{17}O$ = -4.346, -4.971, -4.979 (linearized, all permil).
Classification: Carbonaceous chondrite (CO3.1) based on mean Cr_2O_3=0.22±0.08 wt% in ferroan olivines, approximately midway between Rainbow (CO3.2) and Colony (CO3.0), as reported by Grossman and Brearley (2005).
Specimens: 20.7 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8291 (NWA 8291)
(Northwest Africa)
Purchased: 2013
Classification: Mesosiderite
History: Purchased by Brahim Tahiri from a Moroccan meteorite hunter and sent to his partner Sean Tutorow for classification, 2013.
Physical characteristics: 45 small stones that are visually identical, irregular dark exterior with some iron staining, saw cut reveals mm-sized, bright metal grains set in dark brown silicate matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows approximately 70% silicate minerals and 30% metal. Silicate mineralogy ~70% pyroxene, ~25% plagioclase, accessory silica and olivine. Silicate grain sizes up to 300 μm. Metal: ~90% kamacite, ~10% taenite, 5-10% of total metal is oxidized. Metal domains up to 3 mm. Many metal/oxide veinlets and blebs throughout.
Geochemistry: (C. Agee and H. Miley, *UNM*) EMPA. Low Ca-pyroxene $Fs_{32.4\pm7.0}Wo_{2.7\pm0.7}$, Fe/Mn=28±2 n=9, olivine $Fa_{31.7.7}$, Fe/Mn=43, n=1, plagioclase $Or_{0.5\pm0.1}Ab_{9.0\pm1.5}An_{90.5\pm1.6}$, n=7.
Classification: Mesosiderite
Specimens: 20.95 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8292 (NWA 8292)
(Northwest Africa)
Purchased: 2013

Classification: Ordinary chondrite (L5)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, 2013.
Physical characteristics: Ten stones, weathered exterior saw cut reveals dark gray interior, chondrules visible.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows many distinct, porphyritic and radial chondrules. Plagioclase up to 50 μm. Matrix is permeated with oxide veins. Kamacite, oxidized iron, troilite, chromite, Cl-apatite, and merrillite present.
Geochemistry: (C. Agee and N. Muttik, *UNM*) EMPA. Olivine $Fa_{24.6\pm0.6}$, Fe/Mn=50±1, n=7, Low Ca-pyroxene $Fs_{20.1\pm1.7}Wo_{1.6\pm1.6}$, Fe/Mn=34±10, n=7.
Classification: Ordinary chondrite (L5), weathering grade (W3).
Specimens: 20.5 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8293 (NWA 8293)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite (L5)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, 2013.
Physical characteristics: Single stone, smooth fusion crust exterior, saw cut reveals scattered opaques set in a fresh, light colored groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows many distinct, equilibrated chondrules. Plagioclase up to 100 μm. Kamacite, minor oxidized iron, troilite, and chromite present.
Geochemistry: (C. Agee and N. Muttik, *UNM*) EMPA. Olivine $Fa_{25.0\pm0.4}$, Fe/Mn=50±2, n=8, Low Ca-pyroxene $Fs_{22.2\pm1.3}Wo_{1.6\pm0.3}$, Fe/Mn=32±3, n=8.
Classification: Ordinary chondrite (L5), weathering grade (W1).
Specimens: 19.2 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8294 (NWA 8294)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite (H6)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, 2013.
Physical characteristics: Single stone, weathered irregular exterior saw cut reveals fine-grained reddish brown interior, porous.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows a few equilibrated chondrules, coarse-grained plagioclase. Most metal domains are oxidized, many with weathered out voids.
Geochemistry: (C. Agee and H. Miley, *UNM*) EMPA. Olivine $Fa_{18.9\pm0.7}$, Fe/Mn=41±4, n=18, low Ca-pyroxene $Fs_{15.1\pm0.2}Wo_{4.2\pm0.0}$, Fe/Mn=22±0, n=2.
Classification: Ordinary chondrite (H6), weathering grade (W4).
Specimens: 26.44 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8295 (NWA 8295)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite (H4)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, 2013.

Physical characteristics: Single stone, weathered dark exterior, saw cut reveals abundant fine-grained metal set in a dark brown groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows a few distinct, equilibrated chondrules, plagioclase up to 50 μm, oxide veinlets throughout.
Geochemistry: (C. Agee and H. Miley, *UNM*) EMPA. Olivine $Fa_{20.4\pm2.3}$, Fe/Mn=42±7, n=13, low Ca-pyroxene $Fs_{17.7\pm1.7}Wo_{1.7\pm0.8}$, Fe/Mn=24±3, n=8; plagioclase $Ab_{81.1\pm2.9}An_{12.6\pm1.2}Or_{6.3\pm1.7.}$
Classification: Ordinary chondrite (H4), weathering grade (W2).
Specimens: 26.55 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8296 (NWA 8296)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite (L5)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, 2013.
Physical characteristics: Single stone, weathered dark exterior, saw cut reveals scattered fine-grained metal set in a dark brown groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows a numerous distinct, equilibrated chondrules.
Geochemistry: (C. Agee and H. Miley, *UNM*) EMPA. Olivine $Fa_{24.8\pm0.5}$, Fe/Mn=51±3, n=26, low Ca-pyroxene $Fs_{21.2\pm1.3}Wo_{1.5\pm0.7}$, Fe/Mn=30±1, n=11.
Classification: Ordinary chondrite (L5), weathering grade (W2).
Specimens: 23.70 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8297 (NWA 8297)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite (H6)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, 2013.
Physical characteristics: Five identical stones, weathered dark exterior, saw cut reveals abundant fine-grained metal set in a dark brown groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows a numerous distinct, equilibrated chondrules, plagioclase up to 150 μm. Oxidized iron and veinlets throughout.
Geochemistry: (C. Agee and H. Miley, *UNM*) EMPA. Olivine $Fa_{19.4\pm0.3}$, Fe/Mn=39±2, n=25, low Ca-pyroxene $Fs_{17.1\pm0.4}Wo_{1.3\pm0.3}$, Fe/Mn=24±1, n=11; plagioclase $Ab_{82.5\pm0.2}An_{11.8\pm0.2}Or_{5.7\pm0.2}$, n=2.
Classification: Ordinary chondrite (H6), weathering grade (W3).
Specimens: 36.23 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8298 (NWA 8298)
Northwest Africa
Purchased: 2013
Classification: Ordinary chondrite (L5)
History: One crusted stone weighing 206.9 g was found and purchased in Agadir in 2013. Greg Catterton acquired the sample from a meteorite prospector in 2013.
Physical characteristics: Black shiny fusion crust fusion crust covers ~40% of the flattened rounded stone.
Petrography: Description and classification (A. Love, *App*): Sample is light in color and displays recrystallized chondritic texture composed of indistinct chondrules, with a mean diameter of 843 μm, in recrystallized matrix containing unweathered, irregularly shaped grains of FeNi and FeS. Matrix contains secondary plagioclase grains with an average length of 35 μm.

Geochemistry: (A. Love, *App*) Olivine $Fa_{23.8\pm0.2}$, n=12; low Ca pyroxene $Fs_{21.4\pm0.5}Wo_{1.8\pm0.6}$, n=12.
Classification: Ordinary Chondrite (L5 S3 W1)
Specimens: 23.2 g and 1 polished thin section and 2 polished mounts are on deposit at *App*

Northwest Africa 8300 (NWA 8300)
Morocco
Purchased: June 2013
Classification: Carbonaceous chondrite (CM2)
Petrography: (M.A. Ivanova, *Vernad*) The meteorite consists of chondrules, their fragments, and refractory inclusions embedded in a fine-grained matrix. Mesostasis of many chondrules replaced by carbonate material. The main minerals of chondrules are olivine and pyroxene. The minor phases are plagioclase, spinel, chromite, sulfides, Fe,Ni metal grains and carbonates. The main minerals of refractory inclusions are spinel, Al-Ti-diopside, melilite, and anorthite.
Geochemistry: Mineral composition and geochemistry: Olivine (EMP) is $Fa_{0.85-41.6.}$ Pyroxene is represented by low-Ca pyroxene $Fs_{0.9-43}Wo_{0.7-3.8}$ and augite $Fs_{0.7-2.1}Wo_{32-43.}$ Oxygen isotopic composition (I.A. Franchi, *OU*): $\delta^{17}O = 2.36$, $\delta^{18}O = 10.51$, $\Delta^{17}O = -3.14$ (all ‰).
Classification: carbonaceous chondrite (CM2)

Northwest Africa 8301 (NWA 8301)
Morocco
Purchased: June 2013
Classification: Carbonaceous chondrite (CM2)
Petrography: (M.A. Ivanova, *Vernad*) The meteorite consists of chondrules, their fragments, and refractory inclusions embedded in a fine-grained matrix. The main minerals of chondrules are olivine and pyroxene. The minor phases are plagioclase, spinel, chromite, sulfides, magnetite, Fe,Ni metal grains. The main minerals of refractory inclusions are spinel, Al-Ti-diopside, melilite, anorthite and hibonite. Secondary phases are nepheline and sodalite.
Geochemistry: Mineral composition and geochemistry: Olivine (EMP) is $Fa_{0.72-63.}$ Pyroxene is represented by low-Ca pyroxene $Fs_{1.0-3.6}Wo_{0.5-1.2}$ and augite $Fs_{0.9-4.1}Wo_{8-41.}$ Oxygen isotopic composition (I.A. Franchi, *OU*): $\delta^{17}O = 0.68$, $\delta^{18}O = 8.11$, $\Delta^{17}O = -3.54$ (all ‰).
Classification: carbonaceous chondrite (CM2)

Northwest Africa 8302 (NWA 8302)
(Northwest Africa)
Purchased: 2010
Classification: Iron meteorite (IIAB)
Petrography: A 139 g piece of the type specimen shows a typical hexahedrite structure. Inclusions are common but small. Most are FeS, 1-3 mm in long dimension, and always surrounded by schreibersite. Oxidation is minor, and mainly at inclusion boundaries; there may be a heat-altered zone but better sample prep is needed to confirm this. There are parallel 1 mm thick bands crossing the specimen, which may be shear zones that were later annealed.
Geochemistry: Composition: Co, 4.54 mg/g; Ni, 57.0 mg/g; Ga, 59.6 µg/g; Ge, <250 µg/g; As, 4.6 µg/g Ir, 7.6 µg/g; and Au, 0.59 µg/g. No close NWA relatives; nearest in Ir is NWA 3202 with 11.4 µg/g.

Northwest Africa 8304 (NWA 8304)
(Northwest Africa)
Purchased: 2013 Nov
Classification: Primitive achondrite (Lodranite)
History: Purchased in Morocco in November 2013 by Mike Farmer.
Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular aggregate (grainsize 0.4-1.2 mm) of olivine, orthopyroxene, intermediate plagioclase, merrillite, kamacite and troilite.

Geochemistry: Olivine ($Fa_{13.8-14.1}$, FeO/MnO = 35-41), orthopyroxene ($Fs_{12.3-12.4}Wo_{2.3-2.5}$, FeO/MnO = 15-18).
Classification: Lodranite.
Specimens: 20.6 g including one polished endcut at *UWB*. The remaining material is held by *Farmer*.

Northwest Africa 8306 (NWA 8306)
(Northwest Africa)
Purchased: 2014 Feb
Classification: Lunar meteorite (feldspathic breccia)
History: Purchased by Darryl Pitt in February 2014 from a Moroccan dealer at the Tucson Gem and Mineral Show.
Physical characteristics: Single stone (1389 g) lacking fusion crust and composed of pale gray, pale yellow and white clasts in a very dark gray matrix.
Petrography: (A. Irving and S. Kuehner, *UWS*) Breccia composed of angular clasts in a partly glassy matrix containing trapped microbubbles. Minerals are olivine, pigeonite, fayalite, anorthite, silica (as separate clasts), hedenbergite, Ti-poor chromite, Ti-rich chromite, ilmenite, and minor exsolved pigeonite, baddeleyite, kamacite and barite. One fine grained, quenched-textured basaltic clast was found.
Geochemistry: Olivine ($Fa_{26.5-36.0}$; FeO/MnO = 102-116, N = 3), pigeonite ($Fs_{19.8-24.0}Wo_{19.9-17.0}$; FeO/MnO = 47-56; $Fs_{28.8}Wo_{6.5}$; FeO/MnO = 55), fayalite ($Fa_{72.6}$; FeO/MnO = 104). Bulk composition (R. Korotev, *WUSL*) INAA of subsamples gave the following mean abundances (in wt.%) FeO 8.9, Na_2O 0.41; (in ppm) Sc 17.1, Ni 230, La 7.3, Sm 3.30, Eu 0.93, Yb 2.30, Lu 0.317, Hf 2.4, Th 1.0.
Classification: Lunar (feldspathic regolithic breccia).
Specimens: A 20.2 g specimen with one polished surface is at *UWB*. The main mass is held by *DPitt*.

Northwest Africa 8307 (NWA 8307)
(Northwest Africa)
Purchased: 2012 Oct
Classification: Ureilite
History: Purchased by Marc Jost in October 2012 at the Munich Mineral Show.
Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular aggregate of olivine (with fairly thick, patchy, opaque metal-rich rims) and pigeonite.
Geochemistry: Olivine (core $Fa_{22.1}$, rim $Fa_{2.7}$), pigeonite ($Fs_{18.2-18.3}Wo_{9.8-10.1}$).
Classification: Ureilite.
Specimens: 22.2 g including one polished thin section at *UWB*. The remaining material is held by Mr. M. Jost.

Northwest Africa 8308 (NWA 8308)
(Northwest Africa)
Purchased: 2012 Aug
Classification: HED achondrite (Howardite)
History: Purchased from a Moroccan dealer in Brügg, Switzerland in August 2012 by Marc Jost.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fresh fragmental breccia composed of lithic clasts of gabbroic eucrite, diogenite (~10 vol.%) and rare basaltic eucrite, plus mineral clasts of various pyroxenes, calcic plagioclase, silica polymorph, Ti-poor chromite, ilmenite, troilite and minor Ni-free metal, in a finer matrix of the same phases.
Geochemistry: Diogenitic orthopyroxene ($Fs_{24.5-27.1}Wo_{1.7-2.4}$, FeO/MnO = 32-34), orthopyroxene ($Fs_{47.3}Wo_{3.3}$, FeO/MnO = 31), augite ($Fs_{15.8-20.2}Wo_{42.3-42.1}$, FeO/MnO = 24-29), olivine ($Fa_{44.0-44.3}$, FeO/MnO = 49).
Classification: Howardite.
Specimens: 21.4 g including one polished thin section at *UWB*. The remaining material is held by Mr. M. Jost.

Northwest Africa 8309 (NWA 8309)
(Northwest Africa)
Purchased: 2012 Jun
Classification: HED achondrite (Eucrite)
History: Purchased from a Moroccan dealer in Brügg, Switzerland in June 2012 by Marc Jost.
Petrography: (A. Irving and S. Kuehner, *UWS*) This fresh specimen exhibits a cataclastic structure with larger and smaller domains, all of which retain the primary texture of an extremely fine grained (0.02 to 0.2 mm), intersertal igneous rock. Minerals are exsolved pigeonite, calcic plagioclase, silica polymorph, Ti-chromite, ilmenite (in parallel growth with Ti-poor chromite), troilite and zircon.
Geochemistry: Host orthopyroxene ($Fs_{60.6-60.7}Wo_{2.5-2.6}$; FeO/MnO = 32-34), clinopyroxene exsolution lamellae ($Fs_{26.2-27.2}Wo_{43.5-42.1}$; FeO/MnO = 32).
Classification: Eucrite, basaltic, cataclastic. The primary basaltic eucrite lithology is unusually fine grained.
Specimens: 21.2 g including one polished thin section at *UWB*. The remaining material is held by Mr. M. Jost.

Northwest Africa 8311 (NWA 8311)
(Northwest Africa)
Purchased: 2012 Mar
Classification: Ureilite
History: Purchased by Marc Jost in March 2012 from a dealer in Agadir, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Coarse protogranular aggregate of olivine (with fairly thick, patchy, opaque metal-rich rims) and pigeonite.
Geochemistry: Olivine (core $Fa_{21.2}$, rim $Fa_{8.6}$), pigeonite ($Fs_{18.4-18.8}Wo_{5.7-5.8}$).
Classification: Ureilite.
Specimens: 20.9 g including one polished thin section at *UWB*. The remaining material is held by Mr. M. Jost.

Northwest Africa 8313 (NWA 8313)
(Northwest Africa)
Purchased: 2014 Jan
Classification: HED achondrite (Diogenite)
History: Purchased by *GHupé* in January 2014 from a Moroccan dealer at the Tucson Gem and Mineral Show.
Petrography: (A. Irving and S. Kuehner, *UWS*) Matrix-poor breccia composed primarily of orthopyroxene with accessory olivine, altered Ni-free metal, chromite and troilite.
Geochemistry: Orthopyroxene ($Fs_{25.3-26.1}Wo_{2.8-3.6}$), FeO/MnO =28), olivine ($Fa_{22.8-24.1}$, FeO/MnO = 34-37).
Classification: Diogenite. The orthopyroxene has a composition typical for diogenites, but the olivine is not in equilibrium with it and its FeO/MnO ratio is much lower than for olivine in diogenites, so it must be an exotic component.
Specimens: 5.33 g including one polished thin section at *UWB*. The remaining material is held by *GHupé*.

Northwest Africa 8316 (NWA 8316)
(Northwest Africa)
Purchased: 2014 Jan
Classification: HED achondrite (Diogenite)
History: Purchased by *GHupé* in January 2014 from a Moroccan dealer at the Tucson Gem and Mineral Show.

Petrography: (A. Irving and S. Kuehner, *UWS*) Matrix-poor monomict breccia composed predominantly of orthopyroxene with minor (~5 vol.%) olivine clinopyroxene, Al-bearing chromite, troilite and Ni-poor kamacite.
Geochemistry: Orthopyroxene ($Fs_{23.2-25.5}Wo_{2.8-2.5}$), FeO/MnO = 29-30), olivine ($Fa_{32.9-33.3}$, FeO/MnO = 50-53), clinopyroxene ($Fs_{10.3}Wo_{44.6}$, FeO/MnO = 25).
Classification: Diogenite, monomict breccia.
Specimens: 20.1 g including one polished thin section at *UWB*. The remaining material is held by *GHupé*.

Northwest Africa 8317 (NWA 8317)
(Northwest Africa)
Purchased: 2014 Jan
Classification: HED achondrite (Eucrite, brecciated)
History: Purchased from a Moroccan dealer in New York City in January 2014 by Darryl Pitt.
Petrography: (A. Irving and S. Kuehner, *UWS*) Breccia composed of both gabbroic and basaltic-textured eucrite clasts plus related mineral debris. The pyroxenes in all textural components have a distinctive pinkish clove brown color, suggesting that this is a genomict breccia. Minerals are exsolved pigeonite (unusually ferroan), calcic plagioclase, silica polymorph, ilmenite and troilite.
Geochemistry: Host orthopyroxene ($Fs_{63.8-64.2}Wo_{2.0-2.2}$; FeO/MnO = 32-35), clinopyroxene exsolution lamellae ($Fs_{27.5-27.8}Wo_{43.6-43.1}$; FeO/MnO = 30-31).
Classification: Eucrite, genomict breccia. Pyroxene in this specimen is unusually ferroan.
Specimens: 20.1 g including one polished thin section at *UWB*. The remaining material is held by *DPitt*.

Northwest Africa 8318 (NWA 8318)
(Northwest Africa)
Purchased: 2014 Feb
Classification: HED achondrite (Eucrite, monomict)
History: Purchased by Darryl Pitt from a Moroccan dealer in February 2014.
Petrography: (A. Irving and S. Kuehner, *UWS*) Very fresh monomict breccia composed of clasts of basaltic eucrite and related crystalline debris. A moderate degree of recrystallization is evident from the texture of the coarse grained matrix. Eucrite clasts consist of exsolved pigeonite, calcic plagioclase, silica polymorph, ilmenite, Ti-rich chromite and troilite.
Geochemistry: Host orthopyroxene ($Fs_{57.8-60.4}Wo_{2.1-1.8}$; FeO/MnO = 32-33), clinopyroxene exsolution lamellae ($Fs_{25.4-25.5}Wo_{42.4-42.6}$; FeO/MnO = 30-31).
Classification: Eucrite, monomict.
Specimens: 14.2 g including one polished thin section at *UWB*. The remaining material is held by *DPitt*.

Northwest Africa 8321 (NWA 8321)
(Northwest Africa)
Purchased: Dec 2013
Classification: HED achondrite (Diogenite)
Physical characteristics: The meteorite is partly covered by black fusion crust and shows a light yellowish interior.
Petrography: The achondrite displays a cumulate texture of dominantly large orthopyroxene crystals with less abundant calcic plagioclase. Accessory minerals include chromite and troilite.
Geochemistry: low-Ca pyroxene: $Fs_{21.3\pm0.6}Wo_{3.2\pm1.2}$ (range $Fs_{20.2-22-2}Wo_{1.7-5.1}$, n=14), FeO/MnO: 25-29; clacic plagioclase: $An_{88\pm0.9}$ (range $An_{86.6-89.5}$, n=15)

Northwest Africa 8323 (NWA 8323)
(Northwest Africa)
Purchased: Dec 2013

Classification: Carbonaceous chondrite (CV3)
Petrography: The meteorite displays a black to dark grayish interior and consists of abundant chondrules, CAIs, and amoeboid olivine aggregates set in a fine-grained, almost opaque matrix. Chondrules are typically 0.5 to 1 mm in size; FeNi metal is rare.

Northwest Africa 8326 (NWA 8326)
(Northwest Africa)
Purchased: Dec 2013
Classification: HED achondrite (Diogenite)
Physical characteristics: The eight individuals are partly to totally covered by black fusion crust and show a light greyish interior.
Petrography: The meteorite displays a pronounced cumulate texture of predominantly large orthopyroxene and plagioclase crystals. Orthopyroxene is heavily fractured and plagioclase partly converted to maskelynite due to shock. Accessory minerals include augite, SiO_2 polymorphs, chromite and troilite.
Geochemistry: low-Ca pyroxene: $Fs_{35.5\pm0.4}Wo_{2.5\pm0.5}$ ($Fs_{34.4\text{-}36.1}Wo_{1.7\text{-}4.2}$, n=17), FeO/MnO: 26-32; Ca-pyroxene: $Fs_{14.9\pm0.2}Wo_{43.8\pm0.2}$ ($Fs_{14.6\text{-}15.1}Wo_{43.5\text{-}44}$, n=10), FeO/MnO: 22-26; clacic plagioclase: $An_{84.4\pm1}$ ($An_{83.2\text{-}86.3}$, n=12)

Northwest Africa 8330 (NWA 8330)
Morocco
Purchased: Jan 2014
Classification: Ordinary chondrite (LL3)
History: Purchased from a dealer in Morocco in 2014 by Aras Jonikas
Physical characteristics: One brown partially fusion crusted stone, cut surface reveals many very closely packed chondrules of various sizes and colors.
Petrography: (A. Rubin, *UCLA*) Microprobe examination of a polished mount shows the rock contains very sharply defined chondrules averaging about 600 μm in diameter; this is in the LL range. Chondrule textural types include PO, POP, PP, BO, C, RP. Many of the chondrules contain polysynthetically twinned low-Ca clinopyroxene phenocrysts. Small amounts of fine-grained silicate matrix material are present.
Geochemistry: Mineral compositions and geochemistry: Olivine $Fa_{15.7\pm10.5}$ ($Fa_{0.52\text{-}37.7}$, n=24), olivine Cr_2O_3 is 0.06±0.08 wt.%, 21% of the olivine Fa analyses are in the LL range; low-Ca pyroxene $Fs_{7.8\pm4.7}Wo_{0.8\pm1.2}$ ($Fs_{1.9\text{-}14.0}$, n=13); Ca-pyx $Fs_{22.7\pm1.3}Wo_{20.5\pm10.5}$ (n=5).
Classification: Ordinary Chondrite (LL3), Cr_2O_3 indicates that the petrologic type is >3.2, the absence of isotropic glass suggests that the petrologic type is >3.5.
Specimens: 24.9 g type specimen including a probe mount and a 20.47 g slice on deposit at *UCLA*, Aras Jonikas holds the main mass

Northwest Africa 8331 (NWA 8331)
Morocco
Purchased: 2002
Classification: Carbonaceous chondrite (CV3)
History: The meteorite was bought in 2002 in Sainte-Marie-aux-Mines, France, from a Moroccan dealer
Physical characteristics: A single dark stone without fusion crust. Cut face display abundant orange and brownish chondrules in a dark brown matrix.
Petrography: (J. Gattacceca, B. Devouard, *CEREGE*) Chondrule mean apparent size 934±914 μm (N=57), up to 6 mm. Most chondrules are surrounded by fine-grained dark rims. Modal abundances by point counting: 45 vol% chondrules, 40 vol% matrix, 13 vol% opaques. Opaques consist mostly of troilite (11 vol%), both in matrix and chondrules, in grains up to 500 μm. Metal is very scarce. Magnetic

measurements (hysteresis) indicate the presence of about 5 wt% magnetite, present as fine grains in the matrix. Rare refractory inclusions up to 1 mm.
Geochemistry: Chondrule olivine $Fa_{6.4\pm5.2}$, PMD 62%, range 0.7-20.5, mean FeO/MnO=53, mean NiO 0.08 wt.%, N=19. Cr_2O_3 in ferroan olivine 0.18±0.11 wt.% (N=13). Matrix olivine Fa~56. Orthopyroxene $Fs_{1.7\pm0.6}Wo_{1.0\pm0.4}$, PMD 36%, mean NiO 0.15 wt.%, N=10. FeNi metal Ni=60 wt.% (N=2). Oxygen isotopic compositions: (J. Gattacceca and C. Sonzogni, *CEREGE*) analysis of four 1.5 mg acid-washed chondrule samples (from two different chondrules) by laser fluorination gave $\delta^{17}O$ = -5.67, -5.54, -3.71, -3.48; $\delta^{18}O$ = -1.50, -1.34, -0.36, 0.11; $\Delta^{17}O$ = -4.89, -4.84, -3.52, -3.53 (all per mil). Magnetic susceptibility log χ = 4.36 (c in 10^{-9} m^3/kg).
Classification: Carbonaceous chondrite (CV3), oxidized subgroup.
Specimens: 8.7 g and a polished section at *CEREGE*. Main mass with N. Tourment.

Northwest Africa 8336 (NWA 8336)
(Northwest Africa)
Purchased: 2014 Feb
Classification: HED achondrite (Eucrite, monomict)
Petrography: (K. Metzler, *IfP*) Coarse-grained breccia consisting of gabbroic eucrite clasts and subrounded melt-rock clasts, embedded in a fine-grained clastic matrix of mainly pyroxene and plagioclase fragments. Pyroxene in eucrite clasts and clastic matrix with strong recrystallization textures and relict augite exsolution lamellae. Plagioclase shows strong undulatory extinction. Localized melt pockets with vesicles and fluidal texture of plagioclase grains. Accessory minerals are a silica polymorph, chromite, ilmenite, and very minor metallic iron.
Geochemistry: Pigeonite host: $Fs_{59.3\pm3}Wo_{4.9\pm3}$ (n=9); Augite lamellae, $Fs_{27.2\pm2}Wo_{42.8\pm1.7}$ (n=7). Plagioclase compositions, $An_{92.5\pm2}$ ($An_{89\text{-}95}$, n=13).
Classification: Strongly shocked eucrite, containing gabbroic eucrite clasts and melt rock clasts.

Northwest Africa 8337 (NWA 8337)
(Northwest Africa)
Purchased: 2012
Classification: Iron meteorite (IAB, ungrouped)
History: This sample was donated to *UCLA* by Arlene Schlazer.
Petrography: The type specimen dimensions are about 4 × 3 × 0.3 cm thick. It is a medium octahedrite containing numerous 1-3 mm troilite masses which tend to be clustered. Schreibersite masses are common but small, typically 0.05 × 0.3 mm. The bandwidth is 0.7±0.1 mm. The heat-altered zone is missing with the possible exception of one small area where there is a hint of taenite dissolution. Rust forms on a time scale of weeks around some inclusions.
Geochemistry: Composition: Co, 4.48 mg/g; Ni, 111.8 mg/g; Ga, 20.6 μg/g; Ge, <120 μg/g; As, 11.6 μg/g; Ir, 3.32 μg/g; and Au, 1.286 μg/g. The contents of Cu (760 μg/g) and Sb (1002 ng/g) are exceptionally high. Composition is unique. there are no close relatives.

Northwest Africa 8338 (NWA 8338)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Eucrite, melt breccia)
History: Purchased by Ali and Mohammed Hmani in Erfoud, Morocco, 2013.
Physical characteristics: Single stone, light brown-green, weathered, irregular surface, with some vesicles visible, one prominent vesicle ~2 cm in diameter. Saw cut reveals scattered plagioclase and pyroxene fragments up to 3 mm set in a very fine grained matrix, numerous vesicles throughout, many <1 mm, though larger >1 mm also present.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows many fragmental plagioclase and pyroxene grains 50-2000 μm surrounded by vesicular melt veins and pools, some melt

zones transitioning to a groundmass of very fine-grained acicular plagioclase and equant pyroxene. Fragmental plagioclase and pyroxene show irregular resorption or reaction rims, most pyroxene possess exsolution lamellae. Accessory iron metal, troilite, chromite, and silica.
Geochemistry: (C. Agee and H. Miley, *UNM*) Low-Ca pyroxene $Fs_{56.9\pm5.0}Wo_{8.2\pm4.3}$, Fe/Mn=32±1, n=17; augite $Fs_{29.9\pm1.8}Wo_{41.3\pm2.0}$, Fe/Mn=32±2, n=12; plagioclase $An_{88.8\pm4.0}$, n=9.
Classification: Achondrite (Eucrite, melt breccia) fragmental, equilibrated basaltic eucrite grains set in a vesicular eucritic melt rock.
Specimens: 24.3 g including a probe mount on deposit at *UNM*, Ali and Mohammed *Hmani* hold the main mass.

Northwest Africa 8339 (NWA 8339)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Eucrite, cumulate)
History: Purchased by Ali and Mohammed Hmani in Erfoud, Morocco, 2013.
Physical characteristics: A dozen fragments with identical appearance. Shiny black fusion crust, broken surfaces show coarse white plagioclase and light green pyroxene.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows ~75% pyroxene and ~25% plagioclase, grains up to 2000 μm. Accessory troilite, chromite, and silica.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Low-Ca pyroxene $Fs_{34.5\pm0.4}Wo_{2.2\pm0.6}$, Fe/Mn=31±1, n=34; augite $Fs_{20.3\pm5.8}Wo_{31.0\pm10.9}$, Fe/Mn=27±4, n=3; plagioclase $An_{88.5\pm1.2}$, n=5.
Classification: Achondrite (cumulate eucrite).
Specimens: 20.5 g including a probe mount on deposit at *UNM*, Ali and Mohammed *Hmani* hold the main mass.

Northwest Africa 8341 (NWA 8341)
(Northwest Africa)
Purchased: 2012
Classification: Enstatite chondrite (EL6)
Petrography: No chondrules were found. Most of this meteorite is composed of enstatite. Minor phases include troilite, schreibersite, metal.
Geochemistry: Enstatite $En_{97.8}$; FeNi metal Fe 91.56, Ni 6.03, Si 0.91, Co 0.54 %.

Northwest Africa 8342 (NWA 8342)
(Northwest Africa)
Purchased: 2013
Classification: Carbonaceous chondrite (CO3.1)
History: Purchased by F. Kuntz in Erfoud, Morocco, January 2013.
Physical characteristics: Single stone. Dark brown exterior, saw cut reveals scattered, very small chondrules set in a dark brown matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows numerous chondrules up to 200 μm, fine-grained matrix makes up about 40% of this meteorite, some domains and chondrules appear sulfide/metal-rich.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Type I chondrule olivine $Fa_{1.2\pm0.3}$, n=9; ferroan chondrule olivine $Fa_{36.3\pm15.0}$, Fe/Mn=97±27, Cr_2O_3=0.26±0.14 wt%, n=46; low-Ca pyroxene $Fs_{4.1\pm4.4}Wo_{2.3\pm1.2}$, Fe/Mn=18±11, n=15; aluminous diopside.
Classification: Carbonaceous chondrite (CO3.1) based on mean Cr_2O_3=0.26±0.14 wt% in ferroan olivines, values plotting closer to Colony (CO3.0) than to Rainbow (CO3.2) as reported by Grossman and Brearley (2005).
Specimens: 21.35 g including a probe mount on deposit at *UNM*, *Kuntz* holds the main mass.

Northwest Africa 8343 (NWA 8343)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Howardite)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, 2013.
Physical characteristics: Four stones with identical appearance (338.70 g, 192.18 g, 96.79 g, 73.25 g), irregular dark brown weathered exterior. Saw cut reveals breccia with white, green, and dark gray clasts.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows a fragmental to cataclastic breccia with equilibrated (exsolution lamellae) and unequilibrated (igneous zoned) pyroxenes throughout. Silica, ilmenite, chromite, and iron-nickel metal present. Approximately 30% of this meteorite is diogenitic, ~60% is basaltic eucrite, and ~10% is cumulate eucrite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Diogenite minerals: low-Ca pyroxene $Fs_{29.5\pm5.2}Wo_{3.6\pm1.3}$, Fe/Mn=30±3, n=4; olivine $Fa_{33.5}$, Fe/Mn=61, n=1; plagioclase $An_{93.2\pm0.7}Ab_{6.5\pm0.6}Or_{0.3\pm0.1}$, n=3. Basaltic eucrite minerals: low-Ca pyroxene $Fs_{55.3\pm2.7}Wo_{8.1\pm2.9}$, Fe/Mn=32±0, n=9; augite $Fs_{39.1\pm1.2}Wo_{39.8\pm0.5}$, Fe/Mn=33±1, n=2, olivine $Fa_{77.4}$, Fe/Mn=41, n=1; plagioclase $An_{88.4\pm2.2}Ab_{11.1\pm2.2}Or_{0.5\pm0.0}$, n=2. Cumulate eucrite minerals: low-Ca pyroxene $Fs_{37.9.3\pm2.2}Wo_{5.0\pm2.0}$, Fe/Mn=30±1, n=3; plagioclase $An_{91.5\pm0.3}Ab_{8.0\pm0.3}Or_{0.5\pm0.1}$, n=2.
Classification: Achondrite (howardite)
Specimens: 22.5 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8344 (NWA 8344)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Eucrite, monomict)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, 2013.
Physical characteristics: Three stones with identical appearance (1380.27 g, 75.23 g, 40.20 g), irregular dark brown weathered exterior. Saw cut reveals breccia with white clasts up to 1 cm set in a dark matrix, vesicles up to 4 mm observed.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows brecciated basaltic eucrite clasts, also fragmental to cataclastic fine-grained domains, numerous shock melt veins up to 500 μm wide. Many pyroxenes show exsolution lamellae. Accessory troilite, chromite, ilmenite, and silica.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Low-Ca pyroxene $Fs_{60.6\pm1.4}Wo_{3.4\pm1.2}$, Fe/Mn=32±1, n=17; augite $Fs_{31.4\pm5.1}Wo_{38.2\pm5.7}$, Fe/Mn=32±2, n=10; plagioclase $An_{89.3\pm1.8}Ab_{10.0\pm1.6}Or_{0.8\pm0.5}$, n=8. Shock melt veins SiO_2=47.14±0.19, CaO/Al_2O_3=0.62±0.02 (wt%), Mg#=37.5±1.2, Fe/Mn=34±2, n=8.
Classification: Achondrite (monomict eucrite).
Specimens: 21.2 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8345 (NWA 8345)
(Northwest Africa)
Purchased: 2013
Classification: Carbonaceous chondrite (CO3.2)
History: Purchased by Sean Tutorow from a Moroccan dealer in Quartzsite, Arizona, January 2013.
Physical characteristics: Three pieces that fit together, partial black fusion crust, saw cut reveals many sub-mm chondrules and sparse small CAIs set in a dark gray-brown matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows numerous, small (50-400 μm) unequilibrated chondrules, many are porphyritic, fine grained matrix makes up approximately 30% of this meteorite. Melilite, anorthite, Ti-rich aluminous diopside, aluminous diopside, aluminous enstatite, aluminous low-Ca pyroxene, augite, troilite and Fe-Ni metal detected.

Geochemistry: (C. Agee and N. Muttik, *UNM*) Type I chondrules: olivine $Fa_{1.3\pm0.4}$, n=7; enstatite $Fs_{1.9.\pm1.7}Wo_{0.8\pm1.6}$, n=6. Type II chondrules: olivine $Fa_{31.5\pm17.6}$, Fe/Mn=91±26, Cr_2O_3=0.14±0.09 wt%, n=23; low-Ca pyroxene $Fs_{5.5\pm4.3}Wo_{1.6\pm1.3}$, n=6.
Classification: Carbonaceous chondrite (CO3.2). Type 3.2 based on mean value and sigma of Cr_2O_3 in ferroan chondrule olivines, as given by Grossman and Brearley (2005).
Specimens: 21 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8346 (NWA 8346)
Morocco
Purchased: June 2010
Classification: Iron meteorite (IAB-sLL)
Petrography: Coarse medium octahedrite, bandwidth 1.31±0.23 mm (n=38). Numerous tiny schreibersite crystals, graphite, rare troilite. X-ray fluorescence maps were used to characterize mineralogy/structure.
Geochemistry: composition by ICPMS (K. Tachikawa, *CEREGE*): 4.80 mg/g Co, 84.3 mg/g Ni, 13 µg/g Cr, 175 µg/g Cu, 57.3 µg/g Ga, 175 µg/g Ge,16.6 µg/g As, 1.9 µg/g Ir, 4.3 µg/g Pt, 1.2 µg/g Au.
Classification: IAB-sLL

Northwest Africa 8347 (NWA 8347)
Morocco
Purchased: June 2010
Classification: Iron meteorite (IAB-sLL)
Petrography: Coarse octahedrite, bandwidth 1.64±0.25 mm (n=28) . Numerous tiny schreibersite crystal, rare troilite. X-ray fluorescence maps were used to characterize mineralogy/structure.
Geochemistry: Composition by ICPMS (K. Tachikawa, *CEREGE*): 4.38 mg/g Co, 79.9 mg/g Ni, 6.8 µg/g Cr, 186 µg/g Cu, 76.4 µg/g Ga, 257 µg/g Ge,15 µg/g As, 2.3 µg/g Ir, 5.3 µg/g Pt, 1.5 µg/g Au.
Classification: IAB-sLL

Northwest Africa 8348 (NWA 8348)
Morocco
Purchased: June 2010
Classification: Iron meteorite (IAB-sHL)
Petrography: Plessitic octahedrite with anomalous structure. Plessitic cm-sized domains with relict Widmanstätten pattern in their center, separated by a continuous millimeter-thick undulose network of swathing kamacite and schreibersite crystals, up to 8 mm long. Neighboring plessitic domains have incoherent orientation. Contact between kamacite and plessitic domains is enriched in Ni. X-ray fluorescence maps were used to characterize mineralogy/structure.
Geochemistry: Composition by ICPMS (K. Tachikawa, *CEREGE*): 5.49 mg/g Co, 146.5 mg/g Ni, 20.1 µg/g Cr, 495 µg/g Cu, 20.3 µg/g Ga, 54.1 µg/g Ge, 27.1 µg/g As, 0.1 µg/g Ir, 2.2 µg/g Pt, 2.5 µg/g Au.
Classification: IAB-sHL

Northwest Africa 8354 (NWA 8354)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Diogenite, polymict)
History: Purchased by Stefan Ralew from a Moroccan dealer in 2013.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental breccia composed predominantly of clasts of a feldspathic diogenite lithology accompanied by mineral debris derived from several eucritic lithologies. Feldspathic diogenite clasts are composed of orthopyroxene with ~5 vol.% calcic plagioclase, silica polymorph, chromite, Ti-chromite, troilite and Ni-free metal.
Geochemistry: Diogenitic orthopyroxene ($Fs_{30.8}Wo_{5.4}$, FeO/MnO = 28), orthopyroxene ($Fs_{48.3}Wo_{3.2}$, FeO/MnO = 34), pigeonite ($Fs_{43.1}Wo_{8.8}$, FeO/MnO = 32), augite ($Fs_{22.4}Wo_{40.4}$, FeO/MnO = 28).

Classification: Diogenite, feldspathic, polymict breccia.
Specimens: 11.4 g including one polished thin section at *UWB*. The remaining material is held by *Ralew*.

Northwest Africa 8362 (NWA 8362)
(Northwest Africa)
Purchased: 2013 Dec
Classification: HED achondrite (Howardite)
History: Purchased in December 2013 by John Higgins from a dealer in Tagounite, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental breccia composed of diogenitic orthopyroxene (~50 vol.%), calcic plagioclase, finely exsolved pigeonite, augite, olivine, Ti-bearing chromite, Cr-rich chromite, ilmenite, silica polymorph, troilite, stained Ni-free metal and some basaltic eucrite clasts.
Geochemistry: Diogenitic orthopyroxene ($Fs_{19.7\text{-}19.9}Wo_{0.9\text{-}1.0}$, FeO/MnO = 30-35, N = 3), host orthopyroxene ($Fs_{58.2}Wo_{2.4}$, FeO/MnO = 27), clinopyroxene exsolution lamella ($Fs_{28.5}Wo_{41.0}$, FeO/MnO = 28), ferroan low-Ca pyroxene ($Fs_{51.7}Wo_{2.0}$, FeO/MnO = 25), augite ($Fs_{17.7}Wo_{42.1}$, FeO/MnO = 23), olivine ($Fa_{42.0\text{-}43.0}$, FeO/MnO = 46, N = 2).
Classification: Howardite.
Specimens: 25.2 g including one polished thin section at *UWB*. The remainder is held by J. Higgins.

Northwest Africa 8365 (NWA 8365)
(Northwest Africa)
Purchased: 2014 Mar
Classification: HED achondrite (Eucrite, monomict)
History: Purchased in March 2014 by John Higgins from a dealer in Agadir, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Breccia composed of clasts of gabbroic eucrite and related crystalline debris. Pale clove-brown exsolved pigeonite grains have wavy exsolution lamellae and calcic plagioclase is polycrystalline. Portions of the matrix are vesicular and consist mainly of very fine grained pigeonite and calcic plagioclase. Accessory minerals include silica polymorph, Ti-bearing chromite, ilmenite, troilite and secondary barite.
Geochemistry: Orthopyroxene host ($Fs_{58.7\text{-}58.9}Wo_{3.4\text{-}3.3}$, FeO/MnO = 31, N = 3), clinopyroxene exsolution lamellae ($Fs_{26.6\text{-}27.6}Wo_{42.3\text{-}41.4}$, FeO/MnO = 30-31, N = 3), matrix quench pigeonite ($Fs_{61.7}Wo_{17.3}$).
Classification: Eucrite (breccia, gabbroic). This specimen is likely paired with NWA 7989 and other such stones based on close similarities in lithology, shock and style of weathering.
Specimens: 23.5 g including one polished thin section at *UWB*. The remainder is held by J. Higgins.

Northwest Africa 8367 (NWA 8367)
(Northwest Africa)
Purchased: 2013 Dec
Classification: HED achondrite (Diogenite)
History: Purchased by Gary Fujihara from a Moroccan dealer in December 2013.
Petrography: (A. Irving and S. Kuehner, *UWS*) Unbrecciated but moderately shocked specimen composed mainly of orthopyroxene (containing minor blebby exsolved clinopyroxene) with ~5 vol.% calcic plagioclase (polycrystalline and partially converted to maskelynite), Ti-poor chromite, apatite and troilite.
Geochemistry: Orthopyroxene ($Fs_{33.6\text{-}33.7}Wo_{2.4\text{-}2.3}$, FeO/MnO = 31-34), clinopyroxene ($Fs_{14.0\text{-}14.3}Wo_{43.1\text{-}43.2}$, FeO/MnO = 24-25).
Classification: Diogenite, feldspathic, unbrecciated.
Specimens: 20.7 g including one polished thin section at *UWB*. The remaining material is held by Mr. G. Fujihara.

Northwest Africa 8368 (NWA 8368)

(Northwest Africa)
Purchased: 2014 Feb
Classification: Mesosiderite

History: Purchased by *GHupé* in February 2014 from a Moroccan dealer at the Tucson Gem and Mineral Show.

Physical characteristics: A large (1994 g) stone composed mainly of brown orthopyroxene and Fe-Ni metal with some scattered large (up to 3 cm), rounded metal-rich nodules and large (up to 1.3 cm), deep green, angular olivine clasts.

Petrography: (A. Irving and S. Kuehner, *UWS*) The main portion of the specimen consists of orthopyroxene, calcic plagioclase, minor clinopyroxene, merrillite, silica polymorph, troilite and metal (predominantly kamacite with rounded, amoeboid grains of taenite). Metal-rich nodules have a different texture and consist of kamacite, taenite and minor orthopyroxene exhibiting triple grain junctions among all phases.

Geochemistry: Orthopyroxene ($Fs_{30.4\text{-}31.0}Wo_{4.3\text{-}2.9}$, FeO/MnO =24-25), clinopyroxene ($Fs_{13.8\text{-}16.3}Wo_{41.4\text{-}38.4}$, FeO/MnO = 17-19), olivine ($Fa_{33.6\text{-}33.7}$, FeO/MnO = 41-43).

Classification: Mesosiderite. The rounded geometry of grain boundaries for all mineral phases (except the large olivine clasts) is indicative of extensive recrystallization or annealing of an assemblage that originally was a fragmental breccia. The clasts of olivine cannot be in equilibrium with the silica-bearing main portion of the specimen, and must be derived from a separate lithology.

Specimens: A 27.7 g polished slice is at *UWB*. The remaining material is held by *GHupé*.

Northwest Africa 8370 (NWA 8370)
Morocco
Found: 2011
Classification: Iron meteorite (IIIAB)

History: Found in 2011 in Morocco and purchased by *DPitt*.

Physical characteristics: Complete specimen with regmaglypts. Minor weathering. No oxidition on outer surface, probably reflecting natural sandblasting; the buried surface possesses a deep ocher patina.

Petrography: Heavily shocked and cross-hatched medium octahedrite. Bandwidth 1.1±0.2 mm. The cross hatching of the kamacite is very prominent. One small (0.7 × 2.5 mm) FeS grain, close to a shear(?) zone cutting across a corner of the section, seems to have survived intact.

Geochemistry: Composition: 5.26 mg/g Co, 84.4mg/g Ni, 21.4 µg/g Ga, 9.9 µg/g As, 5.9 µg/g Ir, and 1.19 µg/g Au.

Classification: Bandwidth and position on Co-Au and Ga-Au diagrams indicate classification as IIIAB.

Specimens: This iron can be resolved from all other IIIAB irons in the *UCLA* data base. Among the twenty irons closest in Au and Co there are no other NWA irons.

Northwest Africa 8372 (NWA 8372)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Eucrite)

Petrography: (A. Greshake, *MNB*): The meteorite shows an overall grayish interior with up to 2-cm sized, often more brownish colored, fragments. It is composed of various basaltic lithologies with different textures and grain sizes embedded in a fine-grained clastic matrix. Dominant mineral phases are low-Ca pyroxene, Ca-pyroxene, and calcic feldspar; pyroxenes are often exsolved. Minor phases include chromite and SiO_2 polymorphs.

Geochemistry: Low-Ca pyroxene: $Fs_{41.6\pm9.6}Wo_{5.3\pm1.2}$ (range $Fs_{29.4\text{-}54.6}Wo_{1.8\text{-}7.4}$, n=22), FeO/MnO=26-37; Ca-pyroxene: $Fs_{36.2\pm6.5}Wo_{37.9\pm1.9}$ (range $Fs_{29.1\text{-}47}Wo_{32.2\text{-}41.7}$, n=18), FeO/MnO=30-34; calcic plagioclase: $An_{90.3\pm3.8}$ (range $An_{81.3\text{-}93.7}$, n=20)

Northwest Africa 8377 (NWA 8377)

(Northwest Africa)
Purchased: Oct 2013
Classification: Carbonaceous chondrite (CV3)
Physical characteristics: The five individuals are partly covered by fusion crust and display a dark grayish to black interior.
Petrography: The carbonaceous chondrite is composed of up to 8 mm sized chondrules, whitish CAIs, and olivine amoeboids set into a fine-grained matrix. Chondrules often show brownish staining due to terrestrial weathering; type II chondrules are present.

Northwest Africa 8378 (NWA 8378)
(Northwest Africa)
Purchased: Oct 2013
Classification: Ureilite
Petrography: The meteorite shows a cumulate texture of 2 to 3 mm olivine and pigeonite grains. It contains flaky graphite; olivine displays characteristic reduced rims.
Geochemistry: Olivine reduced rims: $Fa_{7.4\text{-}11.7}$

Northwest Africa 8379 (NWA 8379)
(Northwest Africa)
Purchased: Feb 2013
Classification: HED achondrite (Diogenite)
Physical characteristics: The nine individuals are partly covered by black fusion crust and show a light grayish interior.
Petrography: The meteorite displays a pronounced cumulate texture of dominantly large, blocky orthopyroxene crystals and less abundant calcic plagioclase. Accessory minerals include chromite, troilite, and silica polymorphs.
Geochemistry: Calcic plagioclase: $An_{85.9\pm1.3}$ (range $An_{83.1\text{-}87.9}$, n=11)

Northwest Africa 8380 (NWA 8380)
(Northwest Africa)
Purchased: 2014 Mar 26
Classification: Carbonaceous chondrite (CK5)
Petrography: The meteorite is composed of few clearly discernible chondrules (mostly porphyritic olivine-pyroxene) set into abundant fine-grained matrix. Fe-rich olivine is the dominant mineral phase. Minor phases include low-Ca pyroxene, augite, plagioclase, and Cr-bearing magnetite; metal is virtually absent.
Geochemistry: magnetite contains up to 5.6 wt.% Cr_2O_3

Northwest Africa 8383 (NWA 8383)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Eucrite, cumulate)
History: Single stone acquired by Ruben Garcia at the 2013 Denver mineral show and donated to CMS.
Physical characteristics: Single, 24.9 g, glossy fusion-crusted stone. Minor weathering. Sawn surface shows coarsely crystalline interior dominated by mm-sized light greenish-gray pyroxene crystals (roughly 85%), interstitial glassy to white plagioclase (roughly 15%), with a smattering of fine opaques.
Petrography: Thin section and microprobe examination shows coarse-grained cumulate basalt composed of intercumulus irregularly-shaped plagioclase (to 5 mm in the long dimension), with cumulate pyroxene (<3 mm). Most pyroxenes show fine (<1 μm) exsolution lamellae. Silicates highly fractured and show undulatory extinction and mosaicism. Chromite with two size ranges: scattered and sparse 100 to 500 μm, and ubiquitous fine grained, typically 10 μm. Rare troilite and Fe-metal to 20 μm. Some melt veins and

fractures with small-scale brecciation are present, and range in width from a few tens of microns to ~100 microns across.
Geochemistry: (K. Tucker, J. Lagerman, A. Pena and L. Garvie, *ASU*) Low Ca-pyroxene $Fs_{35.3\pm0.5}Wo_{3.1\pm1.0}$, Fe/Mn=32.4, n=8; augite-diopside $Fs_{14.0\pm0.7}Wo_{45.0\pm0.4}$, Fe/Mn=26.6±2.0, n=5; and plagioclase $An_{89.6\pm1.6}Or_{0.4\pm0.1}$, n=5.
Classification: Achondrite (cumulate eucrite).
Specimens: 20.28 g and one polished thin section at *ASU*.

Northwest Africa 8384 (NWA 8384)
(Northwest Africa)
Found: 2011 Aug
Classification: Ordinary chondrite (LL3)
History: Meteorite was purchased from a dealer online.
Physical characteristics: Meteorite is a single weathered stone with little remaining fusion crust.
Petrography: (A. Rubin, *UCLA*) The average chondrule size is about 600 μm, in the LL range.
Classification: Ordinary chondrite (LL3, W3, S1) The Cr_2O_3 content of the ferroan olivine = 0.11±0.09, indicating that it is greater than or equal to type 3.2
Specimens: Main mass 1030 g, *Tobin*; type specimen: 50.7 grams, *UCLA*.

Northwest Africa 8385 (NWA 8385)
Morocco
Purchased: March 2014
Classification: Carbonaceous chondrite (CK5)
History: Purchased from a dealer in Morocco in 2014 by A. Jonikas
Physical characteristics: One weathered stone fragment with some remnant crust. Cut surface reveals brown matrix with sparse chondrules of various sizes and CAIs.
Petrography: (A. Rubin, *UCLA*) Microprobe examination of a polished mount shows the rock contains ~40 vol.% matrix material; magnetite modal abundance is about 10-15 vol.%. Chondrules average ~800 μm in diameter and are readily delineated, consistent with type 5. Plagioclase grains range in size from ~40-100 μm. The groundmass if relatively coarse, with an average grain size of ~70 μm.
Geochemistry: Olivine $Fa_{32.0\pm0.8}$, n=13; high Ca-pyroxene $Fs_{11.7\pm3.8}Wo_{49.6\pm0.1}$, n=4.
Classification: Carbonaceous Chondrite (CK5) Chondrules are readily delineated, consistent with type 5.
Specimens: 20.85 g type specimen including a probe mount

Northwest Africa 8386 (NWA 8386)
(Northwest Africa)
Purchased: 2014
Classification: HED achondrite (Howardite)
History: Purchased by B. Reed in Tucson, February 2014.
Physical characteristics: Many small fragments with identical appearance and irregular, dark-brown, weathered exterior. Saw cut reveals breccia with white, green, and dark gray clasts.
Petrography: (C. Agee) Microprobe examination of a polished mount shows a fragmental to cataclastic breccia with equilibrated (exsolution lamellae) and unequilibrated (igneous zoned) pyroxenes throughout. Silica, hedenbergite, troilite, ilmenite, chromite, and iron-nickel metal present. Approximately 30% of this meteorite is diogenitic, ~60% is basaltic eucrite, and ~10% is cumulate eucrite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Diogenite minerals: low-Ca pyroxene $Fs_{32.5\pm3.2}Wo_{3.6\pm0.7}$, Fe/Mn=31±1, n=6; olivine $Fa_{31.9}$, Fe/Mn=57, n=1; plagioclase $An_{93.5\pm1.0}Ab_{6.3\pm1.0}Or_{0.3\pm0.0}$, n=2. Basaltic eucrite minerals: low-Ca pyroxene $Fs_{56.5\pm3.4}Wo_{5.9\pm3.4}$, Fe/Mn=32±1, n=7; augite $Fs_{32.4\pm2.4}Wo_{37.1\pm2.7}$, Fe/Mn=31±3, n=6, olivine $Fa_{54.0\pm3.6}$, Fe/Mn=49±0, n=2; plagioclase $An_{82.7\pm5.4}Ab_{16.5\pm5.1}Or_{0.9\pm0.3}$, n=4. Cumulate eucrite minerals: low-Ca pyroxene $Fs_{42.6\pm6.6}Wo_{3.0\pm0.8}$, Fe/Mn=32±1, n=3; augite $Fs_{23.1}Wo_{39.3}$, Fe/Mn=14, n=1; plagioclase $An_{91.0\pm0.8}Ab_{8.6\pm0.8}Or_{0.4\pm0.1}$, n=3.

Classification: Achondrite (howardite) likely paired with NWA 8343.
Specimens: 23.8 g including a probe mount on deposit at *UNM*, *Reed* holds the main mass.

Northwest Africa 8387 (NWA 8387)
(Northwest Africa)
Purchased: 2014
Classification: Ordinary chondrite (LL3)
History: Purchased by Blaine Reed in Tucson, February 2014.
Physical characteristics: Single stone with oxidized weathered exterior. Saw cut reveals chondrules and metal/sulfide set in a light gray matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount reveals numerous chondrules, some poryphyritic with igneous zoning and mesostasis. Kamacite, troilite, and iron oxide present.
Geochemistry: (C. Agee, N. Muttik, *UNM*) Olivine $Fa_{27.1\pm2.1}$, Fe/Mn=55±2.1, n=36; low-Ca pyroxene $Fs_{17.1\pm8.0}Wo_{0.8\pm0.7}$, Fe/Mn=38±18, n=20.
Classification: Ordinary chondrite (LL3, W2). Based on σ-Fa, this is likely near petrologic type 3.9.
Specimens: 23.4 g including a probe mount on deposit at *UNM*, *Reed* holds the main mass.

Northwest Africa 8388 (NWA 8388)
Western Sahara
Found: 2014
Classification: Ordinary chondrite (H6)
History: Found by a meteorite hunter on a January/February, 2014, expedition in an area just northwest of the Free Zone in Western Sahara, and subsequently purchased by Darryl Pitt.
Physical characteristics: Single stone with fusion crust. Saw cut reveals abundant fine-grained metal/sulfide set in a fine-grained green-brown matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows scatttered equilibrated chondrules, vesicular glassy fusion crust, plagioclase grain size up to 100 μm. Kamacite, troilite, chromite, and apatite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{19.4\pm0.7}$, Fe/Mn=39±2, n=7; low-Ca pyroxene $Fs_{16.5\pm0.7}Wo_{1.5\pm0.2}$, Fe/Mn=22±1, n=7.
Classification: Ordinary chondrite (H6)
Specimens: 20.3 g including a probe mount on deposit at *UNM*, Darryl Pitt holds the main mass.

Northwest Africa 8389 (NWA 8389)
Western Sahara
Found: 2014
Classification: Ordinary chondrite (L6)
History: Found by a meteorite hunter on a January/February, 2014, expedition in an area just northwest of the Free Zone in Western Sahara, and subsequently purchased by Darryl Pitt.
Physical characteristics: Single stone with green-brown weathered exterior. Saw cut reveals scattered chondrules and metal/sulfide grains set in a green-brown matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows equilibrated chondrules, plagioclase grain size up to 200 μm. Kamacite, troilite, and apatite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{24.7\pm0.4}$, Fe/Mn=49±2, n=7; low-Ca pyroxene $Fs_{20.6\pm0.2}Wo_{1.7\pm0.1}$, Fe/Mn=28±1, n=7.
Classification: Ordinary chondrite (L6), weathering grade W1.
Specimens: 21.24 g including a probe mount on deposit at *UNM*, Darryl Pitt holds the main mass.

Northwest Africa 8390 (NWA 8390)
Western Sahara

Found: 2014
Classification: Ordinary chondrite (H6)
History: Found by a meteorite hunter on a January/February, 2014, expedition in an area just northwest of the Free Zone in Western Sahara, and subsequently purchased by Darryl Pitt.
Physical characteristics: Single stone with dark-brown weathered exterior. Saw cut reveals metal/sulfide grains set in a dark brown matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows faint relict chondrules, numerous oxide veinlets. Kamacite, oxidized iron, and troilite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{19.4\pm0.7}$, Fe/Mn=40±2, n=9; low-Ca pyroxene $Fs_{17.2\pm0.7}Wo_{1.8\pm0.4}$, Fe/Mn=23±1, n=7.
Classification: Ordinary chondrite (H6), weathering grade W3.
Specimens: 10.5 g including a probe mount on deposit at *UNM*, Darryl Pitt holds the main mass.

Northwest Africa 8391 (NWA 8391)
Western Sahara
Found: 2014
Classification: Ordinary chondrite (H6)
History: Found by a meteorite hunter on a January/February, 2014, expedition in an area just northwest of the Free Zone in Western Sahara, and subsequently purchased by Darryl Pitt.
Physical characteristics: Single stone with dark-brown, weathered, fusion-crusted exterior. Saw cut reveals abundant metal/sulfide grains set in a dark brown matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows equilibrated chondrules, vesicular fusion crust, plagioclase grain size up to 200 μm. Kamacite, troilite, chromite and apatite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{19.3\pm0.4}$, Fe/Mn=39±2, n=7; low-Ca pyroxene $Fs_{16.4\pm0.2}Wo_{1.4\pm0.3}$, Fe/Mn=22±1, n=7.
Classification: Ordinary chondrite (H6).
Specimens: 25.2 g including a probe mount on deposit at *UNM*, Darryl Pitt holds the main mass.

Northwest Africa 8392 (NWA 8392)
Western Sahara
Found: 2014
Classification: Ordinary chondrite (H5)
History: Found by a meteorite hunter on a January/February, 2014, expedition in an area just northwest of the Free Zone in Western Sahara, and subsequently purchased by Darryl Pitt.
Physical characteristics: Single stone with black, weathered, fusion-crusted exterior. Saw cut reveals abundant metal/sulfide grains set in a light gray matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows small, equilibrated chondrules. Kamacite, troilite, chromite and apatite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{18.1\pm0.9}$, Fe/Mn=37±1, n=8; low-Ca pyroxene $Fs_{16.3\pm0.6}Wo_{1.6\pm0.7}$, Fe/Mn=22±1, n=6.
Classification: Ordinary chondrite (H5), weathering grade W1.
Specimens: 7.7 g including a probe mount on deposit at *UNM*, Darryl Pitt holds the main mass.

Northwest Africa 8393 (NWA 8393)
Western Sahara
Found: 2014
Classification: Ordinary chondrite (H6)
History: Found by a meteorite hunter on a January/February, 2014, expedition in an area just northwest of the Free Zone in Western Sahara, and subsequently purchased by Darryl Pitt.

Physical characteristics: Single stone with dark, weathered exterior. Saw cut reveals fine-grained metal/sulfide set in a dark gray matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows small, equilibrated chondrules and abundant oxide veinlets. Kamacite, troilite, chromite and oxidized iron.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{18.4\pm0.2}$, Fe/Mn=38±1, n=6; low-Ca pyroxene $Fs_{16.2\pm0.4}Wo_{1.6\pm0.4}$, Fe/Mn=23±2, n=7.
Classification: Ordinary chondrite (H6), weathering grade W3.
Specimens: 6.2 g including a probe mount on deposit at *UNM*, Darryl Pitt holds the main mass.

Northwest Africa 8394 (NWA 8394)
Western Sahara
Found: 2014
Classification: Ordinary chondrite (H5)
History: Found by a meteorite hunter on a January/February, 2014, expedition in an area just northwest of the Free Zone in Western Sahara, and subsequently purchased by Darryl Pitt.
Physical characteristics: Single stone with black, weathered, fusion-crusted exterior. Saw cut reveals abundant fine-grained metal/sulfide set in a brown matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows equilibrated chondrules, fine grained plagioclase, and abundant oxide veinlets. Kamacite, troilite, chromite, apatite and oxidized iron.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{19.0\pm0.7}$, Fe/Mn=40±1, n=7; low-Ca pyroxene $Fs_{17.1\pm0.8}Wo_{1.6\pm0.2}$, Fe/Mn=23±1, n=7.
Classification: Ordinary chondrite (H5), weathering grade W2.
Specimens: 5.15 g including a probe mount on deposit at *UNM*, Darryl Pitt holds the main mass.

Northwest Africa 8395 (NWA 8395)
Western Sahara
Found: 2014
Classification: HED achondrite (Eucrite)
History: Found by a meteorite hunter on a 2014 Jan-Feb expedition in Western Sahara, and subsequently purchased by Darryl Pitt.
Physical characteristics: Single stone with partial weathered fusion crust. Saw cut reveals fine-grained, light gray groundmass, scattered oxidation stains.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows ophitic texture with ~60% pyroxene and ~40% plagioclase, grain size ~100 μm. Accessory troilite, ilmenite, chromite, and silica.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Low-Ca pyroxene $Fs_{64.3\pm2.0}Wo_{5.3\pm1.8}$, Fe/Mn=31±1, n=6; high-Ca pyroxene $Fs_{48.4\pm\pm0.1}Wo_{23.6\pm10.8}$, Fe/Mn=32±1, n=14; plagioclase $An_{78.7\pm4.6}Ab_{19.3\pm3.5}Or_{2.0\pm1.9}$, n=6.
Classification: Achondrite (Eucrite). Equilibrated, basaltic eucrite
Specimens: 20.65 g including a probe mount on deposit at *UNM*, *DPitt* holds the main mass.

Northwest Africa 8396 (NWA 8396)
Western Sahara
Found: 2014
Classification: Enstatite achondrite (Aubrite)
History: Found by a meteorite hunter on a 2014 Jan-Feb expedition in Western Sahara, and subsequently purchased by Darryl Pitt.
Physical characteristics: Single stone with dark brown weathered exterior. Saw cut reveals fine-grained polycrystalline texture, small weathering veins present.

Petrography: (C. Agee, *UNM*) Examination of a polished mount shows approximately 80% enstatite grains (50-200 μm), 5% feldspar (10-50 μm) in enstatite triple junctions and on grain boundaries, 10-15% metal and sulfide. Many weathering veins, about 50% of the metal is oxidized.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Enstatite $Fs_{0.7\pm0.3}Wo_{1.4\pm0.0}$, n=18; plagioclase $An_{15.4\pm0.5}Ab_{80.5\pm0.2}Or_{4.1\pm0.3}$, n=2; potassium feldspar $An_{0.0\pm0.0}Ab_{5.6\pm0.4}Or_{94.4\pm0.4}$, n=2; kamacite Ni=5.84±0.57, Si=1.10±0.09, Co=0.37±0.06 (wt%), n=5; troilite with Cr=0.72±0.09 (wt%), n=5.
Classification: Achondrite (aubrite)
Specimens: 23.08 g including a probe mount on deposit at *UNM*, *DPitt* holds the main mass.

Northwest Africa 8397 (NWA 8397)
Western Sahara
Found: 2014
Classification: Carbonaceous chondrite (CV3)
History: Found by a meteorite hunter on a 2014 Jan-Feb expedition in Western Sahara, and subsequently purchased by Darryl Pitt.
Physical characteristics: Single stone with dark weathered exterior. Saw cut reveals chondrules and CAIs set in a dark gray matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows numerous irregular shaped chondrules, many with metal/sulfide inclusions, fine-grained matrix makes up about 50% of this meteorite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Type I chondrule olivine $Fa_{1.1\pm0.5}$, n=9, ferroan chondrule olivine $Fa_{10.6\pm9.3}$, Fe/Mn=63±44, Cr_2O_3=0.20±0.13, n=31; enstatite $Fs_{2.3\pm2.3}Wo_{1.7\pm2.2}$, n=15; diopside and aluminous diopside detected.
Classification: Carbonaceous chondrite (CV3)
Specimens: 6.11 g including a probe mount on deposit at *UNM*, *DPitt* holds the main mass.

Northwest Africa 8398 (NWA 8398)
Western Sahara
Found: 2014
Classification: Carbonaceous chondrite (CO3.2)
History: Found by a meteorite hunter on a 2014 Jan-Feb expedition in Western Sahara, and subsequently purchased by Darryl Pitt.
Physical characteristics: Single stone with dark weathered exterior. Saw cut reveals chondrules set in a dark brown matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows numerous chondrules many in the range 50-300 μm, many metal/sulfide blebs, fine-grained matrix makes up about 30% of this meteorite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Ferroan chondrule olivine $Fa_{28.8\pm18.3}$, Fe/Mn=85±26, Cr_2O_3=0.12±0.09, n=41; low-Ca pyroxene $Fs_{47.5\pm6.4}Wo_{3.2\pm1.0}$, Fe/Mn=66±12, n=4; enstatite $Fs_{3.1\pm1.9}Wo_{1.3\pm1.0}$, n=11; aluminous diopside and diopside found.
Classification: Carbonaceous chondrite (CO3.2) based on mean value and sigma of Cr_2O_3 in ferroan olivine, similar values to Rainbow (CO3.2) as reported in Grossman and Brearley (2005).
Specimens: 2.3 g including a probe mount on deposit at *UNM*, *DPitt* holds the main mass.

Northwest Africa 8399 (NWA 8399)
Western Sahara
Found: 2014
Classification: Ureilite
History: Found by a meteorite hunter on a 2014 Jan-Feb expedition in Western Sahara, and subsequently purchased by Darryl Pitt.

Physical characteristics: Single stone with dark weathered fusion crust. Saw cut reveals polycrystalline texture of light and dark grains.
Petrography: (C. Agee, *UNM*) Examination of a polished mount shows approximately 75% olivine, 20% pyroxene, texturally equilibrated with triple junctions, ubiquitous Fe-Ni metal and troilite blebs, olivines zoned with forsteritic rims. Diamonds occur throughout, often forming elongate domains up to 1000 μm.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine cores $Fa_{23.6\pm1.7}$, Fe/Mn=43±5, Cr_2O_3=0.48±0.05, n=6; olivine rims $Fa_{6.9\pm2.9}$, Fe/Mn=10±2, Cr_2O_3=0.69±0.02 wt%, n=2; low-Ca pyroxene $Fs_{18.4\pm2.2}Wo_{2.9\pm1.3}$, Fe/Mn=29±4, Cr_2O_3=1.39±0.29 wt%, n=8; chromium sulfide detected.
Classification: Achondrite (ureilite).
Specimens: 3.9 g including a probe mount on deposit at *UNM*, *DPitt* holds the main mass.

Northwest Africa 8400 (NWA 8400)
Western Sahara
Found: 2014
Classification: Ordinary chondrite (H7)
History: Found by a meteorite hunter on a 2014 Jan-Feb expedition in Western Sahara, and subsequently purchased by Darryl Pitt.
Physical characteristics: Single stone with brown weathered exterior. Saw cut reveals polygonal texture of dark colored silicates and metal/sulfides.
Petrography: (C. Agee, *UNM*) Examination of a polished mount shows intergranular texture of olivines and pyroxenes, grain size 50-500 μm, plagioclase >100 μm, ~10% metal and sulfide, numerous oxide veinlets.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{18.6\pm0.4}$, Fe/Mn=38±2, n=7; low Ca-pyroxene $Fs_{16.2\pm0.6}Wo_{3.3\pm0.5}$, Fe/Mn=24±1; augite $Fs_{8.9}Wo_{37.4}$, Fe/Mn=17, Cr_2O_3=1.3 wt%; plagioclase $An_{28.5\pm2.0}Ab_{78.3\pm1.2}Or_{3.3\pm0.4}$, n=6. Oxygen isotopes (Karen Ziegler, *UNM*) Oxygen isotope values of 3 acid-washed aliquots of bulk sample, 1.3, 1.3, 1.1 mg, gave $\delta^{17}O$ = 2.979, 3.056, 2.753, $\delta^{18}O$ = 4.763, 4.947, 4.212, $\Delta^{17}O$ = 0.464, 0.444, 0.529 (linearized, all permil).
Classification: H chondrite, H7, based on oxygen isotope values that are in the H-chondrite range, absence of chondrules, recrystallized silicates, remobilized metal-sulfide, Fa and Fs values that are H-chondrite-like.
Specimens: 20.5 g including a probe mount on deposit at *UNM*, *DPitt* holds the main mass.

Northwest Africa 8401 (NWA 8401)
(Northwest Africa)
Purchased: 2014
Classification: HED achondrite (Howardite)
History: Purchased from Adam Aaronson in Tucson in 2014
Physical characteristics: Single stone with black, shiny fusion crust. Saw cut reveals a few dark scattered grains (~1 mm) set in a fine-grained light gray groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows isolated equilibrated cumulate eucrite clasts surrounded by a diogenitic breccia of variable grain size, some cataclastic, shock melt clasts are also present. Approximately 75% diogenite and 25% cumulate eucrite. Two distinct feldspar populations: anorthite and labradorite. Accessory iron metal, troilite, chromite, apatite, and silica.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Diogenite low-Ca pyroxene $Fs_{26.8\pm2.6}Wo_{2.4\pm0.8}$, Fe/Mn=30±1, n=7; eucrite low-Ca pyroxene $Fs_{36.9\pm2.9}Wo_{1.6\pm0.7}$, Fe/Mn=34±2, n=6; clinopyroxene $Fs_{26.3\pm0.9}Wo_{18.4\pm2.3}$, Fe/Mn=30±1, n=2; anorthite $An_{90.2\pm3.0}Ab_{9.4\pm2.9}Or_{0.4\pm0.1}$, n=6; labradorite $An_{66.9\pm1.2}Ab_{31.4\pm1.0}Or_{1.7\pm0.2}$, n=3.
Classification: Achondrite (howardite)
Specimens: 14.5 g including a probe mount on deposit at *UNM*, *DPitt* holds the main mass.

Northwest Africa 8402 (NWA 8402)

(Northwest Africa)
Purchased: 2014
Classification: Mesosiderite (group A3)
History: Purchased from S. Haddany in March 2014
Physical characteristics: Single stone with irregular dark gray-brown exterior. Saw cut reveals numerous spherical metal domains >1 mm, but also abundant fine-grained metal distributed uniformly throughout. Silicate clasts >1 mm, some fragmental, others rounded or texturally equilibrated. Abundant fine-grained silicate groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows pyroxene making up approximately 75% of the silicate portion of this meteorite, ~25% plagioclase, ~5% silica. Pyroxene grains in section up to 1 mm, some poikiloblastic; plagioclase up to 500 μm, but also finer-grained intergranular; numerous intersertal silica laths up to 200 μm in length and ~10 μm thick; no olivine detected. Metal makes up approximately 40% of this meteorite and is primarily segregated into domains >1 mm, although there are scattered smaller (~10 μm) grains throughout the silicate domains. No brecciation observed. Minor oxidation of metal and a few weathering veinlets.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Low-Ca pyroxene $Fs_{37.4\pm0.3}Wo_{3.2\pm0.1}$, Fe/Mn=22±1, n=3; high-Ca pyroxene $Fs_{18.6\pm0.1}Wo_{39.9\pm0.0}$, Fe/Mn=18±0, n=2; plagioclase $An_{90.2\pm1.8}Ab_{9.2\pm1.8}Or_{0.6\pm0.1}$, n=6; kamacite Fe=93.7±0.1, Ni=6.2±0.0 (wt%), n=2; taenite Fe=62.0±5.8, Ni=37.9±5.8 (wt%), n=2.
Classification: Mesosiderite-A3. Relatively high abundance of plagioclase and silica consistent with group A. Segregated metal, presence of some texturally and chemically equilibrated silicates, and absence of brecciation consistent with type 3.
Specimens: 29.7 g including a probe mount on deposit at *UNM*, *DPitt* holds the main mass.

Northwest Africa 8403 (NWA 8403)
(Northwest Africa)
Purchased: 2014
Classification: Enstatite chondrite (EL6)
History: Purchased from S. Haddany in Tucson in Feb 2014
Physical characteristics: Single stone with weathered brown exterior. Saw cut reveals brown to light brown fine-grained matrix with oxide veins, rare mm-sized chondrules.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows silicates: 95% enstatite and 5% plagioclase; no chondrules observed in the microprobe section. Kamacite, daubreelite, troilite, djerfisherite, and abundant iron-oxide veins present.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Enstatite $Fs_{0.5\pm0.1}Wo_{1.4\pm0.0}$, n=8; plagioclase $Ab_{80.2\pm0.3}An_{15.3\pm0.4}Or_{4.5\pm0.3}$, n=7; kamacite Si=0.98±0.11, Ni=5.53±0.56, Co=0.39±0.04 (wt%), n=3; daubreelite Cr=35.04±0.18, Fe=17.98±0.14, Mn=1.57±0.10, S=42.88±0.30 (wt%), n=4.
Classification: Enstatite chondrite (EL6), weathering grade W3.
Specimens: 30.5 g including a probe mount on deposit at *UNM*, *DPitt* holds the main mass.

Northwest Africa 8404 (NWA 8404)
(Northwest Africa)
Purchased: 2014
Classification: HED achondrite (Diogenite, olivine)
History: Purchased by J. Wooddell from a Moroccan dealer, 2014 Feb 7, at the Tucson Gem and Mineral Show.
Physical characteristics: Single stone fragment with dull moderately weathered black fusion crust covering 35% of the stone. Broken surface and saw cut reveal numerous mm-sized green crystals set in light yellow groundmass.
Petrography: Microprobe examination of a polished mount shows a brecciated texture with large pyroxene grains 300-2000 μm and smaller olivine grains 100-500 μm, many grains are fragmental to cataclastic. Accessory plagioclase, iron metal, and troilite. Minor amounts of iron oxidation.

Geochemistry: (C. Agee and N. Muttik, *UNM*) EMPA. Low Ca-pyroxene $Fs_{25.0\pm0.3}Wo_{3.3\pm0.3}$, Fe/Mn=30±1, n=13; olivine $Fa_{26.8\pm0.3}$, Fe/Mn=49±3, n=9; plagioclase $An_{88.2\pm3.0}Ab_{11.4\pm2.9}Or_{0.4\pm0.2}$, n=4. (Karen Ziegler, *UNM*) Oxygen isotope values of 3 acid-washed aliquots of bulk sample, 1.0, 1.7, 1.8 mg, gave $\delta^{17}O$ = 1.510, 1.328, 1.452, $\delta^{18}O$ = 3.477, 3.103, 3.233, $\Delta^{17}O$ = -0.326, -0.310, -0.255 (linearized, all permil).
Classification: Achondrite (Diogenite-olivine) based on the presence of approximately 25% olivine. Typical $\delta^{18}O$ values for diogenites, however two analyses gave anomalously low values for $\Delta^{17}O$.
Specimens: 16.1 g plus a thin section on deposit at *UNM*, J. Wooddell holds the remainder and a mount.

Northwest Africa 8407 (NWA 8407)
(Northwest Africa)
Purchased: 2013 Jun
Classification: Ureilite
History: Purchased in June 2013 by Marc Jost from a Moroccan dealer at the Ensisheim Show.
Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular aggregate of olivine with thick, dark reduced rims and pigeonite.
Geochemistry: Olivine (cores $Fa_{22.2\text{-}22.3}$, N = 2; rim $Fa_{1.7}$), pigeonite ($Fs_{17.2\text{-}17.5}Wo_{10.4\text{-}10.3}$, N = 3).
Classification: Ureilite.
Specimens: 22.1 g including one polished thin section at *UWB*. The remainder is held by *SJS*.

Northwest Africa 8410 (NWA 8410)
(Northwest Africa)
Purchased: 2013 Jun
Classification: Primitive achondrite (Lodranite)
History: Purchased in June 2013 by Marc Jost from a Moroccan dealer at the Ensisheim Show.
Petrography: (A. Irving and S. Kuehner, *UWS*) Coarse grained (0.8-4 mm), protogranular aggregate of olivine with reduced rims, subcalcic augite and rare low-Ca pyroxene with accessory altered Ni-poor metal and rare Cr-bearing troilite.
Geochemistry: Olivine (cores $Fa_{12.7\text{-}12.9}$; FeO/MnO = 21-23, N = 2; rims $Fa_{6.5\text{-}7.2}$), subcalcic augite ($Fs_{6.1\text{-}6.2}Wo_{36.4\text{-}36.5}$; FeO/MnO = 10, N = 2), low-Ca pyroxene ($Fs_{10.0}Wo_{4.9}$; FeO/MnO = 12).
Classification: Lodranite. This specimen is unusual because of the presence of reduced rims on olivine grains.
Specimens: 21.8 g including one polished thin section at *UWB*. The remainder is held by *SJS*.

Northwest Africa 8411 (NWA 8411)
(Northwest Africa)
Purchased: 2013 Jun
Classification: HED achondrite (Howardite)
History: Purchased in June 2013 by Marc Jost from a Moroccan dealer at the Ensisheim Show.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fresh fragmental breccia composed of clasts of gabbroic eucrite, minor fine grained, recrystallized basaltic eucrite, large grains of diogenitic orthopyroxene (~12 vol.%, of varying composition) and related crystalline debris. Minerals are calcic plagioclase, orthopyroxene, ferroan low-Ca pyroxene, augite, Ti-poor chromite and troilite.
Geochemistry: Orthopyroxene ($Fs_{14.9\text{-}15.9}Wo_{0.4\text{-}0.5}$, FeO/MnO = 28-32, N = 2; $Fs_{21.7}Wo_{1.5}$, FeO/MnO = 27), ferroan low-Ca pyroxene ($Fs_{52.8}Wo_{3.4}$; FeO/MnO = 33), augite ($Fs_{26.9}Wo_{40.0}$, FeO/MnO = 30; $Fs_{32.7}Wo_{41.6}$, FeO/MnO = 31), olivine ($Fa_{45.1\text{-}48.1}$; FeO/MnO = 46-47, N = 2).
Classification: Howardite.
Specimens: 26.1 g including one polished thin section at *UWB*. The remainder is held by *SJS*.

Northwest Africa 8412 (NWA 8412)
(Northwest Africa)

Purchased: 2014 Mar
Classification: Ordinary chondrite (L5)
History: Purchased by Mohamed Aid in Ouarzazate, Morocco, in March 2014.
Petrography: (A. Irving and S. Kuehner, *UWS*) Mostly recrystallized but sparse chondrules are present. Olivine in particular is not translucent but distinctly cloudy in transmitted light, implying modification by shock.
Geochemistry: Olivine ($Fa_{24.6\text{-}24.9}$, N = 3), orthopyroxene ($Fs_{19.7\text{-}20.1}Wo_{1.6\text{-}1.7}$, N = 3), clinopyroxene ($Fs_{7.8\text{-}8.3}Wo_{44.3\text{-}43.2}$).
Classification: Ordinary chondrite (L5).
Specimens: 75 g including one polished thin section at *UWB*. The remainder is held by M. Aid.

Northwest Africa 8413 (NWA 8413)
(Northwest Africa)
Purchased: 2011 Mar
Classification: Ordinary chondrite (H6)
History: Purchased by Mohamed Aid in Ouarzazate, Morocco in March 2011.
Petrography: (A. Irving and S. Kuehner, *UWS*) Mostly recrystallized with rare chondrule remnants and relatively abundant metal. The specimen is crosscut by subparallel, thin goethite veinlets.
Geochemistry: Olivine ($Fa_{19.0\text{-}19.2}$, N = 3), orthopyroxene ($Fs_{16.1\text{-}16.4}Wo_{1.6\text{-}1.7}$, N = 3), clinopyroxene ($Fs_{5.9\text{-}7.5}Wo_{44.6\text{-}43.2}$).
Classification: Ordinary chondrite (H6).
Specimens: 33.6g including one polished thin section at *UWB*. The remainder is held by M. Aid.

Northwest Africa 8415 (NWA 8415)
(Northwest Africa)
Purchased: 2013 Jun
Classification: Ordinary chondrite (L5)
History: Purchased by Mohamed Aid in Ouarzazate, Morocco in June 2013.
Petrography: (A. Irving and S. Kuehner, *UWS*) Sparse chondrules occur within a recrystallized matrix.
Geochemistry: Olivine ($Fa_{25.7\text{-}25.8}$, N = 3), orthopyroxene ($Fs_{20.9\text{-}21.0}Wo_{1.8\text{-}1.3}$, N = 3), clinopyroxene ($Fs_{8.4\text{-}8.7}Wo_{42.7\text{-}42.5}$).
Classification: Ordinary chondrite (L5).
Specimens: 73.6g including one polished thin section at *UWB*. The remainder is held by M. Aid.

Northwest Africa 8416 (NWA 8416)
(Northwest Africa)
Purchased: 2014 Mar
Classification: Ureilite
History: Purchased in Temara, Morocco, by Adam Aaronson in March 2014.
Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular aggregate of olivine with very thick, dark reduced rims and pigeonite.
Geochemistry: Olivine (cores $Fa_{22.4\text{-}22.5}$, N = 2; rim $Fa_{5.2}$), pigeonite ($Fs_{17.9\text{-}18.6}Wo_{6.5\text{-}7.0}$, N = 3).
Classification: Ureilite.
Specimens: 20.1 g including one polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8417 (NWA 8417)
(Northwest Africa)
Purchased: 2014 Apr
Classification: Ordinary chondrite (LL7)
History: Purchased by Aras Jonikas in April 2014 from a Moroccan dealer.

Physical characteristics: Single stone (221.5 g) partly coated by brownish-black fusion crust. The interior is pale green with sparse black grains and visible specks of metal plus brown stained areas.
Petrography: (A. Irving and S. Kuehner, *UWS*) Very fresh, metal-poor specimen with a complex texture. Large (up to 5 mm across) oikocrysts of orthopyroxene enclose numerous small chadacrysts of olivine, but there also are regions of about equal size composed mostly of olivine and orthopyroxene exhibiting triple grain junctions. Chondrules are absent. Olivine and orthopyroxene of all textural types are highly equilibrated. Accessory minerals are clinopyroxene, Ti-free chromite, sodic plagioclase, K-feldspar, albite, stained kamacite (<1 vol.%), troilite and taenite.
Geochemistry: Olivine ($Fa_{26.5-26.6}$; FeO/MnO = 54-63), orthopyroxene ($Fs_{21.6-21.7}Wo_{2.8-3.2}$; FeO/MnO = 31-32), clinopyroxene ($Fs_{10.5-10.7}Wo_{40.4-39.6}$). Oxygen isotopes (K. Ziegler, *UNM*): acid-washed subsamples analyzed by laser fluorination gave the following results, respectively: $\delta^{17}O$ 3.789, 3.862, 3.729; $\delta^{18}O$ 4.937, 5.020, 4.890; $\Delta^{17}O$ 1.182, 1.211, 1.147 (all per mil).
Classification: Ordinary chondrite (LL7). The very low metal content, the large size of the oikocrysts (presumably representing former chondrules), and the FeO/MnO ratios in olivine are features consistent with LL parentage (prior to thermal metamorphism). Oxygen isotope compositions plot within the overlapping fields for LL and L chondrites, and the olivine and pyroxene compositions fall within the gaps between the accepted ranges for L and LL chondrites, but if all the characteristics are considered together then this specimen is best classified as an LL7 chondrite.
Specimens: 21 g including one polished thin section at *UWB*. The main mass is held by A. Jonikas.

Northwest Africa 8422 (NWA 8422)
(Northwest Africa)
Purchased: 2014 Mar
Classification: Primitive achondrite (Lodranite)
History: Purchased in Temara, Morocco by Adam Aaronson in March 2014.
Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular aggregate (grainsize 0.8-3 mm) of olivine with reduced rims, subcalcic augite and low-Ca pyroxene with accessory altered metal.
Geochemistry: Olivine (cores $Fa_{12.4-12.5}$, FeO/MnO = 22, N = 2; rims $Fa_{5.0}$), subcalcic augite ($Fs_{6.7-6.8}Wo_{36.0-35.9}$; FeO/MnO = 12-13, N = 2) and low-Ca pyroxene ($Fs_{10.7-10.9}Wo_{4.9-4.7}$; FeO/MnO = 14-16, N = 2).
Classification: Lodranite. This specimen is unusual because of the presence of reduced rims on olivine grains.
Specimens: 20.1 g including one polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8425 (NWA 8425)
(Northwest Africa)
Purchased: 2014 Mar
Classification: Ordinary chondrite (LL6)
History: Purchased by Adam Aaronson in Temara, Morocco in March 2014.
Petrography: (A. Irving and S. Kuehner, *UWS*) Breccia composed of separated, angular clasts (containing rare large chondrule remnants) in a dark fragmental matrix of related crystalline debris.
Geochemistry: Olivine ($Fa_{29.9-30.9}$, N = 3), orthopyroxene ($Fs_{24.3-24.8}Wo_{1.6-2.2}$, N = 3), subcalcic augite ($Fs_{10.7}Wo_{24.7}$), augite ($Fs_{7.9}Wo_{42.7}$).
Classification: Ordinary chondrite (LL6 breccia).
Specimens: 16.7g including one polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8426 (NWA 8426)
(Northwest Africa)
Purchased: 2014 Mar
Classification: HED achondrite (Eucrite, monomict)
History: Purchased in Temara, Morocco by Adam Aaronson in March 2014.

Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental breccia composed of large gabbroic eucrite clasts within a sparse matrix of finer related mineral debris. Clasts consist of reddish-brown pigeonite (zoned and partly exsolved), polycrystalline calcic plagioclase, silica polymorph, ilmenite, Ti-chromite and troilite.
Geochemistry: Pigeonite grains consist of exsolution lamellae of clinopyroxene ($Fs_{27.5\text{-}29.2}Wo_{42.6\text{-}40.1}$; FeO/MnO = 28-31, N = 3) within host orthopyroxene ($Fs_{59.4\text{-}59.9}Wo_{4.6\text{-}3.6}$; FeO/MnO = 28-30, N = 3).
Classification: Eucrite (breccia, gabbroic). This specimen is likely paired with NWA 7989 and other such stones based on close similarities in lithology, shock and style of weathering.
Specimens: 20.5 g including one polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8431 (NWA 8431) 24°17.688'N, 15°16.499'W
Western Sahara
Found: 06/2013
Classification: HED achondrite (Eucrite, polymict)
History: (H. Chennaoui Aoudjehane, *FSAC*) The meteorite was found by the shepherd Mr. Ettalibi Abdelkader on June 2013 in a reg and sold to Mr. Aomar Benchaou Dakhla.
Physical characteristics: The grayish subrounded fragments lack fusion crust. Surface weathering might be enhanced by the close proximity to the Atlantic ocean, which is just 5 km away from the find site.
Petrography: The specimen consists of lithic and mineral clasts set in a fine-grained clastic matrix dominated by calcic plagioclase and exsolved pyroxene. Lithic clasts are basaltic lithologies with variable grain size and dark melt clasts. Mineral fragments are plagioclase and pyroxene. Minor phases include SiO_2, chromite, and troilite.
Geochemistry: Low-Ca pyroxene $Fs_{22.8\text{-}61.8}Wo_{1.8\text{-}6}$, FeO/MnO=19-35; Ca-pyroxene $Fs_{15.7\text{-}40.5}Wo_{30.5\text{-}43.5}$, FeO/MnO=25-36; plagioclase $An_{86\text{-}95.2.}$

Northwest Africa 8432 (NWA 8432)
(Northwest Africa)
Purchased: 2012
Classification: Ordinary chondrite (LL7)
History: Purchased in Agadir in 2012
Physical characteristics: Two partially crusted stones. Cut surface reveals brecciated structure with dark clasts in a light-gray groundmass.
Petrography: (J. Gattacceca, *CEREGE*): Breccia with shock-darkened clasts up to 1 cm. Recrystallized texture without visible chondrule. Minerals are olivine, pyroxene, plagioclase (many >100 μm), troilite, chromite, Ca-phosphate, rare metal.
Geochemistry: Olivine $Fa_{31.5\pm0.1}$, orthopyroxene $Fs_{25.7\pm0.1}Wo_{2.3\pm0.1}$, plagioclase $An_{11}Ab_{84}Or_{5.}$ Magnetic susceptibility log $\chi = 3.83$ (χ in 10^{-9} m^3/kg).
Classification: Ordinary chondrite (LL7), breccia. Weathering grade W1
Specimens: 21 g in *CEREGE*, main mass with *Labenne*

Northwest Africa 8433 (NWA 8433)
(Northwest Africa)
Purchased: 2002
Classification: Ordinary chondrite (LL7)
History: Purchased in Tucson in 2002
Physical characteristics: One partially crusted stone.
Petrography: (J. Gattacceca, *CEREGE*): Breccia with shock-darkened clasts up to 5 mm and mm-thick shock veins. No chondrule visible. Recrystallized texture with triple junctions. Most plagioclase are >100 μm. Minerals are olivine, pyroxene, plagioclase, troilite, chromite, Ca-phosphate, metal.
Geochemistry: Olivine $Fa_{31.4\pm0.1}$, orthopyroxene $Fs_{26.4\pm0.2}Wo_{2.3\pm0.3}$, plagioclase $An_{11}Ab_{82}Or_{7.}$ Magnetic susceptibility log $\chi = 3.82$ (χ in 10^{-9} m^3/kg).

Classification: Ordinary chondrite (LL7), breccia. Weathering grade W1
Specimens: 22 g in *CEREGE*, main mass with *Labenne*

Northwest Africa 8436 (NWA 8436)
(Northwest Africa)
Purchased: 2013 Jun
Classification: HED achondrite (Eucrite, monomict)
History: Purchased in 2013 in Agadir
Physical characteristics: Cut surface reveals a gray brecciated interior with abundant shock veins and melt pockets.
Petrography: (J. Gattacceca, *CEREGE*) Brecciated ophitic to subophitic basalt. Main minerals are plagioclase and pyroxene, with typical grain size 500 μm and 1 mm, respectively. Accessory silica (most grains >200 μm), troilite, chromite, ilmenite, metal.
Geochemistry: Orthopyroxene $Fs_{61.2\pm0.5}Wo_{3.0\pm0.3}$, FeO/MnO = 33.6±2.3. Ca-pyroxene $Fs_{24.9}Wo_{45.6}$, FeO/MnO = 35.1. Plagioclase $An_{89.2}Or_{0.4}$ Magnetic susceptibility log χ = 2.60 (χ in 10^{-9} m^3/kg)
Classification: Achondrite (basaltic monomict eucrite). Moderate weathering.
Specimens: 12 g in *CEREGE*, main mass with *Labenne*

Northwest Africa 8437 (NWA 8437)
(Northwest Africa)
Purchased: 2013 Feb
Classification: HED achondrite (Howardite)
History: Purchased in 2013 in Tucson
Physical characteristics: Cut surface reveals a light gray brecciated interior.
Petrography: (J. Gattacceca, *CEREGE*) Brecciated crystalline rock composed mostly of pyroxene and plagioclase, with accessory silica, chromite, ilmenite, troilite, metal. Both eucrite and diogenite material are present. The pigeonite in the eucrite material has augite exsolution.
Geochemistry: Eucrite: Orthopyroxene $Fs_{53.4\text{-}60.5}Wo_{10.2\text{-}5.7}$, FeO/MnO = 32.0, diogenite clasts: Orthopyroxene $Fs_{25.0\text{-}34.1}Wo_{2.8\text{-}2.5}$, FeO/MnO = 28.3. Plagioclase $An_{90.6}Or_{0.3.}$ Magnetic susceptibility log χ = 3.43 (χ in 10^{-9} m^3/kg)..
Classification: Achondrite (howardite). Moderate weathering.
Specimens: 5 g in *CEREGE*, main mass with *Labenne*

Northwest Africa 8438 (NWA 8438)
(Northwest Africa)
Purchased: 2013 Jun
Classification: HED achondrite (Howardite)
History: Purchased in 2013 in Ensisheim
Physical characteristics: Cut surface reveals a dark brecciated interior.
Petrography: (J. Gattacceca, *CEREGE*) Brecciated crystalline rock composed mostly of pyroxene and plagioclase, with accessory silica, chromite, ilmenite, troilite, metal. Both eucrite and diogenite material are present. Some melt clasts are present.
Geochemistry: Eucrite: Orthopyroxene $Fs_{53.7\text{-}62.2}Wo_{10.8\text{-}3.2}$, FeO/MnO = 32.7, diogenite clasts: Orthopyroxene $Fs_{26.9}Wo_{3.0}$, FeO/MnO = 32.7. Plagioclase $An_{93.8}Or_{0.2.}$ Magnetic susceptibility log χ = 3.32 (χ in 10^{-9} m^3/kg).
Classification: Achondrite (howardite). Strong weathering.
Specimens: 4 g in *CEREGE*, main mass with *Labenne*

Northwest Africa 8439 (NWA 8439)
(Northwest Africa)
Purchased: 2013 Feb

Classification: HED achondrite (Eucrite, monomict)
History: Purchased in 2013 in Tucson
Physical characteristics: Broken and wind ablated stone with remnants of fusion crust. Cut surface reveals a light gray brecciated interior.
Petrography: (J. Gattacceca, *CEREGE*) Brecciated ophitic to subophitic basalt with grain size to 1 mm. Mineralogy: low Ca-pyroxene with augite exsolution, plagioclase, accessory ilmenite, silica, chromite, troilite, rare metal.
Geochemistry: Orthopyroxene $Fs_{58.2\text{-}61.2}Wo_{5.0\text{-}3.1}$, FeO/MnO = 33.1. Plagioclase $An_{91.8}$ $Or_{0.3.}$ Magnetic susceptibility log $\chi = 2.65$ (χ in 10^{-9} m^3/kg).
Classification: Achondrite (basaltic monomict eucrite). Strong weathering.
Specimens: 23 g in *CEREGE*, main mass with *Labenne*

Northwest Africa 8440 (NWA 8440)
(Northwest Africa)
Purchased: 2014
Classification: HED achondrite (Howardite)
History: Purchased from a Moroccan meteorite dealer in 2014.
Physical characteristics: Single stone. Dark irregular exterior, saw cuts reveals fresh-appearing breccia with white, green, and dark gray clasts.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows a fragmental to cataclastic breccia with equilibrated (exsolution lamellae) and unequilibrated (igneous zoned) pyroxenes throughout. Silica, troilite, ilmenite, chromite, kamacite, and taenite present. Some shock melt veins observed. Approximately 25% of this meteorite is diogenitic, ~50% is basaltic eucrite, and ~25% is cumulate eucrite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Diogenite minerals: low-Ca pyroxene $Fs_{26.9\pm6.8}Wo_{3.2\pm0.4}$, Fe/Mn=31±1, n=4; plagioclase $An_{95.2\pm0.6}Ab_{4.6\pm0.6}Or_{0.2\pm0.1}$, n=4. Basaltic eucrite minerals: low-Ca pyroxene $Fs_{55.1\pm3.3}Wo_{8.8\pm4.1}$, Fe/Mn=32±1, n=8; augite $Fs_{30.6\pm2.4}Wo_{38.7\pm1.5}$, Fe/Mn=30±5, n=5; plagioclase $An_{89.2}Ab_{10.3}Or_{0.5}$, n=1. Cumulate eucrite minerals: low-Ca pyroxene $Fs_{39.1\pm2.5}Wo_{3.7\pm0.3}$, Fe/Mn=29±1, n=4; plagioclase $An_{91.0}Ab_{8.6}Or_{0.4}$, n=1.
Classification: Achondrite (Howardite)
Specimens: 26.7 g on deposit at *UNM*, D. Chenin holds the main mass.

Northwest Africa 8441 (NWA 8441)
(Northwest Africa)
Purchased: June 2012
Classification: Iron, IAB-sLM-an
Petrography: The type specimen is etched on two surfaces to yield a total area of about 10 cm^2. It is a finest octahedrite with kamacite bandwidth of 0.09±0.02 mm. It contains three small (0.3 to 1.3 mm diameter) FeS inclusions. Tiny amounts of schreibersite were tentatively identified at points where kamacite bands intersect. No silicates were recognized. Near the end of one surface is a wide wavy kamacite interpreted to be the boundary between two precursor gamma crystals. Weathering is minor but no heat-altered zone was recognized.
Geochemistry: Composition: Co, 5.18 mg/g; Ni, 119.5 mg/g; Ga, 37.9 µg/g; Ge, ~150 µg/g; As, 16.0 µg/g; Ir, 1.64 µg/g; and Au, 1.629 µg/g. The meteorite plots in or close to IAB-sLM fields on element-Au diagrams but differs in enough cases that the preferred classification is IAB-sLM-an.
Classification: The nearest compositional relatives are Edmonton (Kentucky) and Persimmon Creek but its Ir and W contents are higher and its Co content lower than in these IAB-sLM irons.

Northwest Africa 8442 (NWA 8442)
(Northwest Africa)
Purchased: June 2012

Classification: Iron meteorite (IIIAB)
Petrography: The examined polished surface has an area of about 15 cm^2; an additional 30 cm^2 is sawed surface with features >0.4 mm across visible. Meteorite is moderately weathered with oxidation revealing the kamacite bandwidth to be about 1.2±0.2 mm, similar to the highest in IIIAB. On the polished surface no inclusions >0.1 mm in maximum dimensions were observed; in the remaining 30 cm^2 no inclusions >0.4 mm were observed.
Geochemistry: Composition: Co, 5.02 mg/g; Ni, 79.8 mg/g; Ga, 20.4 µg/g; Ge, <54 µg/g; As, 5.29 µg/g; Ir, 2.82 µg/g; and Au, 0.707 µg/g. All elements plot within IIIAB fields.
Classification: There are no known close NWA relatives; the nearest are the "Tata" irons (NWA 1430, etc.) The composition is similar to al-Ghanim (iron) and unresolvable from that of Rowton.

Northwest Africa 8443 (NWA 8443)
Morocco
Purchased: Feb 2013
Classification: Iron meteorite (IAB complex)
History: A single specimen was purchased in February 2013 by Andreas Koppelt from a Moroccan dealer in Zagora.
Physical characteristics: The 164.2 g mass is shield shaped and oriented with moderate weathering. The leading edge of the specimen is characterized by a ~7 × 7 mm circular depression.
Petrography: Optical investigation reveals a well-developed Widmanstätten pattern consistent with a fine octahedrite. Plessite is common.
Geochemistry: Bulk composition: INAA data (J. Duke and C. Herd, *UAb*): Ni=9.59±0.08 wt%, Co=0.504±0.003 wt%; Ir=0.83±0.04, Au=1.58±0.02, Ga=49.4±0.6, As=15.1±0.2, W=0.28±0.07, Re<0.1, Cr=40±13, Cu=292±22, Ge=115±22 (all µg/g).
Classification: (C. Herd, *UAb*): IAB complex, fine octahedrite. Trace element composition suggestive of Udei Station grouplet of Wasson and Kallemeyn (2002).
Specimens: Type specimen of 22.6 g, including slice used for INAA, at *UAb*. Most of the main mass remains with A. Koppelt.

Northwest Africa 8444 (NWA 8444)
Western Sahara
Purchased: Apr 2013
Classification: Iron meteorite (IIIAB)
History: One specimen (1406 g) found ~60 km northeast of Boujdour was purchased by Marc Jost in April 2013 was cut for classification. A second (9460 g) mass identical in external appearance was found in the same area in November 2013 by Aziz Mouadine.
Physical characteristics: Specimens show very little evidence of terrestrial alteration or weathering.
Petrography: Optical investigation reveals a well-developed Widmanstätten pattern consistent with a medium octahedrite. Some areas of plessite are visible.
Geochemistry: Bulk composition: INAA data (J. Duke and C. Herd, *UAb*): Ni = 7.07±0.07 wt%, Co = 0.497±0.003 wt%; Ir = 7.40±0.08, Au = 0.550 ± 0.009, Ga = 18.0 ± 0.8, As = 3.35±0.12, W = 0.99±0.09, Re = 0.80±0.03, Cr = 170±15, Cu = 174±15, Ge = 78±25 (all µg/g).
Classification: (C. Herd, *UAb*): IIIAB, medium octahedrite. Trace element composition consistent with IIIAB chemical group.
Specimens: Type specimen of 33.6 g, including slice used for INAA, at *UAb*. The 1406 g specimen with M. Jost, *SJS*. The 9460 g specimen is with Aziz Mouadine, Klagenfurt, Austria.

Northwest Africa 8445 (NWA 8445)
(Northwest Africa)
Purchased: 2014
Classification: Carbonaceous chondrite (CV3)

History: Purchased in Morocco in 2014
Physical characteristics: A single crusted stone. Cut surface reveals abundant brownish chondrules up to 4 mm, and CAI up to 5 mm set in a dark matrix.
Petrography: Chondrules and CAIs set in a fine-grained matrix. Chondrule:matrix ratio is about 1:1. Chondrule mean apparent size 1.1±0.1 mm (n=25). Dusty olivines present.
Geochemistry: Olivine $Fa_{3.3\pm2.7}$ (PMD=72%, n=11, range 0.5-8.5). Orthopyroxene $Fs_{3.0\pm3.7}$ (PMD=91%, n=6, range 0.7-11.1). Magnetic susceptibility log $\chi = 4.64$ (χ in 10^{-9} m^3/kg)
Classification: Carbonaceous chondrite (CV3). Severe weathering.
Specimens: 9.9 g and a polished section in *CEREGE*. Main mass with Pierre-Marie Pelé

Northwest Africa 8446 (NWA 8446)
(Northwest Africa)
Purchased: 2014
Classification: HED achondrite (Diogenite)
History: Purchased in Morocco in 2014
Physical characteristics: Crusted stones. Cut surface reveals gray interior
Petrography: Coarse-grained crystalline rock. Main mineral is orthopyroxene with typical grain size 750 μm. Plagioclase with grain size 100 μm. Chromite, metal (grain size 70 μm), silica and metal weathering products are present. No olivine was observed
Geochemistry: OPX $Fs_{25.8\pm0.1}$ (n=3), FeO/MnO=29.9. Plagioclase $An_{88.3}Ab_{11.5}Or_{0.2.}$ Magnetic susceptibility log $\chi = 3.67$ (χ in 10^{-9} m^3/kg) indicates an unusually high metal content for a diogenite (like in Garland)
Classification: Achondrite (diogenite, metal rich)
Specimens: 2 g and a polished section in *CEREGE*. Main mass with Pierre-Marie Pelé.

Northwest Africa 8447 (NWA 8447)
(Northwest Africa)
Purchased: 2014
Classification: Carbonaceous chondrite (CK6)
History: Purchased in Morocco in 2014
Physical characteristics: A single crusted stone. Cut surface reveals poorly delineated dark chondules (up to 1 mm) and CAIs (up to 1 mm) embedded in a gray to greenish matrix.
Petrography: Chondrule mean apparent size 750±340 μm (n=26). Matrix plagioclase up to 200 μm
Geochemistry: Olivine $Fa_{34.1\pm0.3}$ (PMD = 0.8, n=10, range 33.6-34.5). CPX $Fs_{9.8}Wo_{48.8}$ (n=2). Magnetite contains 5.1 wt.% Cr_2O_3. Magnetic susceptibility log $\chi = 4.57$ (χ in 10^{-9} m^3/kg)
Classification: Carbonaceous chondrite (CK6)
Specimens: 8.4 g and a polished section in *CEREGE*. Main mass with Pierre-Marie Pelé

Northwest Africa 8448 (NWA 8448)
(Northwest Africa)
Purchased: 2014 Jan
Classification: Ordinary chondrite (L6)
History: Purchased by Pierre-Marie Pele in January 2014 from a dealer in Erfoud, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Extensively recrystallized with rare remnant chondrules and fairly oxidized metal.
Geochemistry: Olivine ($Fa_{24.5\text{-}24.9}$), orthopyroxene ($Fs_{20.6\text{-}21.3}Wo_{1.5\text{-}1.4}$), clinopyroxene ($Fs_{6.6\text{-}7.2}Wo_{45.8\text{-}45.3}$).
Classification: Ordinary chondrite (L6).
Specimens: Type specimen plus one polished thin section are at *PSF*; main mass with Mr. P. Pele.

Northwest Africa 8449 (NWA 8449)
(Northwest Africa)

Purchased: 2014 Jan
Classification: Ordinary chondrite (L4)
History: Purchased by Pierre-Marie Pele in January 2014 from a dealer in Tagounite, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Closely-packed, well-formed, medium-sized chondrules (0.6-1.8 mm) are set in a relatively coarse grained matrix.
Geochemistry: Olivine ($Fa_{23.3-24.5}$), orthopyroxene ($Fs_{19.3-20.3}Wo_{0.3-1.5}$), clinopyroxene ($Fs_{8.5-9.0}Wo_{41.9-46.0}$).
Classification: Ordinary chondrite (L4).
Specimens: Type specimen plus one polished thin section are at *PSF*; main mass with Mr. P. Pele.

Northwest Africa 8450 (NWA 8450)
(Northwest Africa)
Purchased: 2014 Jan
Classification: Ordinary chondrite (H5)
History: Purchased by Pierre-Marie Pele in January 2014 from a dealer in Erfoud, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Sparse chondrules are set in a finer grained recrystallized matrix.
Geochemistry: Olivine ($Fa_{18.6-19.1}$), orthopyroxene ($Fs_{16.2-16.6}Wo_{1.3-1.4}$), clinopyroxene ($Fs_{5.8-6.9}Wo_{45.1-44.7}$).
Classification: Ordinary chondrite (H5).
Specimens: Type specimen plus one polished thin section are at *PSF*; main mass with Mr. P. Pele.

Northwest Africa 8451 (NWA 8451)
(Northwest Africa)
Purchased: 2014 Jan
Classification: Ordinary chondrite (H5)
History: Purchased by Pierre-Marie Pele in January 2014 from a dealer in Rissani, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Sparse chondrules are set in a finer grained recrystallized matrix.
Geochemistry: Olivine ($Fa_{18.6-18.9}$), orthopyroxene ($Fs_{15.9-16.1}Wo_{1.6-1.7}$), clinopyroxene ($Fs_{5.9-6.6}Wo_{44.3-44.2}$).
Classification: Ordinary chondrite (H5).
Specimens: Type specimen plus one polished thin section are at *PSF*; main mass with Mr. P. Pele.

Northwest Africa 8452 (NWA 8452)
(Northwest Africa)
Purchased: 2014 Jan
Classification: Ordinary chondrite (H4)
History: Purchased by Pierre-Marie Pele in January 2014 from a dealer in Rissani, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fairly closely-packed, well-formed, small to medium-sized chondrules (0.3-1.8 mm) are set in a fine grained grained matrix.
Geochemistry: Olivine ($Fa_{17.5-17.8}$), orthopyroxene ($Fs_{15.1-15.4}Wo_{1.4-1.3}$), clinopyroxene ($Fs_{5.1}Wo_{46.8}$).
Classification: Ordinary chondrite (H4).
Specimens: Type specimen plus one polished thin section are at *PSF*; main mass with Mr. P. Pele.

Northwest Africa 8453 (NWA 8453)
(Northwest Africa)
Purchased: 2014 Jan
Classification: Ordinary chondrite (H4)
History: Purchased by Pierre-Marie Pele in January 2014 from a dealer in Rissani, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fairly closely-packed round, small to medium-sized chondrules (0.5-1.7 mm) are set in a fine grained grained matrix.
Geochemistry: Olivine ($Fa_{19.0-19.4}$), orthopyroxene ($Fs_{16.7-16.8}Wo_{1.1-2.1}$), clinopyroxene ($Fs_{5.5-5.9}Wo_{45.2-44.7}$).
Classification: Ordinary chondrite (H4).

Specimens: Type specimen plus one polished thin section are at *PSF*; main mass with Mr. P. Pele.

Northwest Africa 8455 (NWA 8455)
(Northwest Africa)
Purchased: 2014
Classification: Lunar meteorite
History: Purchased from a Moroccan meteorite dealer in 2014.
Physical characteristics: Single stone, no fusion crust, irregular exterior with desert patina, freshly broken surface and saw cut reveals a few scattered millimeter-sized white feldspar clasts set in a very dark gray groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows this specimen to be a fragmental breccia composed of clasts (up to ~500 μm) of individual plagioclase, pyroxene, olivine grains, and also lithic clasts (up to ~1 mm) of gabbro and shock melt, set in a pervasive matrix of micrometer- to submicrometer-sized silicates. Accessory ilmenite, silica polymorph, chromite, phosphate, Fe-metal.
Geochemistry: (C. Agee and N. Muttik). Olivine $Fa_{26.6\pm3.5}$, Fe/Mn=100±9, n=28; pigeonite $Fs_{26.2\pm6.2}Wo_{8.7\pm4.4}$, Fe/Mn=58±5, n=22; augite $Fs_{21.5\pm8.4}Wo_{34.5\pm6.8}$, Fe/Mn=55±11, n=11; plagioclase $An_{95.1\pm1.0}Ab_{4.5\pm1.0}Or_{0.4\pm0.1}$, n=4. Shock melt (proxy for bulk composition) SiO_2=44.6±1.1, TiO_2=0.59±0.53, Al_2O_3=26.1±3.2, Cr_2O_3=0.10±0.03, MgO=6.8±1.8, FeO=5.0±1.3, MnO=0.04±0.03, NiO=0.02±0.01, Na_2O=0.69±0.20, K_2O=0.19±0.04 (all wt%).
Classification: Achondrite (lunar feldspathic breccia)
Specimens: 20.5 g, including a probe mount is on deposit at *UNM*. J. Piatek holds the main mass.

Northwest Africa 8456 (NWA 8456)
(Northwest Africa)
Purchased: 2014
Classification: Primitive achondrite (Lodranite)
History: Purchased from a Moroccan meteorite dealer in 2014.
Physical characteristics: Single stone, some weathered fusion crust, irregular exterior with desert patina, iron-oxide staining. Saw cut reveals a coarsely crystalline texture with green, white, and brown silicate crystals, and metal/sulfide rich domains.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows this specimen to be a brecciated lodranite composed of mm-sized olivine and pyroxene clasts, with smaller fragments (100-300 μm) in cataclastic zones. Many Fe-Ni metal domains, with some up to 1 mm. Accessory phosphate, chromite, and troilite.
Geochemistry: (C. Agee and N. Muttik). Olivine $Fa_{11.8\pm0.2}$, Fe/Mn=25±1, n=10; pigeonite $Fs_{11.7\pm1.8}Wo_{5.5\pm4.5}$, Fe/Mn=17±2, n=9; augite $Fs_{6.5\pm1.8}Wo_{39.9\pm6.4}$, Fe/Mn=14±4, n=9.
Classification: Primitive achondrite (lodranite) possibly paired with NWA 8118, NWA 8216, NWA 8251.
Specimens: 22.0 g, including a probe mount is on deposit at *UNM*. Jay Piatek holds the main mass.

Northwest Africa 8457 (NWA 8457)
(Northwest Africa)
Purchased: 2014
Classification: Ordinary chondrite (LL3.2)
History: A partially crusted stone weighing 54.6 g was found in Morocco and purchased by Blaine Reed at the Tucson Gem and Mineral Show in February of 2014
Physical characteristics: Sample is irregularly shaped and contains minor amounts of weathered fusion crust.
Petrography: Description and classification (A. Love, *App*): Sample is dark-colored and displays numerous close-packed large (up to 2.5 mm) unequilibrated chondrules (avg. dia. 702 μm). Chondrules

commonly contain mesostasis that displays yellow CL (44%) and blue CL (53%). Many chondrules display fine-grained rims composed of clastic and amorphous silicate and metal materials. Sample contains many Fe-Oxides and a single irregular-shaped metal grain composed of rounded taenite nodules with surrounded by rims of kamacite and troilite.
Geochemistry: (A.Love, *App*) $Fa_{12.0\pm7.4}$ ($Fa_{0.0\text{-}29.3}$ n=23), Fe/Mn=53.68, Cr_2O_3 in ferroan olivine is 0.28±0.09 wt%; Low Ca pyroxene $Fs_{8.4\pm7.6}Wo_{1.6\pm1.5}$, N=8.
Classification: Ordinary Chondrite (LL3.2 S3 W3). LL based on chondrule diameter and Fe/Mn ratios in olivine. Estimation of subtype based on mean content and variability of wt% Cr_2O_3 in ferroan olivine after Grossman and Brearley (2005) and CL signature of chondrule olivines and mesostasis of Huss et al. (2006).
Specimens: A 10.95 g type specimen and one polished thin section are on deposit at *App*.

Northwest Africa 8459 (NWA 8459)
(Northwest Africa)
Purchased: 2013
Classification: Enstatite chondrite (EL6)
History: Purchased by Nicola Castellano at the Genova Mineral Show ,Italy.
Physical characteristics: A single piece weighing 2650 g partially covered by fusion crust.
Petrography: (V. Moggi Cecchi, G. Pratesi, S. Caporali, *MSP*); The thin section displays very rare relict chondrules set in a fine-grained matrix, mainly consisting of pyroxene, with minor plagioclase. Subparallel 210 μm-wide veinlets filled with iron oxides/hydroxides are present. Relict chondrules range from 0.3 to 0.9 mm in diameter and are mainly RP type, with minor GP. Opaque phases are mainly kamacite and troilite, partially weathered to iron oxides. Accessory phases are alabandite and daubreelite as blades in troilite.
Geochemistry: Orthopyroxene ($Fs_{0.9}En_{97.8}Wo_{1.3}$), plagioclase ($An_{15.7}Or_{3.4}$); Si in kamacite = 0.7 wt.%, Ti in troilite = 5.9 wt.%
Classification: Enstatite chondrite (EL6); S1; W3. The presence of alabandite, An content of plagioclase and Si content of kamacite point to a classification as EL chondrite.
Specimens: A total of 21.3 g specimen and one thin section is on deposit at *MSP*. Castellano holds the main mass.

Northwest Africa 8460 (NWA 8460)
(Northwest Africa)
Purchased: 2013
Classification: Enstatite chondrite (EL6)
History: Purchased by Nicola Castellano at the Genova Mineral Show, Italy.
Physical characteristics: A single piece weighing 155 g with no fusion crust.
Petrography: (V. Moggi Cecchi, G. Pratesi, S. Caporali, *MSP*); The thin section displays very rare relict chondrules set in a fine-grained matrix, mainly consisting of pyroxene, with minor plagioclase. Many iron oxides/hydroxides veinlets (170 μm-wide) are present. Subparallel 210 μm-wide veinlets filled with iron oxides/hydroxides are present. Relict chondrules range from 0.2 to 1.0 mm in diameter and are mainly RP type, with minor GP. Opaque phases are mainly kamacite and troilite, partially weathered to iron oxides. Accessory phases are alabandite and daubreelite as blades in troilite.
Geochemistry: Orthopyroxene ($Fs_{0.8}En_{97.8}Wo_{1.4}$), plagioclase ($An_{14.8}Or_{3.0}$); Si in kamacite = 0.9 wt.%, Ti in troilite = 6.1 wt.%
Classification: Enstatite chondrite (EL6); S2; W3. The presence of alabandite, An content of plagioclase and Si content of kamacite point to a classification as EL chondrite.
Specimens: A total of 20.5 g specimen and one thin section is on deposit at *MSP*. Castellano holds the main mass.

Northwest Africa 8467 (NWA 8467)

(Northwest Africa)
Purchased: 2013
Classification: Enstatite chondrite (EL6)
History: Purchased by Nicola Castellano at the Genova Mineral Show, Italy.
Physical characteristics: A single piece weighing 165 g with a small portion of fusion crust.
Petrography: (V. Moggi Cecchi, G. Pratesi, S. Caporali, *MSP*); The thin section displays rare relict chondrules set in a fine-grained matrix, mainly consisting of pyroxene, with minor plagioclase. Relict chondrules range from 0.5 to 0.9 mm in diameter and are mainly RP type, with minor PP. Opaque phases are mainly kamacite and troilite, almost completely weathered to iron oxides. Accessory phases are alabandite and daubreelite as blades in troilite.
Geochemistry: Orthopyroxene ($Fs_{0.5}En_{98.0}Wo_{1.5}$), plagioclase ($An_{16.4}Or_{4.2}$); Si in kamacite = 0.8 wt.%, Ti in troilite = 6.3 wt.%
Classification: Enstatite chondrite (EL6); S2; W3. The presence of alabandite, An content of plagioclase and Si content of kamacite point to a classification as EL chondrite.
Specimens: A total of 21.4 g specimen and one thin section is on deposit at *MSP*. Castellano holds the main mass.

Northwest Africa 8468 (NWA 8468)
(Northwest Africa)
Purchased: 2013
Classification: Enstatite chondrite (EL6)
History: Purchased by Nicola Castellano at the Genova Mineral Show, Italy.
Physical characteristics: A single piece weighing 204 g with no fusion crust.
Petrography: (V. Moggi Cecchi, G. Pratesi, S. Caporali, *MSP*); The thin section displays very rare relict chondrules set in a fine-grained matrix, mainly consisting of pyroxene, with minor plagioclase. Rare 150 μm-wide veinlets filled with iron oxides/hydroxides are present. Relict chondrules range from 0.5 to 1.3 mm in diameter and are mainly RP type, with minor GP. Opaque phases are mainly kamacite and troilite, partially weathered to iron oxides. Accessory phases are alabandite and daubreelite as blades in troilite.
Geochemistry: Orthopyroxene ($Fs_{0.6}En_{98.0}Wo_{1.4}$), plagioclase ($An_{15.3}Or_{5.1}$); Si in kamacite = 0.7 wt.%, Ti in troilite = 6.4 wt.%
Classification: Enstatite chondrite (EL6); S1; W3. The presence of alabandite, An content of plagioclase and Si content of kamacite point to a classification as an EL chondrite.
Specimens: A total of 20.7 g specimen and one thin section is on deposit at *MSP*. Castellano holds the main mass.

Northwest Africa 8469 (NWA 8469)
(Northwest Africa)
Purchased: 2013
Classification: Enstatite chondrite (EL6)
History: Purchased by Nicola Castellano at the Genova Mineral Show, Italy.
Physical characteristics: A single piece weighing 137 g with a small portion of fusion crust.
Petrography: (V. Moggi Cecchi, G. Pratesi, S. Caporali, *MSP*); The thin section displays rare relic chondrules set in a fine-grained matrix, mainly consisting of pyroxene, with minor plagioclase. Relic chondrules (mainly RP type, with minor PP) range from 0.2 to 0.4 mm in diameter. Opaque phases are mainly kamacite and troilite, partially weathered to iron oxides. Accessory phases are alabandite and daubreelite as blades in troilite. The presence of alabandite, An content of plagioclase and Si content of kamacite point to a classification as EL chondrite.
Geochemistry: Orthopyroxene ($Fs_{0.5}En_{98.2}Wo_{1.3}$), plagioclase ($An_{14.6}Or_{3.8}$); Si in kamacite = 1.0 wt.%, Ti in troilite = 5.8 wt.%
Classification: Enstatite chondrite (EL6); S1; W3

Specimens: A total of 25.3 g specimen and one thin section is on deposit at *MSP*. Castellano holds the main mass.

Northwest Africa 8471 (NWA 8471)
Morocco
Purchased: 2014 Mar
Classification: Carbonaceous chondrite (CV3)
History: Purchased from a dealer in Morocco in March of 2014 by A. Jonikas
Physical characteristics: One stone lacking fusion crust, cut surface reveals closely packed chondrules and CAIs in a dark gray matrix
Petrography: (A. Rubin, *UCLA*) Microprobe examination of a polished mount shows the rock is an oxidized CV3; it contains abundant magnetite and has little metallic Fe-Ni. It has a preferred orientation petrofabric, suggesting it may be a member of the Bali subgroup. Chondrules are large, averaging 900 μm in diameter. Textural types of chondrules include Type-I porphyritic olivine and olivine-pyroxene and barred olivine. Type-II chondrules are rare. No radial pyroxene chondrules were observed in the thin section. Many of the chondrules are surrounded by igneous rims. The rock contains 5-10 vol.% amoeboid olivine inclusions ranging in length from 0.8 to 5 mm.
Geochemistry: Olivine $Fa_{4.0\pm2.6}$ ($Fa_{0.5\text{-}10.0}$, n=30); Low-Ca pyroxene $Fs_{2.2\pm1.7}Wo_{1.5\pm0.8}$ ($Fs_{0.9\text{-}4.7}$, n=12).
Classification: Carbonaceous chondrite (CV3)
Specimens: 21 g type specimen including a probe mount, *UCLA*; A. Jonikas hold the main mass

Northwest Africa 8472 (NWA 8472)
Morocco
Purchased: May 2014
Classification: Ordinary chondrite (LL3)
History: Purchased from a dealer in Morocco in May of 2014 by A. Jonikas
Physical characteristics: one stone contianing weathered fusion crust, cut surface reveals very closely packed chondrules of various shapes and sizes and a small dark carbonaceous clast set in a grayish-brown matrix
Petrography: (A. Rubin, *UCLA*) Microprobe examination of a polished mount shows that chondrules lack clear glassy mesostasis. There are numerous grains of polysynthetically twinned low-Ca pyroxene. Chondrules are large, averaging ~600 μm in diameter, consistent with LL. There is very little metal present, consistent with LL. Even though the rock is W4 and most of the metal has been weathered, there is not that much limonite, indicating that there was little metal initially.
Geochemistry: Olivine $Fa_{12.0\pm3.9}$ ($Fa_{3.7\text{-}15.9}$, n=14); Low-Ca pyroxene $Fs_{8.6\pm10.8}Wo_{1.0\pm1.0}$ ($Fs_{6.2\text{-}20.5}$, n=18).
Classification: Ordinary chondrite (LL3); subtype estimated >3.5 due to chondrules lacking clear glassy mesostases.
Specimens: 21.8 g type specimen including a probe mount, *UCLA*; A. Jonikas hold the main mass

Northwest Africa 8473 (NWA 8473)
(Northwest Africa)
Purchased: 2013 Jun
Classification: HED achondrite (Eucrite, monomict)
History: Purchased in 2013 in Zagora
Physical characteristics: Cut surface reveals a fresh light gray interior with a few clasts about 1 mm in size.
Petrography: (J. Gattacceca, *CEREGE*) Brecciated ophitic to subophitic basalt with grain size 500 μm to 1 mm. Mineralogy: pyroxene, plagioclase, accessory ilmenite, silica, chromite, troilite, rare metal.
Geochemistry: Orthopyroxene $Fs_{58.2\text{-}62.4}Wo_{7.6\text{-}1.7}$, FeO/MnO = 35.0, n=6. Plagioclase $An_{86.7}Or_{0.8}$ range $An_{77.7\text{-}92.8}Or_{1.7\text{-}0.1}$), n=5. Magnetic susceptibility log χ = 2.82 (χ in 10^{-9} m^3/kg).
Classification: Achondrite (basaltic monomict eucrite). Strong weathering.

Specimens: 21 g in *CEREGE*, main mass with *Labenne*

Northwest Africa 8474 (NWA 8474)
(Northwest Africa)
Purchased: 2013 Jun
Classification: HED achondrite (Eucrite)
History: Purchased in 2013 in Zagora
Physical characteristics: Cut surface reveals a gray coarse brecciated interior.
Petrography: (J. Gattacceca, *CEREGE*) Brecciated ophitic to subophitic coarse basalt with crystal between 1 mm and 3 mm. Mineralogy: pigeonite with augite exsolution, plagioclase, accessory silica, chromite, ilmenite, Ca-phosphate, troilite, rare metal. Some pyroxenes are zoned, with outer rim enriched in iron.
Geochemistry: Pigeonite $Fs_{35.7\text{-}59.1}Wo_{6.9\text{-}26.9}$, FeO/MnO= 34.8±3.5 (n=13). Augite exsolution $Fs_{30.7}Wo_{43.5}$ (N=1). Orthopyroxene $Fs_{65.8}Wo_{2.5}$ (N=1). Plagioclase $An_{78.2\pm2.2}Ab_{20.0\pm1.8}Or_{1.8\pm0.4}$ (N=7). Magnetic susceptibility log χ = 2.91 (χ in 10^{-9} m^3/kg).
Classification: Achondrite (basaltic polymict eucrite). The polymict character is evidenced by the presence of both exsolved and zoned pyroxenes. Moderate weathering.
Specimens: 5 g in *CEREGE*, main mass with *Labenne*

Northwest Africa 8475 (NWA 8475)
(Northwest Africa)
Purchased: 2013 Feb
Classification: HED achondrite (Eucrite, cumulate)
History: Purchased in 2013 in Tucson.
Physical characteristics: A single stone without fusion crust. Cut surface reveals a gray interior.
Petrography: (J. Gattacceca, *CEREGE*) Protogranular crystalline rock dominated by pyroxene and plagioclase with typical grain size 1 to 1.5 mm. Accessory silica (often containing kamacite inclusions up to 5 μm), troilite (up to 250 μm), chromite, kamacite.
Geochemistry: Pigeonite $Fs_{47.8\pm1.6}Wo_{8.3\pm2.1}$, FeO/MnO= 32.1±1.0 (N=5). Augite $Fs_{29.5\pm0.8}Wo_{34.0\pm1.2}$, FeO/MnO= 28.8±1.8 (n=5). Plagioclase $An_{90.6\pm0.2}Ab_{9.1\pm0.2}Or_{0.3\pm0.0}$ (N=6). Magnetic susceptibility log χ = 2.66 (χ in 10^{-9} m^3/kg).
Classification: Achondrite (cumulate eucrite). Moderate weathering.
Specimens: 7 g in *CEREGE*, main mass with *Labenne*

Northwest Africa 8476 (NWA 8476)
Tan Tan, Morocco
Purchased: 2013 Jun 4
Classification: HED achondrite (Diogenite)
History: Found in the Tan Tan region, Morocco, and purchased in Erfoud in June 2013.
Physical characteristics: Many fragments consisting of a homogeneous assemblage of mm sized green minerals
Petrography: (C. Cournède, J. Gattacceca, *CEREGE*): Main minerals are orthopyroxene with typical grain size 2 to 5 mm. Accessory chromite, silica. Metal is observed as aligned droplets (25 μm) in pyroxene crystals.
Geochemistry: Orthopyroxene $Fs_{28.5\pm0.4}Wo_{3.0\pm0.2}$ (n=5). FeO/MnO=31.3±3.1. Chromite Cr#=72%. Magnetic susceptibility log χ = 2.90 (χ in 10^{-9} m^3/kg).
Classification: Diogenite. Moderate weathering.
Specimens: 20.5 g at *CEREGE*. Main mass with P. Thomas.

Northwest Africa 8478 (NWA 8478)
(Northwest Africa)

Purchased: 2013 Jun 05
Classification: Carbonaceous chondrite (CV3)
History: Purchased in Erfoud June 5, 2013.
Physical characteristics: Thirteen dark fragments, some with dull fusion crust. Cut surface reveals chondrules and CAIs set in a dark matrix.
Petrography: (J. Gattacceca, *CEREGE*): Chondrules up to 2 mm set in a fine-grained matrix. Chondrule:matrix ratio is 59%:41% (by point counting, n=323). Chondrule mean apparent size 850±430 μm (N=25). Troilite and metal are present. Metal is found in the matrix (~5 μm grains) and as blebs in the chondrules (10-50 μm).
Geochemistry: Olivine $Fa_{4.8\pm6.7}$ (PMD=90%, range 0.5-26.3, N=17), orthopyroxene $Fs_{1.3\pm0.3}Wo_{0.9\pm0.0}$ (N=3). Olivines are slightly zoned. Magnetic susceptibility log $\chi = 3.85$ (χ in 10^{-9} m^3/kg).
Classification: Carbonaceous chondrite (CV3). moderate weathering
Specimens: 13 g at *CEREGE*. Main mass with P. Thomas.

Northwest Africa 8479 (NWA 8479)
(Northwest Africa)
Purchased: 2013 Jun 06
Classification: HED achondrite (Eucrite, unbrecciated)
History: Purchased in Erfoud June 6, 2013.
Physical characteristics: Five complete stones with a thin translucent fusion crust. Cut surface reveals a homogeneous coarse-grained grayish interior.
Petrography: (J. Gattacceca, *CEREGE*): Unbrecciated and heavily fractured inequigranular igneous rock with poikilophytic texture. Typical grain size 800 μm. Mineralogy: pyroxene (53 vol%, with exsolution of augite in low-Ca pyroxenes), plagioclase (45 vol%), accessory chromite, ilmenite, silica, rare metal.
Geochemistry: Low Ca pyroxene $Fs_{59.4\pm1.9}Wo_{4.3\pm1.9}$ (n=8) FeO/MnO = 31.4±2.0. Augite exsolution $Fs_{26.3}Wo_{44.0}$ (n=1) FeO/MnO = 31.2. Plagioclase $An_{88.5\pm0.2}Ab_{11.2\pm0.3}Or_{0.2\pm0.1}$ (n=4). Chromite Cr# 81% (n=1). Magnetic susceptibility 3.08 (log χ with χ in 10^{-9} m^3/kg).
Classification: Eucrite (basaltic, unbrecciated). Low weathering.
Specimens: 24.1 g at *CEREGE*. Main mass with P. Thomas

Northwest Africa 8481 (NWA 8481)
(Northwest Africa)
Purchased: 2013 June 7
Classification: Carbonaceous chondrite (CV3)
History: Purchased in Erfoud, June 2013
Physical characteristics: A single oriented stone in three fragments. Cut surfaces reveals abundant grayish chondrules up to 2 mm, set in a brownish matrix.
Petrography: (C. Cournède and J. Gattacceca, *CEREGE*) Chondrules and CAIs set in a fine-grained matrix. Chondrule:matrix ratio is about 1:1. Chondrule mean apparent size 0.61±0.4 mm (N=28). Presence of magnetite (120 μm), sufides (120 μm) and metal (80 μm)
Geochemistry: Olivine $Fa_{15.9\pm15.2}$ (PMD=85%, n=17, range 0.6-43.6). Orthopyroxene $Fs_{8.3\pm8.2}Wo_{1.6\pm0.8}$ (PMD=97%, n=10, range $Fs_{0.9\text{-}19.5}$) . Magnetic susceptibility log $\chi = 3.82$ (χ in 10^{-9} m^3/kg).
Classification: Carbonaceous chondrite (CV3). Strong weathering
Specimens: 22.8 g and a polished section in *CEREGE*. Main mass with P. Thomas

Northwest Africa 8482 (NWA 8482)
(Northwest Africa)
Purchased: 2013 June 7
Classification: HED achondrite (Eucrite, polymict)
History: Purchased in Erfoud, June 2013

Physical characteristics: A single crusted full stone. Cut surface reveals light gray interior with lighter mm-sized clasts.
Petrography: (C. Cournède and J. Gattacceca, *CEREGE*) Basalt with sub-ophitic texture. Mm-sized clasts with cumulate texture. Main minerals are plagioclase (~250 μm) and clinopyroxenes (~400 μm). Accessory silica (~90 μm), chromite (~100 μm). Rare metal.
Geochemistry: Basaltic host orthopyroxene $Fs_{61.3\pm1.1}Wo_{1.9\pm0.2}$ (n=10). Cumulate clasts $Fs_{42.3\pm5.5}Wo_{2.4\pm0.7}$ (n=5). Augite exsolutions $Fs_{25.3\pm4.4}Wo_{42.7\pm1.5}$ (n=4). Plagioclase $An_{88.3}Ab_{11.2}Or_{0.5}$ (n=2). Magnetic susceptibility log $\chi = 3.32$ (χ in 10^{-9} m^3/kg).
Classification: Eucrite polymict. Minimal weathering
Specimens: 5.2 g and a polished section in *CEREGE*. Main mass with P. Thomas

Northwest Africa 8483 (NWA 8483)
(Northwest Africa)
Purchased: 2013 Apr 30
Classification: Carbonaceous chondrite (CV3)
History: Purchased in Erfoud, April 2013. Found in Western Sahara.
Physical characteristics: Three crusted stones. Cut surface reveals abundant brownish chondrules up to 3 mm, and CAI up to 1 mm set in a dark matrix.
Petrography: (C. Cournède and J. Gattacceca, *CEREGE*) Chondrules set in a fine-grained matrix. Chondrule:matrix ratio is about 60%:40%. Chondrule mean apparent size 0.78±0.58 mm (N=34).
Geochemistry: Olivine $Fa_{4.8\pm4.0}$ (PMD=70%, n=18, range 0.5-14.1). Orthopyroxene $Fs_{1.2\pm0.2}$ (PMD=13%, n=6, range $Fs_{1.0\text{-}2.3}$). Magnetic susceptibility log $\chi = 4.13$ (χ in 10^{-9} m^3/kg).
Classification: Carbonaceous chondrite (CV3). Strong weathering.
Specimens: 12.4 g and a polished section in *CEREGE*. Main mass with P. Thomas

Northwest Africa 8484 (NWA 8484)
(Northwest Africa)
Purchased: 2014
Classification: Ordinary chondrite (LL3)
History: Purchased in Morocco in 2014.
Physical characteristics: A single stone with a grayish desert varnish. Cut surface reveals closely packed grayish and reddish chondrules up to 5 mm.
Petrography: (C. Cournède and J. Gattacceca, *CEREGE*) Closely packed chondrules. Chondrule mean apparent size 0.79±0.57 mm (N=40). Zoned olivines and pyroxenes.
Geochemistry: Olivine $Fa_{16.4\pm11.0}$ (PMD=56%, n=24, range 0.6-41.8). Orthopyroxene $Fs_{9.2\pm5.5}Wo_{1.1\pm0.8}$ (PMD=51%, n=9, range $Fs_{3.0\text{-}18.0}$). Cr_2O_3 in ferroan olivines 0.09±0.08 wt.% (n=22). Magnetic susceptibility log $\chi = 3.82$ (χ in 10^{-9} m^3/kg).
Classification: LL3. LL classification based on magnetic susceptibility and chondrule size. Estimated sub-type between 3.2 and 3.5 based on Fa scatter and Cr_2O_3 content of olivine.
Specimens: 17 g and a polished section in *CEREGE*. Main mass with Pierre-Marie Pelé

Northwest Africa 8486 (NWA 8486)
Morocco
Purchased: 2014 June
Classification: Ungrouped achondrite
History: Purportedly found at the same site as NWA 7325 near Bir el Abbas, Morocco. Acquired by CMS from Ruben Garcia in June, 2014.
Physical characteristics: A single, dark greenish stone (43.81 g), with one side showing chartreuse-colored fusion crust. Cut surfaces show almost equal amounts of bright, transparent, apple-green clinopyroxene (crystals to 3 mm) and milky white plagioclase (regions to 5 mm). The plagioclase contains abundant "clouds" of opaques heterogeneously distributed and concentrated. Vugs (to 2 mm)

common within the plagioclase and at the plagioclase/clinopyroxene boundaries. Olivine, which is clear and glassy, is uncommon, occurring as grains to 1.5 mm and constituting <5 areal% of four examined surfaces.
Petrography: (L. Garvie, *ASU*) One polished mount (of 4 cm^2) dominated by an apparent cumulate texture of diopside (Al and Cr-bearing) and calcic plagioclase. Pyroxene shows several sets of twin lamellae. Pyroxene/plagioclase grain boundaries show a micro-euhedral consertal texture of interdigitating euhedral plagioclase (to 10 μm) penetrating the pyroxene, and small "relict" micronmeter-sized grains of pyroxene in the plagioclase adjacent to the boundary. Olivine/plagioclase and olivine/pyroxene boundaries are sharp and smooth. Olivine show rounded and lobate-shaped grains. "Clouds" of micrometer-sized opaques (Cr-troilite and kamacite) locally common in the plagioclase. Accessory Cr-troilite, kamacite, and taenite, together with possibly weathered P-K-Si phases associated with the opaques.
Geochemistry: (L. Garvie, *ASU*) Clinopyroxene, $Fs_{1.15\pm0.03}Wo_{45.06\pm0.12}$, Al_2O_3=2.72±0.12 wt%, Cr_2O_3=0.98±0.02 wt%, n=11. Plagioclase, $An_{88.78\pm1.06}Or_{0.0}$, n=10. Olivine $Fa_{2.93\pm0.12}$, Cr_2O_3=0.37±0.01 wt%, CaO=0.34±0.01 wt%, FeO/MnO=39.3±9.1, n=10.
Classification: Ungrouped achondrite paired with NWA 7325 and NWA 8014.
Specimens: 43.81 g at CMS.

Northwest Africa 8487 (NWA 8487)
(Northwest Africa)
Purchased: 2008
Classification: Ordinary chondrite (LL3)
History: A stone weighing 550.1 g was purchased by Rob Wesel from a meteorite prospector.
Physical characteristics: Sample is irregularly shaped and devoid of fusion crust.
Petrography: Description and classification (A. Love, *App*): Sample is dark colored and displays numerous close-packed unequilibrated chondrules of varying size (avg. diameter 768 μm, range 213-3187 μm). Porphyritic chondrules show zoned phenocrysts and turbid mesostasis. Many chondrules display fine-grained rims composed of clastic and amorphous silicate and metal materials. Matrix occurs as a mixture of clastic and amorphous silicates and fine-grained metal.
Geochemistry: (A. Love, *App*) $Fa_{13.0\pm6.8}$ ($Fa_{2.1\text{-}23.2}$ n=15), Fe/Mn=35.9; Low Ca pyroxene $Fs_{13.2\pm10.6}Wo_{1.1\pm1.0}$, N=10.
Classification: Ordinary Chondrite, LL3 S3 W2. LL based on chondrule diameter. Porphyritic chondrules display mesostasis that is zoned, olivines with dull red CL and dull CL of matrix materials suggests sample is LL<3.5 (Huss et al., 2006). Turbid and devitrified mesostasis indicate petrologic grade of LL~3.4
Specimens: Rob Wesel holds the main mass. A 20 g type specimen and one polished thin section are on deposit at *App*

Northwest Africa 8490 (NWA 8490)
(Northwest Africa)
Purchased: 2014
Classification: HED achondrite (Eucrite)
Physical characteristics: The two small individuals are partly covered by fusion crust and display a light grayish interior.
Petrography: The meteorite consists of basaltic lithologies of dominantly exsolved pyroxene and calcic plagioclase set into a fine-grained clastic groundmass. Minor phases are SiO_2 polymorphs, chromite, and pyrrhotite.
Geochemistry: low-Ca pyroxene: $Fs_{55.2\text{-}61.6}Wo_{2.3\text{-}8.6}$; FeO/MnO=31-35; Ca-pyroxene: $Fs_{28.6\text{-}35.4}Wo_{33.9\text{-}42.1}$; FeO/MnO=30-36; calcic plagioclase: $An_{83.5\text{-}89.7}$

Northwest Africa 8499 (NWA 8499)

(Northwest Africa)
Purchased: 2000
Classification: HED achondrite (Eucrite)

Petrography: The meteorite appears to be unbrecciated and displays a coarse-grained basaltic texture of exsolved pyroxene and calcic plagioclase. Minor phases include chromite and troilite.

Geochemistry: low-Ca pyroxene: $Fs_{58\pm0.4}Wo_{1.9\pm0.1}$ ($Fs_{57.1\text{-}58.6}Wo_{1.7\text{-}2}$, n=19), FeO/MnO=32-35; Ca-pyroxene: $Fs_{24\pm0.5}Wo_{45\pm0.5}$ ($Fs_{23.2\text{-}25}Wo_{44.1\text{-}45.7}$, n=17), FeO/MnO=29-36; calcic plagioclase: $An_{82.5\pm1.8}$ ($An_{79.2\text{-}86.9}$, n=25)

Northwest Africa 8500 (NWA 8500)
(Northwest Africa)
Purchased: 2001
Classification: Carbonaceous chondrite (CK6)

Petrography: The meteorite displays a grayish to slightly greenish interior with several regions showing intense brownish staining. It is dominantly composed of recrystallized matrix; relict chondrules are very rare. Olivine is by far the most abundant mineral phase, followed by feldspar, Ca-pyroxene and Cr-bearing magnetite.

Geochemistry: Cr_2O_3 in magnetite: about 6.5 wt%

Northwest Africa 8501 (NWA 8501)
(Northwest Africa)
Purchased: 2001
Classification: Carbonaceous chondrite (CK5)

Petrography: The meteorite shows a dark grayish-greenish interior and consists of few chondrules and rare CAIs set into an abundant, fine-grained matrix. Opaque phases are dominantly Cr-bearing magnetite; FeNi metal is absent.

Geochemistry: Cr_2O_3 in magnetite: about 4 wt%

Northwest Africa 8502 (NWA 8502)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Diogenite)

Petrography: The fragment is partly covered by shiny fusion crust and displays a cumulate texture of dominantly large orthopyroxene crystals and less abundant calcic plagioclase. Minor phases include olivine, chromite and troilite.

Geochemistry: calcic plagioclase: $An_{85.5\pm2.4}$ ($An_{81.9\text{-}88.6}$, n=16)

Northwest Africa 8503 (NWA 8503)
(Northwest Africa)
Purchased: 2013
Classification: Ureilite

Petrography: The meteorite displays a cumulate texture with abundant 120° grain boundaries. In the two thin sections studied only olivine and no pyroxene was found. It contains flaky graphite; olivine displays characteristic reduced rims.

Geochemistry: reduced olivine rims: $Fa_{3.6\text{-}12.6}$; Cr_2O_3 in olivine: about 0.7 wt%

Northwest Africa 8504 (NWA 8504)
(Northwest Africa)
Purchased: 2013
Classification: Carbonaceous chondrite (CK6)

Petrography: The meteorite is dominated by a fine-grained greenish matrix that shows some brownish staining; few poorly defined chondrules are present. Olivine, Ca-pyroxene and feldspar are the most abundant silicates. Opaques include Cr-rich magnetite and troilite.
Geochemistry: Cr_2O_3 in magnetite: about 4.5 wt%

Northwest Africa 8505 (NWA 8505)
(Northwest Africa)
Purchased: 2014
Classification: Mesosiderite
Petrography: The meteorite consists of about 60% silicates and 40% Fe-Ni metal. Silicate portions contain abundant low-Ca pyroxene and calcic plagioclase as well as minor augite, olivine, silica, and merillite.
Geochemistry: low-Ca pyroxene: $Fs_{30.1\pm2.2}Wo_{3.3\pm0.8}$ ($Fs_{25.1\text{-}32.4}Wo_{1.9\text{-}4.2}$, n=22), FeO/MnO=18-30; Ca-pyroxene: $Fs_{14.6\pm1.1}Wo_{41.2\pm0.7}$ ($Fs_{12.8\text{-}17.1}Wo_{39.9\text{-}42}$, n=10), FeO/MnO=17-26; calcic plagioclase: $An_{92.9\pm1.2}$ ($An_{90.4\text{-}95.1}$, n=19)

Northwest Africa 8509 (NWA 8509)
(Northwest Africa)
Purchased: March 2014
Classification: HED achondrite (Eucrite)
Petrography: The meteorite displays a dark grayish to almost black interior and is heavily brecciated. Eucritic clasts and fine-grained matrix are dominantly composed of exsolved pyroxene and calcic plagioclase. Minor phases are SiO_2 polymorphs and chromite. Wide regions of the rock appear to be shock melted and partly recrystallized. Pairing with NWA 8036 seems likely.
Geochemistry: low-Ca pyroxene: $Fs_{49.1\pm8.3}Wo_{3.6\pm1.1}$ ($Fs_{35.9\text{-}59.7}Wo_{2.2\text{-}5.6}$, n=21), FeO/MnO=27-35; Ca-pyroxene: $Fs_{25.8\pm2.9}Wo_{40.6\pm1}$ ($Fs_{22.8\text{-}30.7}Wo_{38.7\text{-}42.1}$, n=12), FeO/MnO=27-34; calcic plagioclase: $An_{90.5\pm0.5}$ ($An_{89.6\text{-}91.4}$, n=20)

Northwest Africa 8510 (NWA 8510)
(Northwest Africa)
Purchased: 2007
Classification: HED achondrite (Eucrite)
Petrography: The achondrite consists of a coarse-grained and a fine-grained basaltic lithology both dominated by exsolved Ca-rich pyroxene, low-Ca pyroxene, and calcic plagioclase. Minor phases include SiO_2 polymorphs, chromite and troilite.
Geochemistry: low-Ca pyroxene: $Fs_{58.4\pm0.3}Wo_{4.4\pm0.4}$ ($Fs_{57.4\text{-}59}Wo_{3.7\text{-}5}$, n=26), FeO/MnO=29-33; Ca-pyroxene: $Fs_{26.7\pm0.6}Wo_{43\pm0.6}$ ($Fs_{25.6\text{-}28.4}Wo_{41.6\text{-}44.1}$, n=30), FeO/MnO=29-37; calcic plagioclase: $An_{89.4\pm0.6}$ ($An_{88.3\text{-}90.2}$, n=17)

Northwest Africa 8513 (NWA 8513)
(Northwest Africa)
Purchased: 2014
Classification: EH6-melt breccia
Petrography: The meteorite consists of abundant, about 100 μm sized enstatite grains, about 30% Fe,Ni metal, and more rarely troilite, niningerite, and schreibersite. Several portions of the meteorite appear melted and recrystallized. Metal contains 2.8-3.1 wt% Si.

Northwest Africa 8523 (NWA 8523)
(Northwest Africa)
Purchased: 2014
Classification: HED achondrite (Eucrite)

Petrography: The meteorite displays a basaltic texture of dominantly calcic plagioclase and exsolved pyroxene. Plagioclase is typically lath-shaped. Accessories include SiO_2 polymorphs, chromite, and trolite. The rock is heavily brecciated and contains abundant shock melt veins.
Geochemistry: low-Ca pyroxene: $Fs_{54.6\pm0.3}Wo_{2.1\pm0.3}$ ($Fs_{54.1\text{-}55.4}Wo_{1.7\text{-}2.7}$, n=22), FeO/MnO=31-35; Ca-pyroxene: $Fs_{22.3\pm1}Wo_{45.7\pm1}$ ($Fs_{20.9\text{-}23.8}Wo_{43.7\text{-}47.3}$, n=15), FeO/MnO=26-35; calcic plagioclase: $An_{83.2\pm3.4}$ ($An_{77.4\text{-}90.7}$, n=35)

Northwest Africa 8534 (NWA 8534)
(Northwest Africa)
Purchased: 2014 Jun 12
Classification: Carbonaceous chondrite (CM1/2)
History: Purchased 12 June 2014 in Morocco.
Physical characteristics: Many identically appearing small fragments, the largest being 2.6 g, with black, fresh fusion crust. Broken surface reveals black, uniform, very fine-grained texture, rare sub-mm CAIs, with no visible chondrules.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows a matrix (80-90%) dominated by (Mg,Fe)-rich phyllosilicates, with scattered, small (~250 μm), mostly irregularly shaped chondrules, many of which contain secondary alteration phases. There is no mesostasis in any chondrule; they are all altered. This meteorite is transitional between CM1 and CM2. There is more fine-grained (80-90%, dominantly phyllosilicate) matrix than in CM2, but less than CM1. Calcium carbonate, (Ca,Mg)-carbonate, sulfides, and Fe-oxides are ubiquitous.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Ferroan olivine $Fa_{25.3\pm23.9}$, Fe/Mn=78±39, Cr_2O_3=0.40±0.09 (wt%), n=4; forsterite $Fa_{1.4\pm0.4}$, Fe/Mn=15±14, n=16; aluminous diopside $Fs_{2.9\pm1.6}Wo_{47.4\pm9.6}$, n=3. Oxygen isotopes (K. Ziegler, *UNM*): acid-washed material analyzed in 8 replicates by laser fluorination gave, respectively $\delta^{18}O$=10.694, 15.433, 9.721, 12.571, 12.343, 13.254, 12.798, 12.440; $\delta^{17}O$=3.496, 6.442, 2.651, 4.363, 4.207, 4.863, 4.722, 4.450; $\Delta^{17}O$= -2.150, -1.706, -2.481, -2.274,-2.310, -2.135, -2.035, -2.118 (all per mil).
Classification: Carbonaceous chondrite (CM1/2), the petrologic type 1/2 is based on the relatively low abundance of chondrules and refractory inclusions, the high abundance of hydrous phases, and high volume percentage of matrix. It is also based on the mean value of eight oxygen isotope analyses that plots outside the field of CM2, at higher values $\delta^{17}O$=4.399±1.096 and $\delta^{18}O$=12.407±1.699 permil.
Specimens: 12 g including a probe mount on deposit at *UNM*, Robert Cucchiara and Ruben Garcia hold 48 g.

Northwest Africa 8535 (NWA 8535)
(Northwest Africa)
Purchased: 2014 Mar 6
Classification: Angrite
History: Purchased by Habib Naji in Guelmin, Morocco, 6 March 2014, from a nomad who reportedly found the meteorite at Tazounte, ~100 km east of Guelmim.
Physical characteristics: Single stone. Exterior with patches of black fusion crust, coarse green crystals up to several mm, scattered mm-sized vugs, broken surface reveals bright green crystalline texture with some dark grains, fresh.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows approximately 90% olivine and ~5% fassaite. Olivines are zoned with Fe-enriched rims, olivine rims are also Ca-enriched, average grain size ~700 μm, triple junctions commonly occupied with fassaite. Accessory aluminous-spinel, chromite, troilite, kamacite, and taenite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{19.4\pm5.8}$, Fe/Mn=88±2, CaO=0.39±0.41 (wt%), Cr_2O_3=0.23±0.13 (wt%), n=24; fassaite $Fs_{11.1\pm0.8}Wo_{56.0\pm1.7}$, Fe/Mn=86±19, Al_2O_3=13.85±2.71 (wt%), TiO_2=1.9±0.4 (wt%), n=12. Oxygen isotopes (K. Ziegler, *UNM*): acid-washed material analyzed in 3

replicates by laser fluorination gave, respectively $\delta^{18}O$ = 2.589, 3.925, 3.761; $\delta^{17}O$ = 1.297, 1.934, 1.877; $\Delta^{17}O$ = -0.070, -0.138, -0.109 (linearized, all per mil).
Classification: Dunitic angrite, with possibly the most magnesian olivines of any known angrite. $\Delta^{17}O$ oxygen isotope values are within the typical angrite range, however one analysis had anomalously low $\delta^{17}O$ and $\delta^{18}O$.
Specimens: 20.5 g including a probe mount on deposit at *UNM*, H. Naji holds the main mass.

Northwest Africa 8538 (NWA 8538)
Northwest Africa
Purchased: 2014
Classification: Ordinary chondrite (LL6, melt breccia)
History: One stone weighing 994.8 g was found in Morocco and purchased by *Reed* in July 2014.
Physical characteristics: Black fusion crust covers 65% of the irregular-shaped stone. The interior shows several different types of clasts crosscut by a prominent melt vein.
Petrography: Description and classification (A. Love, *App*): Sample is a breccia composed of ~3.5 cm irregular to rounded clasts of two recrystallized chondritic lithologies (one showing distinct shock and weathering characteristics from the other) surrounded by ~1.0 cm melt veins composed of vesicular, clast-laden shock-melt material. Relict chondrules within the clasts have an average diameter of 683 μm. One cellular-textured mixed metal nodule was observed.
Geochemistry: (A. Love, *App*) Clasts and melt material approach uniform composition. $Fa_{30.4\pm0.7}$, n=19; low Ca pyroxene $Fs_{26.2\pm0.5}Wo_{2.4\pm0.4}$, n=12.
Classification: Ordinary Chondrite (LL6-melt breccia, S4, W3)
Specimens: 25.52 g and 2 polished thin sections and a polished mount are on deposit at *App*.

Northwest Africa 8540 (NWA 8540)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite (LL4)
History: Purchased by Sean Tutorow and Walter Trentadue from a Moroccan dealer in 2013.
Physical characteristics: Single stone, weathered exterior; saw cut reveals chondrules and scattered fine-grained metal/sulfide set in a dark gray groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows PO and BO chondrules and plagioclase grains <2 μm, FeNi metal, Fe-oxide, troilite, and chromite throughout.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{29.0\pm0.4}$, Fe/Mn=57±2, n=26; low-Ca pyroxene $Fs_{23.6\pm2.3}Wo_{1.6\pm0.5}$, Fe/Mn=40±11, n=13.
Classification: Ordinary chondrite (LL4), weathering grade W2.
Specimens: 21.5 g including a probe mount on deposit at *UNM*. W. Trentadue holds 159.1 g; S. Tutorow holds 127.3 g.

Northwest Africa 8541 (NWA 8541)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite (L6)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Single stone, partially fusion-crusted exterior, saw cut reveals faint chondrules and fine-grained metal/sulfide set in a gray groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows equilibrated chondrules and plagioclase grains up to 200 μm, FeNi metal and troilite throughout.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{25.2\pm0.3}$, Fe/Mn=51±2, n=7; low-Ca pyroxene $Fs_{21.1\pm0.1}Wo_{1.8\pm0.2}$, Fe/Mn=29±1, n=7; plagioclase $Ab_{84.2\pm0.9}An_{10.1\pm0.1}Or_{5.7\pm0.8}$, n=3.

Classification: Ordinary chondrite (L6), weathering grade W1.
Specimens: 21.4 g including a probe mount on deposit at *UNM*, S. Tutorow holds the main mass.

Northwest Africa 8542 (NWA 8542)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite (LL6)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April 2013.
Physical characteristics: Single stone, weathered fusion crust exterior, saw cut reveals faint chondrules and scattered fine-grained metal/sulfide set in a light gray groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows equilibrated chondrules and plagioclase grains up to 300 μm, some chondrules up to 3 mm, minor FeNi metal and troilite throughout.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{31.7\pm0.2}$, Fe/Mn=64±1, n=13; low-Ca pyroxene $Fs_{25.6\pm0.2}Wo_{2.0\pm0.3}$, Fe/Mn=38±2, n=9; augite $Fs_{10.8\pm0.0}Wo_{43.8.0\pm0.1}$, Fe/Mn=30±2, n=2; plagioclase $Ab_{83.7\pm0.4}An_{10.6\pm0.2}Or_{5.7\pm0.4}$, n=9.
Classification: Ordinary chondrite (LL6), weathering grade W1.
Specimens: 21.3 g including a probe mount on deposit at *UNM*, S. Tutorow holds the main mass.

Northwest Africa 8543 (NWA 8543)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite (LL4)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April 2013.
Physical characteristics: Three matching stones 73.7 g, 48.2 g, 27.1 g, weathered exterior, saw cut reveals chondrules and fine-grained metal/sulfide set in a gray groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows numerous distinct chondrules and plagioclase grains <2 μm, FeNi metal, troilite, Fe-oxide, Cl-rich apatite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{28.4\pm1.3}$, Fe/Mn=56±3, n=7; low-Ca pyroxene $Fs_{20.9\pm5.4}Wo_{1.4\pm0.8}$, Fe/Mn=31±6, n=6.
Classification: Ordinary chondrite (LL4), weathering grade W2.
Specimens: 20.9 g including a probe mount on deposit at *UNM*, S. Tutorow holds the main mass.

Northwest Africa 8544 (NWA 8544)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite (L6)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April 2013.
Physical characteristics: Single stone, irregular weathered exterior, saw cut reveals faint chondrules and fine-grained metal set in a light colored matrix with some small patches of iron-staining, also shock melt veins up to 1-cm wide.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows a few indistinct chondrules, some plagioclase grains >50 μm, kamacite, taenite, troilite, Fe-oxide, merrillite, Cl-rich apatite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{25.6\pm0.3}$, Fe/Mn=50±3, n=9; low-Ca pyroxene $Fs_{21.6\pm0.3}Wo_{1.7\pm0.2}$, Fe/Mn=29±1, n=8.
Classification: Ordinary chondrite (L6), weathering grade W1.
Specimens: 35.5 g including a probe mount on deposit at *UNM*, S. Tutorow holds the main mass.

Northwest Africa 8545 (NWA 8545)
(Northwest Africa)
Purchased: 2013
Classification: Ungrouped achondrite
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Single stone. Exterior shows remnants of black fusion crust, saw cut reveals light orange-brown crystalline texture with scattered dark grains ~1 mm, moderately friable.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows approximately 70% pyroxene and ~30% plagioclase. Pyroxenes all show exsolution lamellae, grains are 500-2000 μm, and have a striking appearance in that the grain boundaries are all very irregular with ~50 μm embayments and protrusions. Plagioclase is interstitial to pyroxene and poikioblastic with silica inclusions, some grains up to 1000 μm. Accessory troilite and Cr-Ti oxides.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Pigeonite $Fs_{62.4\pm1.9}Wo_{7.6\pm2.1}$, Fe/Mn=69±2, n=9; augite $Fs_{39.9\pm5.4}Wo_{34.0\pm6.3}$, Fe/Mn=67±5, n=8; olivine $Fa_{84.2}$, Fe/Mn=89, n=1; plagioclase $An_{85.3\pm2.6}Ab_{14.2\pm2.5}Or_{0.4\pm0.1}$, n=10. Oxygen isotopes (K. Ziegler, *UNM*) Oxygen isotope values of 3 acid-washed aliquots of bulk sample, 1.3, 1.3, 2.1 mg, gave $\delta^{17}O$ = 0.004, 0.120, 0.013, $\delta^{18}O$ = 2.966, 3.159, 2.297, $\Delta^{17}O$ = -1.562, -1.548, -1.532 (linearized, all permil).
Classification: Achondrite (ungrouped), probably paired with NWA 011 and NWA 2976.
Specimens: 11.7 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8546 (NWA 8546)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Diogenite)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Single stone. Remnants of weathered fusion crust on exterior. Saw cut reveals nearly monomineralic, coarsely crystalline, mosaic texture, grains in the range 2-4 mm, gray-green, some light oxidation.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows ~99% pyroxene with triple junctions and a texturally equilibrated appearance. Pyroxenes have thin Fe-enriched rims, grain boundaries are occupied by fine grained plagioclase and silica. Scattered troilite and Fe-metal as blebs, also Fe-oxide veinlets present, barite detected.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Low-Ca pyroxene (cores) $Fs_{18.4\pm0.5}Wo_{1.0\pm0.0}$, Fe/Mn=30±1, n=12; low-Ca pyroxene (rims) $Fs_{32.6\pm5.6}Wo_{2.9\pm0.8}$, Fe/Mn=28±2, n=2; plagioclase $An_{91.4\pm2.3}Ab_{8.2\pm2.1}Or_{0.3\pm0.2}$, n=2.
Classification: Achondrite (diogenite)
Specimens: 15.8 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8547 (NWA 8547)
(Northwest Africa)
Purchased: 2013
Classification: Ureilite
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Single stone. Irregular dark exterior saw cut reveals fresh appearing, mosaic of light gray crystals, grain size 1-3 mm.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows texturally equilibrated olivines and pyroxenes, most with triple junctions. Olivine and pyroxene grains have Fe-

depleted rims. Grain boundaries are occupied by graphite, Fe-metal, Fe-oxide, chromite, and very fine-grained Na-rich plagioclase, barite detected.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine (cores) $Fa_{9.5\pm0.5}$, Fe/Mn=20±1, n=7; olivine (rims) $Fa_{3.3\pm0.3}$, Fe/Mn=7±0, n=2; pigeonite (cores) $Fs_{8.9\pm0.3}Wo_{8.3\pm0.3}$, Fe/Mn=12±1, n=10 and(rim) $Fs_{0.9}Wo_{1.1}$, n=1.
Classification: Achondrite (ureilite)
Specimens: 20.0 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8548 (NWA 8548)
(Northwest Africa)
Purchased: 2013
Classification: Primitive achondrite
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Single stone, partially black fusion-crusted, dark green exterior patina. Saw cut reveals fine grained metal/sulfide set in a gray crystalline silicate groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows ~60% olivine and ~40% pyroxene forming a recrystallized porphyroblastic to poikiloblastic texture, some domains are clastic to brecciated, some domains look like relict chondrules, minor plagioclase grains ~20 μm, FeNi metal, sulfide, and chromite throughout.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{38.0\pm0.4}$, Fe/Mn=95±5, n=8; low-Ca pyroxene $Fs_{30.2\pm0.2}Wo_{3.4\pm0.1}$, Fe/Mn=59±2, n=10; plagioclase $An_{50.3\pm1.3}Ab_{48.4\pm1.6}Or_{1.3\pm0.3}$, n=5.
Classification: Primitive achondrite (ungrouped), probably paired with NWA 6901, NWA 3250, and NWA 2994.
Specimens: 20.6 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8549 (NWA 8549)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Eucrite, unbrecciated)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Single stone. Weathered fusion crusted exterior saw cut reveals a light gray, fine-grained, basaltic texture.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows texturally equilibrated pyroxenes and plagioclases, granoblastic to poikilitic with many triple junctions. Pyroxenes show exsolution lamellae. Silica, ilmenite, chromite, and troilite present.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Low-Ca pyroxene $Fs_{59.0\pm2.0}Wo_{5.7\pm3.0}$, Fe/Mn=32±1, n=8; augite $Fs_{32.3\pm0.5}Wo_{37.8\pm0.6}$, Fe/Mn=31±1, n=7; plagioclase $An_{88.8\pm0.3}Ab_{10.5\pm0.3}Or_{0.6\pm0.1}$, n=9.
Classification: Achondrite (unbrecciated eucrite), chemically and texturally equilibrated.
Specimens: 7.1 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8550 (NWA 8550)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Eucrite, monomict)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Single stone. Smooth weathered fusion crust exterior. Saw cut reveals a breccia with white feldspathic clasts up to 5 mm set in a light-gray matrix.

Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount reveals a breccia with some shock melt veins, larger mm-sized clasts and also fine-grained cataclastic zones, pyroxenes show exsolution lamellae. Ubiquitous troilite, chromite, ilmenite, and apatite. Low weathering grade.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Low-Ca pyroxene $Fs_{62.7\pm1.0}Wo_{2.1\pm0.8}$, Fe/Mn=31±1, n=11; high-Ca pyroxene $Fs_{31.2\pm5.3}Wo_{38.6\pm6.2}$, Fe/Mn=31±1, n=11; plagioclase $An_{87.1\pm2.3}$, n=8. Melt vein Mg#=38.3±1.0, n=5.
Classification: Achondrite (monomict eucrite)
Specimens: 25.5 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass

Northwest Africa 8551 (NWA 8551)
(Northwest Africa)
Purchased: 2013
Classification: Ureilite
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Single stone. Irregular dark exterior. Saw cut reveals fresh-appearing mosaic of light gray and dark gray crystals, grain size 1-2 mm.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows texturally equilibrated olivines and pyroxenes, most with triple junctions. Olivine and pyroxene grains have Fe-depleted rims. Grain boundaries are occupied by graphite, Fe-metal, Fe-oxide, and diamond.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{18.6\pm4.5}$, Fe/Mn=39±11, Cr_2O_3=0.75±0.09 (wt%), n=12; $Fs_{15.3\pm3.4}Wo_{10.3\pm0.3}$, Fe/Mn=23±6, Cr_2O_3=1.11±0.05 (wt%), n=12.
Classification: Achondrite (ureilite)
Specimens: 20.2 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8552 (NWA 8552)
(Northwest Africa)
Purchased: 2013
Classification: Enstatite chondrite (EL6)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Single stone. Weathered brown exterior. Saw cut reveals brown to light brown fine-grained matrix, many opaques visible.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows silicates: 90% enstatite and 10% plagioclase; no chondrules observed in the microprobe section, ubiquitous kamacite, taenite, Fe-oxide, Fe-sulfide, many Fe-oxide veinlets.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Enstatite $Fs_{0.2\pm0.1}Wo_{1.7\pm0.2}$, n=14; plagioclase $Ab_{81.2\pm1.2}An_{15.1\pm1.3}Or_{3.7\pm0.2}$, n=6; kamacite Si=1.3±0.1, Ni=5.4±0.8 (wt%), n=5.
Classification: Enstatite chondrite (EL6), weathering grade W2.
Specimens: 23.4 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8553 (NWA 8553)
(Northwest Africa)
Purchased: 2013
Classification: Enstatite chondrite (EL6)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Single stone. Weathered brown exterior. Saw cut reveals brown fine-grained matrix, opaques visible, silicate grains show preferred alignment or fabric.

Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows silicates: 90% enstatite and 10% plagioclase; no chondrules observed in the microprobe section, ubiquitous kamacite, Fe-oxide, Fe-sulfide, Fe,Cr-sulfide, many Fe-oxide veinlets.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Enstatite $Fs_{0.2\pm0.1}Wo_{1.7\pm0.1}$, n=9; plagioclase $Ab_{80.2\pm1.1}An_{16.0\pm1.5}Or_{3.8\pm0.6}$, n=8; alkali-feldspar $Ab_{35.0}An_{1.7}Or_{63.3}$, n-1; kamacite Si=1.2±0.1, Ni=5.0±0.6 (wt%), n=5.
Classification: Enstatite chondrite (EL6), weathering grade W2.
Specimens: 18.0 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8554 (NWA 8554)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Eucrite, monomict)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Single stone. Saw cut reveals a breccia with gray and white fragmental clasts; also cm-size lithic clast set in a light-colored matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount reveals a breccia with some fragmental pyroxene and plagioclase grains, many fine-grained basaltic clasts, pyroxenes lack exsolution lamellae. Ubiquitous Fe-metal, chromite, ilmenite, and silica. Low weathering grade.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Pigeonite $Fs_{50.6\pm2.1}Wo_{13.0\pm2.8}$, Fe/Mn=32±1, n=25; plagioclase $An_{87.1\pm2.3}$, n=5.
Classification: Achondrite (monomict eucrite), single, fairly narrow pyroxene (pigeonite) compositional range, no separation into high and low-calcium pyroxenes.
Specimens: 11.4 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass

Northwest Africa 8555 (NWA 8555)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Eucrite, monomict)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Two matching stones, 1729 g and 1198 g. Irregular weathered exterior. Saw cut reveals a breccia with tan lithic clasts up to 1 cm set in a dark-gray matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount show basaltic eucrite clasts cross-cut by shock melt veins, pyroxenes show exsolution lamellae. Ubiquitous chromite, ilmenite, and silica, some barite found. Moderate weathering.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Low-Ca pyroxene $Fs_{60.7\pm2.2}Wo_{4.5\pm2.4}$, Fe/Mn=33±1, n=12; high-Ca pyroxene $Fs_{29.3\pm1.5}Wo_{41.1\pm1.6}$, Fe/Mn=33±1, n=12; plagioclase $An_{89.0\pm1.2}$, n=8.
Classification: Achondrite (monomict eucrite)
Specimens: 59.78 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8556 (NWA 8556)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Eucrite)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Single stone. Dark irregular weathered exterior. Saw cut reveals a fine grained, light-gray basaltic texture with some shock melt veins.

Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows pyroxene up to 500 μm, some with fine exsolution lamellae, plagioclase laths, shock melt veins, and calcite weathering veins. Ubiquitous troilite, ilmenite, and silica. Moderate weathering.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Low-Ca pyroxene $Fs_{57.1\pm0.8}Wo_{1.8\pm0.2}$, Fe/Mn=34±1, n=15; high-Ca pyroxene $Fs_{33.3\pm13.0}Wo_{32.6\pm15.1}$, Fe/Mn=33±2, n=7; plagioclase $An_{83.7\pm0.7}$, n=4.
Classification: Achondrite (eucrite)
Specimens: 21.95 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8557 (NWA 8557)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Eucrite, monomict)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Single stone. Dark irregular weathered exterior. Saw cut reveals numerous coarse light colored feldspathic clasts up to 1 cm, set in a dark-gray matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows fine-grained basaltic texture, grain size ~25-100 μm, also some elongate pyroxene laths 500 × 100 μm, shock melt veins present. Ubiquitous troilite, ilmenite, chromite, and silica. Moderate weathering.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Low-Ca pyroxene $Fs_{56.6\pm1.4}Wo_{3.9\pm1.6}$, Fe/Mn=35±1, n=15; high-Ca pyroxene $Fs_{26.6\pm3.1}Wo_{42.3\pm4.0}$, Fe/Mn=35±1, n=10; plagioclase $An_{85.9\pm0.6}$, n=6; shock melt vein Mg#=39.2, n=5.
Classification: Achondrite (monomict eucrite)
Specimens: 16.5 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8558 (NWA 8558)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Eucrite, monomict)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Two matching stones, 2264 g and 2072 g. Light irregular weathered exterior. Saw cut reveals numerous coarse light colored feldspathic clasts up to 1 cm, set in a dark-gray matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows basaltic texture, grain size up to 300 μm, also cataclastic zones with shock melt veins. Ubiquitous troilite, ilmenite, chromite, and silica. Moderate weathering.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Low-Ca pyroxene $Fs_{62.1\pm1.2}Wo_{2.5\pm0.8}$, Fe/Mn=32±2, n=13; high-Ca pyroxene $Fs_{28.1\pm1.6}Wo_{42.2\pm1.8}$, Fe/Mn=32±1, n=8; plagioclase $An_{88.5\pm1.7}$, n=5.
Classification: Achondrite (monomict eucrite)
Specimens: 24.0 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8559 (NWA 8559)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Howardite)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Single stone. Smooth brown weathered exterior. Saw cut reveals breccia with white and dark gray fragmental clasts, also lithic clasts set in a medium-gray groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows a fragmental to cataclastic breccia with equilibrated (exsolution lamellae) and unequilibrated (igneous zoned) pyroxenes

throughout. Silica, troilite, ilmenite, chromite present. Approximately 20% of this meteorite is diogenitic, ~30% is basaltic eucrite, and ~50% is cumulate eucrite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Diogenite minerals: low-Ca pyroxene $Fs_{26.4\pm3.0}Wo_{2.5\pm1.0}$, Fe/Mn=28±1, plagioclase $An_{94.6\pm0.5}$, n=2. Basaltic eucrite minerals: low-Ca pyroxene $Fs_{58.1\pm5.0}Wo_{5.9\pm3.1}$, Fe/Mn=32±1, n=6; high-Ca pyroxene $Fs_{35.9\pm9.2}Wo_{34.1\pm13.1}$, Fe/Mn=33±2, n=3; plagioclase $An_{85.8}$, n=1. Cumulate eucrite minerals: low-Ca pyroxene $Fs_{43.6\pm5.3}Wo_{6.7\pm3.7}$, Fe/Mn=32±2, n=9; plagioclase $An_{91.9\pm0.4}$, n=2.
Classification: Achondrite (howardite)
Specimens: 20.7 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8560 (NWA 8560)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite (H5, melt breccia)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Single stone, weathered exterior. Saw cut reveals very fine-grained, dark-gray shock melt with rafted angular fragments of chondrite material up to 1 cm.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows domains of quench shock melt with islands of ordinary chondrite clasts with some equilibrated chondrules, plagioclase grains <50 μm, FeNi metal, troilite, Fe-oxide, chromite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{19.1\pm0.8}$, Fe/Mn=40±2, n=11; low-Ca pyroxene $Fs_{16.9\pm0.9}Wo_{1.9\pm0.3}$, Fe/Mn=24±2, n=10; shock melt (20 μm electron microprobe beam) SiO_2=47.73±1.71, TiO_2=0.14±0.03, Al_2O_3=3.76±1.01, Cr_2O_3=0.54±0.11, MgO=28.16±2.17, MnO=0.38±0.03, FeO=12.78±0.30, CaO=2.28±0.72, Na_2O=1.67±0.50, K_2O=0.22±0.06 (all wt%), n=8.
Classification: H5-melt breccia, weathering grade W2.
Specimens: 20.1 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8561 (NWA 8561)
(Northwest Africa)
Purchased: 2013
Classification: Mesosiderite (group A1)
History: Purchased by Brahim Tahiri from a Moroccan hunter and sent to his partner Sean Tutorow for classification, April, 2013.
Physical characteristics: Single stone, weathered irregular exterior. Saw cut reveals a brown-colored, fine-grained breccia, oxidation present.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows approximately 50% oxidized iron, with some remnant metal (kamacite and taenite); zoned orthopyroxene makes up approximately 70% of the silicate portion, with plagioclase at ~25%, grain size up to 300 μm. Apatite, chromite, and silica present.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{57.4\pm4.5}$, Fe/Mn=46±1, n=2; low-Ca pyroxene $Fs_{40\pm1.0}Wo_{4.7\pm3.4}$, Fe/Mn=30±3, n=15; plagioclase $An_{87.7\pm2.7}$, n=6.
Classification: Mesosiderite A1, high weathering grade.
Specimens: 21.8 g including a probe mount on deposit at *UNM*, Sean Tutorow holds the main mass.

Northwest Africa 8562 (NWA 8562)
(Northwest Africa)
Purchased: 2014
Classification: HED achondrite (Eucrite, unbrecciated)
History: Purchased by Abdelhadi Aithiba in Morocco, 2014.

Physical characteristics: Single stone, smooth, black, weathered fusion crust exterior, one side showing rough secondary fusion crust surface.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount reveals approximately 60% pyroxene and 35% plagioclase, pyroxenes show igneous zoning, many are aggregates of ~50 μm grains in cm-sized clusters. Both pyroxene and plagioclase occur as poikiloblasts. Fayalitic olivine present. Ubiquitous troilite, ilmenite, and silica. Unbrecciated.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Pyroxene $Fs_{50.0\pm6.4}Wo_{12.3\pm4.1}$, Fe/Mn=31±2, n=22; pyroxene ranges from pigeonite $Fs_{41.6}Wo_{8.4}En_{50.0}$ to ferro-augite $Fs_{61.4}Wo_{22.6}En_{16.0}$; olivine $Fa_{85.9\pm0.9}$, Fe/Mn=43±1, n=5; plagioclase $An_{90.3\pm0.4}Ab_{9.0\pm0.3}Or_{0.6\pm0.1}$, n=5.
Classification: Eucrite (unequilibrated basaltic, unbrecciated). Presence of metastable ferro-augite, and the pronounced pyroxene Fe-enrichment trend is consistent with Type 1 eucrites (Takeda and Graham, 1991).
Specimens: 22.0 g including a probe mount on deposit at *UNM*, Abdelhadi Aithiba holds the main mass.

Northwest Africa 8563 (NWA 8563)
Mauritania
Purchased: August 2014
Classification: HED achondrite (Eucrite, monomict)
History: A 9125 g meteorite was purchased by Michael Farmer from a meteorite dealer in Tan Tan, Morocco. The stone is reportedly from Mauritania.
Physical characteristics: Rounded, shiny sand-blasted stone lacking fusion crust. Large (22 × 19 cm) sawn and polished slab shows a breccia of tan, angular to rounded clasts to 3 cm in a dark matrix. Vesicles to 5 mm are common within the dark veins.
Petrography: (L. Garvie, *ASU*) SEM examination of a polished mount shows a monomict, subophitic basaltic breccia of eucritic clasts separated by shock veins, some with cataclastic fine-grained regions. Clasts dominated by roughly equal proportions of low-Ca pyroxene (most grains with augite exsolution lamellae) and augite (most grains with low-Ca pyroxene exsolution lamellae), and calcic plagioclase; grain size to 600 μm. Silica locally abundant, with grains to 500 μm. Accessory low-Ni iron metal (to 50 μm), chromite with variable Ti content (to 20 μm), ilmenite (to 100 μm), and troilite (to 5 μm).
Geochemistry: (L. Garvie, *ASU*) Low-Ca pyroxene $Fs_{60.9\pm1.2}Wo_{2.6\pm0.9}$, FeO/MnO=31.4±0.8, n=11; augite $Fs_{26.6\pm0.8}Wo_{43.5\pm0.9}$, FeO/MnO=31.5±1.4, n=11; plagioclase $An_{90.2\pm0.6}Ab_{9.5\pm0.5}$, n=5; silica with 0.3±0.1 wt% Al_2O_3 and 0.2±0.1 wt% FeO.
Classification: Achondrite, monomict eucrite
Specimens: 388 g and one polished mount at *ASU*.

Northwest Africa 8564 (NWA 8564)
(Northwest Africa)
Found: 2013
Classification: HED achondrite (Eucrite, cumulate)
History: Found 2013 in Morocco, purchased by Dave Gheesling in Erfoud, Morocco.
Physical characteristics: Single stone, weathered fusion crust exterior. Aaw cut reveals a gabbroic texture with white feldspar and green pyroxene grains, some pockets with coarser grains up to cm-size.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount reveals an approximately equal mix of gabbroic pyroxene and plagioclase crystals. Fe-metal, troilite, chromite, and silica present.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Low-Ca pyroxene $Fs_{39.9\pm1.5}Wo_{8.5\pm1.1}$, Fe/Mn=27±1, n=23; plagioclase $An_{93.3\pm1.8}Ab_{6.6\pm1.8}Or_{0.2\pm0.0}$, n=7.
Classification: Achondrite (cumulate eucrite), low weathering grade.
Specimens: 27.2 g including a probe mount on deposit at *UNM*, Dave Gheesling holds the main mass.

Northwest Africa 8565 (NWA 8565)
(Northwest Africa)

Found: 2007
Classification: Ordinary chondrite (L3)
History: Found 2007 in Morocco, purchased by Dave Gheesling in Erfoud, Morocco.
Physical characteristics: Single stone, weathered exterior with caliche and iron staining, radial striations or grooves on the surface.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount reveals numerous distinct, unequilibrated chondrules, PO, POP, and BO, Fe-Ni metal, troilite, chromite, and some iron oxide veinlets.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{23.6\pm7.2}$, Fe/Mn=55±12, n=18; low-Ca pyroxene $Fs_{20.4\pm9.8}Wo_{1.5\pm1.8}$, Fe/Mn=40±27, n=7.
Classification: Ordinary chondrite (L3), subtype approximately L3.5 based on the standard deviation of the mean value of Fa. Weathering grade W2, shock stage S3.
Specimens: 119.2 g including a probe mount on deposit at *UNM*, Dave Gheesling holds the main mass.

Northwest Africa 8566 (NWA 8566)
(Northwest Africa)
Found: 2013
Classification: Ordinary chondrite (H5)
History: Found in Morocco 2013, purchased in Erfoud, Morocco.
Physical characteristics: Single stone, with fresh fusion-crusted exterior and regmaglypts. Saw cut reveals a breccia with numerous chondrules and opaques, set in brown to red-brown groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount reveals numerous equilibrated chondrules, plagioclase <50 μm, Fe-Ni metal, troilite, chromite, merrillite, and Cl-rich apatite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{17.7\pm0.4}$, Fe/Mn=36±2, n=8; low-Ca pyroxene $Fs_{16.3\pm0.7}Wo_{1.0\pm0.6}$, Fe/Mn=22±1, n=8.
Classification: Ordinary chondrite, H5, W1, S3, breccia.
Specimens: 23.7 g including a probe mount on deposit at *UNM*, B. Caress holds the main mass.

Northwest Africa 8567 (NWA 8567)
(Northwest Africa)
Found: 2013
Classification: Ordinary chondrite (L5)
History: Found in Morocco 2013, purchased in Erfoud, Morocco.
Physical characteristics: Single stone with weathered exterior and regmaglypts. Saw cut reveals chondrules and opaques set in a dark groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount reveals numerous equilibrated chondrules, plagioclase <50 μm, Fe-Ni metal, troilite, chromite, merrillite, Cl-rich apatite, some iron-oxide veinlets.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{25.8\pm0.5}$, Fe/Mn=51±4, n=11; low-Ca pyroxene $Fs_{21.8\pm0.7}Wo_{1.6\pm0.2}$, Fe/Mn=30±2, n=8.
Classification: Ordinary chondrite L5, W2, S3.
Specimens: 43.4 g including a probe mount on deposit at *UNM*, B. Caress holds the main mass.

Northwest Africa 8568 (NWA 8568)
(Northwest Africa)
Purchased: 2014
Classification: Iron meteorite (IVA)
History: Purchased in 2014 by Don Hurkot from *Labenne*, who acquired it in 2012 from a nomad in Algeria.

Physical characteristics: Single iron mass with oxidized exterior, centimeter-sized regmaglypts; specimen is 14 × 10 × 3.5 cm.
Petrography: (C. Agee, *UNM*) This iron meteorite consists primarily of kamacite with minor amounts of taenite. Taenite often occurs as isolated skeletal inclusions 5-50 μm wide, up to 1 mm long, within host kamacite. Etched surface on 60 mm × 30-20 mm slab shows kamacite bands with apparent width 0.3-0.5 mm. Neumann lines.
Geochemistry: Bulk composition, ICP-MS (C. Herd and G. Chen, *UAb*): Ni ? 5.1, Co 0.26 (all wt%); Ga 2.2, As 4.7, Mo 5.6, Ru 3.6, Pd 3.6, W 0.6, Ir 2.0, Au 1.8 (all ppm). EMPA, focused beam (C. Agee and N. Muttik, *UNM*): kamacite Fe 94.03±0.74, Ni 7.01±0.09, Co 0.45±0.08 (wt%), n=6; taenite Fe 75.86±6.37, Ni 23.60±6.09, Co 0.21±0.11 (wt%), n=3.
Classification: Bulk data by ICP-MS and structural classification are consistent with a IVA iron. Iron meteorite (IVA). Fine octahedrite.
Specimens: 21.6 g on deposit at *UNM*, KD Meteorites holds 306.6 g, Don Hurkot holds the main mass.

Northwest Africa 8570 (NWA 8570)
Morocco
Purchased: May 2014
Classification: Ordinary chondrite (LL6)
Petrography: This is one of the most oxidized LL chondrites yet measured. There are only a few LL chondrites with a mean olivine Fa content of 32.0 or higher.

Northwest Africa 8575 (NWA 8575)
Morocco
Purchased: May 2014
Classification: Ordinary chondrite (L/LL3)
Geochemistry: Ferroan olivine contains 0.04±0.03 wt.% Cr_2O_3; Kamacite: 1.1±0.1 wt.% Co (n=10) Other elements (P, Cr, Si) are below the detection limit.; The olivine Cr_2O_3 content suggests a subtype of 3.2 or higher according to the diagram from Grossman and Brearley (2005).
Classification: A few porphyritic chondrules contain small amounts of isotropic colorless glass, suggesting a subtype of 3.5 or lower. So the subtype should be between 3.2 and 3.5. The low mean olivine content is in the H range, but this does not matter because the standard deviation is so high. There is also no peak at the mean value, only a continuum of olivine Fa values. According to Rubin (1990), the kamacite Co contents of L chondrites are 0.70-0.95 wt.%; those of LL chondrites are 1.42-37.0 wt.%. The value in this meteorite is in between these ranges, suggesting it is L/LL. The meteorite contains fairly large chondrules, mostly between 400 and 600 μm in diameter, consistent with either an L or LL classification.

Northwest Africa 8576 (NWA 8576)
Morocco
Purchased: May 2014
Classification: Ordinary chondrite (LL3.00)
History: Purchased by Brahim Tahiri from a Moroccan hunter in Erfoud, Morocco and sent to his partner Sean Tutorow for classification.
Geochemistry: Ferroan olivine contains 0.46±0.09 wt.% Cr_2O_3, n=25; Kamacite: 0.42±0.26 wt.% Co; 5.5±1.8 wt.% Ni (n=9). There is a positive correlation between the Co and Ni values in the kamacite, as is found in other highly unequilibrated chondrites. The Cr content of the kamacite is 0.22±0.31 wt.% with a range of 0.00-0.84 wt.%. P (0.03±0.03 wt.%) and Si (0.03±0.04 wt.%) are both approximately at the detection limit.
Classification: Optical microscopy shows that this meteorite has ferroan olivine grains with no chromite exsolution; this implies it is outside the 3.05-3.15 range. About 10 different porphyritic chondrules in the thin section were examined. The meteorite cannot be type 3.2 or higher since it has such high Cr in the

ferroan olivine and a low standard deviation similar to Semarkona (LL3.00), Grossman and Brearley (2005). The chondrules average about 600 μm in diameter, consistent with an LL classification.

Northwest Africa 8577 (NWA 8577)
Morocco
Purchased: May 2014
Classification: CV3-ox
Petrography: Ferroan olivine contains 0.09±0.09 wt.% Cr_2O_3; the meteorite contains abundant fine-grained matrix, about 35 vol.%, consistent with a CV chondrite. It has large chondrules, averaging about 800 μm in diameter, again consistent with CV. Many of the chondrules have igneous rims. Porphyritic and barred olivine chondrules are abundant; RP and C chondrules were not identified (again consistent with a CV classification). Amoeboid olivine inclusions are moderately abundant; several reach 1 mm in maximum dimension. Opaque phases consist of moderately abundant magnetite and sulfide and little metallic Fe-Ni; this indicates that the rock is an oxidized CV chondrite. The meteorite contains a few percent of refractory inclusions; these include several fine-grained inclusions as well as some small CAI fragments in the matrix.

Northwest Africa 8586 (NWA 8586)
Mauritania
Purchased: 2014 Feb
Classification: Lunar meteorite (feldspathic breccia)
History: Purportedly found in Mauritania and purchased by Darryl Pitt in February 2014 from a dealer in Nouadhibou, Mauritania.
Physical characteristics: Single stone (704.5 g) composed of light gray to beige clasts in a dark gray matrix.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental breccia consisting of angular clasts in a finer grained matrix. Minerals are olivine orthopyroxene, subcalcic augite, augite, diopside), anorthite, ilmenite, troilite, rare kamacite and taenite. Several small mare basalt clasts were observed.
Geochemistry: Olivine ($Fa_{21.7\text{-}47.0}$, FeO/MnO = 80-85, N = 3), orthopyroxene ($Fs_{32.3\text{-}47.7}Wo_{2.9\text{-}2.7}$, FeO/MnO = 53-65), subcalcic augite ($Fs_{45.3\text{-}51.6}Wo_{25.6\text{-}21.4}$, FeO/MnO = 55-59), augite ($Fs_{13.7\text{-}14.2}Wo_{44.3\text{-}44.0}$, FeO/MnO = 36-39), diopside ($Fs_{8.7}Wo_{40.8}$, FeO/MnO = 38), plagioclase ($An_{96.9\text{-}97.4}Or_{0.1\text{-}0.2}$). Bulk composition (R. Korotev, *WUSL*) INAA of subsamples gave the following mean abundances (in wt.%) FeO 4.3, Na_2O 0.39; (in ppm) Sc 8.5, Ni 66, La 2.7, Sm 1.18, Eu 0.81, Yb 1.10, Lu 0.156, Hf 0.94, Th 0.7.
Classification: Lunar (feldspathic fragmental breccia).
Specimens: 20.1 g including one polished thin section at *UWB*. The main mass is held by *DPitt*.

Northwest Africa 8588 (NWA 8588)
(Northwest Africa)
Purchased: 2013 Jul
Classification: HED achondrite (Eucrite)
History: Purchased by Steve Witt in July 2013 from a Moroccan dealer.
Physical characteristics: Single large stone (1635 g) lacking fusion crust. The exterior consists of evenly-distributed, dark brown "knobby" regions and rounded, beige clasts (which have been preferentially corroded by wind terrestrial ablation and weathering processes).
Petrography: (A. Irving and S. Kuehner, *UWS*) Breccia composed of mostly basaltic eucrite clasts plus some gabbroic eucrite clasts in a deep brown matrix. Exsolved pigeonite grains are stained orange and calcic plagioclase is polycrystalline. Accessory minerals include silica polymorph, Ti-bearing chromite, ilmenite, troilite and barite.
Geochemistry: Orthopyroxene host ($Fs_{61.6\text{-}62.3}Wo_{2.1\text{-}2.0}$, FeO/MnO = 29-30), clinopyroxene exsolution lamellae ($Fs_{26.9\text{-}27.5}Wo_{43.4\text{-}42.6}$, FeO/MnO = 29-30).

Classification: Eucrite breccia (shocked). The distinctive shock, mineralogical and weathering characteristics suggest that this stone is paired with NWA 7989 and related stones.
Specimens: 20.8 g including one polished thin section at *UWB*. The main mass is held by S. Witt.

Northwest Africa 8589 (NWA 8589)
(Northwest Africa)
Purchased: 2014 Jan
Classification: Carbonaceous chondrite (CV3)
History: Purchased by F. Kuntz in January 2014 from a dealer in Zagora, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Separated, ovoid and irregularly shaped, granular chondrules (1.8±1.0 mm) and fine grained, irregular CAI occur in a reddish-brown matrix.
Geochemistry: Olivine ($Fa_{0.2\text{-}10.0}$, N = 3), orthopyroxene ($Fs_{0.9\text{-}2.6}Wo_{0.9\text{-}2.5}$, N = 3), (clinopyroxene ($Fs_{0.8\text{-}2.3}Wo_{42.6\text{-}44.5}$).
Classification: Carbonaceous chondrite (CV3).
Specimens: 12.26 g including one polished thick section at *PSF*; main mass with *Kuntz*.

Northwest Africa 8590 (NWA 8590)
(Northwest Africa)
Purchased: 2014 Jan
Classification: Ordinary chondrite (LL6)
History: Purchased by F. Kuntz in January 2014 from a dealer in Rissani, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Mostly recrystallized breccia with sparse large (up to 2 mm) chondrule remnants and some cross-cutting shock veins.
Geochemistry: Olivine ($Fa_{31.1\text{-}31.4}$, N = 3), orthopyroxene ($Fs_{25.0\text{-}25.1}Wo_{1.7\text{-}1.6}$, N = 3), clinopyroxene ($Fs_{9.0\text{-}9.8}Wo_{44.6\text{-}43.0}$).
Classification: Ordinary chondrite (LL6).
Specimens: 25.71 g including one polished thick section at *PSF*; main mass with *Kuntz*.

Northwest Africa 8591 (NWA 8591)
(Northwest Africa)
Purchased: 2014 Jan
Classification: HED achondrite (Eucrite, monomict)
History: Purchased by F. Kuntz in January 2014 from a dealer in Rissani, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Relatively fresh monomict breccia composed of basaltic eucrite clasts and related debris. Pyroxenes are compositionally zoned; other minerals include very calcic plagioclase, silica polymorph, fayalitic olivine, ilmenite, troilite and Ni-free metal.
Geochemistry: Pigeonite (core $Fs_{33.0}Wo_{6.6}$, FeO/MnO = 28; rim $Fs_{54.1}Wo_{5.0}$, FeO/MnO = 31), subcalcic augite ($Fs_{38.5}Wo_{31.2}$, FeO/MnO = 29), augite ($Fs_{28.2}Wo_{39.9}$, FeO/MnO = 28), olivine ($Fa_{83.1\text{-}83.5}$, FeO/MnO = 38-40).
Classification: Eucrite (monomict breccia).
Specimens: 18.79 g including one polished thick section at *PSF*; main mass with *Kuntz*.

Northwest Africa 8592 (NWA 8592)
(Northwest Africa)
Purchased: 2014 Jan
Classification: HED achondrite (Diogenite, polymict)
History: Purchased by F. Kuntz in January 2014 from a dealer in Rissani, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental breccia composed predominantly of diogenite clasts and related debris, plus ~2 vol.% basaltic eucrite clasts.
Geochemistry: Diogenitic orthopyroxene ($Fs_{20.6\text{-}22.7}Wo_{1.6\text{-}2.3}$, FeO/MnO =28-30; $Fs_{33.5}Wo_{2.5}$, FeO/MnO = 35), augite ($Fs_{19.2}Wo_{42.8}$, FeO/MnO = 22; $Fs_{42.1}Wo_{45.7}$, FeO/MnO =25), orthopyroxene host ($Fs_{44.5}Wo_{3.1}$,

FeO/MnO = 25), clinopyroxene exsolution lamella (FS23.7$Wo_{39.7}$, FeO/MNO = 26), olivine ($Fa_{34.5}$, FeO/MnO = 53).
Classification: Diogenite (polymict)
Specimens: 21.43 g including one polished thick section at *PSF*; main mass with *Kuntz*.

Northwest Africa 8593 (NWA 8593)
(Northwest Africa)
Purchased: 2014 Jan
Classification: Ordinary chondrite (LL6)
History: Purchased by F. Kuntz in January 2014 from a dealer in Rissani, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Mostly recrystallized breccia with sparse large (up to 1.8 mm) chondrule remnants.
Geochemistry: Olivine ($Fa_{30.9\text{-}31.2}$, N = 3), orthopyroxene ($Fs_{24.8\text{-}24.9}Wo_{2.3\text{-}2.4}$, N = 3), clinopyroxene ($Fs_{10.0\text{-}10.3}Wo_{43.6\text{-}43.8}$).
Classification: Ordinary chondrite (LL6).
Specimens: 15.66 g including one polished thick section at *PSF*; main mass with *Kuntz*.

Northwest Africa 8594 (NWA 8594)
(Northwest Africa)
Purchased: 2014 Jan
Classification: HED achondrite (Eucrite, monomict)
History: Purchased by F. Kuntz in January 2014 from a dealer in Rissani, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Monomict breccia composed of ophitic-textured basaltic eucrite clasts and related debris. Pyroxenes are compositionally zoned; other minerals include calcic plagioclase, silica polymorph, ilmenite, troilite and stained Ni-free metal.
Geochemistry: Pigeonite (cores $Fs_{33.9\text{-}35.2}Wo_{7.1\text{-}5.0}$, FeO/MnO = 27-32; rims $Fs_{61.1\text{-}63.4}Wo_{6.6\text{-}4.0}$, FeO/MnO =30), subcalcic augite ($Fs_{46.9}Wo_{25.6}$, FeO/MnO = 30), augite ($Fs_{32.6}Wo_{42.2}$, FeO/MnO = 34).
Classification: Eucrite (monomict breccia).
Specimens: 20.78 g including one polished thick section at *PSF*; main mass with *Kuntz*.

Northwest Africa 8595 (NWA 8595)
(Northwest Africa)
Purchased: 2014 Jan
Classification: HED achondrite (Howardite)
History: Purchased by F. Kuntz in January 2014 from a dealer in Rissani, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental breccia composed of diogenite clasts and related debris, plus mineral debris derived from eucritic lithologies and rare basaltic eucrite clasts. Minerals include orthopyroxene, olivine (with several different compositions), exsolved pigeonite, calcic plagioclase, silica polymorph, chromite and troilite. One large (1.5 mm) forsteritic olivine grain was found.
Geochemistry: Diogenitic orthopyroxene ($Fs_{24.0\text{-}25.2}Wo_{3.0\text{-}2.0}$, FeO/MnO = 28-32, N = 3), orthopyroxene host ($Fs_{43.0}Wo_{2.2}$, FeO/MnO = 30), clinopyroxene exsolution lamella ($Fs_{16.8}Wo_{44.7}$, FeO/MnO = 27), augite ($Fs_{30.6}Wo_{40.7}$, FeO/MnO = 31), ferropigeonite ($Fs_{78.9}Wo_{14.1}$, FeO/MnO = 24), olivine ($Fa_{73.0\text{-}86.6}$, FeO/MnO = 46-42; $Fa_{11.3}$, FeO/MnO = 33).
Classification: Howardite.
Specimens: 16.14 g including one polished thick section at *PSF*; main mass with *Kuntz*.

Northwest Africa 8596 (NWA 8596)
(Northwest Africa)
Purchased: 2014 Jan
Classification: Ordinary chondrite (LL6)

History: Purchased by F. Kuntz in January 2014 from a dealer in Rissani, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Mostly recrystallized breccia with sparse large (up to 1.8 mm) chondrule remnants.
Geochemistry: Olivine ($Fa_{30.3-30.5}$, N = 3), orthopyroxene ($Fs_{24.6-24.9}Wo_{1.6-1.9}$, N = 3), clinopyroxene ($Fs_{9.8-9.9}Wo_{43.8-43.7}$).
Classification: Ordinary chondrite (LL6).
Specimens: 21.34 g including one polished thick section at *PSF*; main mass with *Kuntz*.

Northwest Africa 8597 (NWA 8597)
(Northwest Africa)
Purchased: 2014 Jan
Classification: Carbonaceous chondrite (CK6)
History: Purchased by F. Kuntz in January 2014 from a dealer in Rissani, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Separated chondrules (0.9±0.3 mm) in a matrix rich in stained Cr-magnetite.
Geochemistry: Olivine ($Fa_{31.8-32.5}$, N = 3), orthopyroxene ($Fs_{25.6-26.2}Wo_{0.7-0.8}$, N = 3), clinopyroxene ($Fs_{8.7}Wo_{47.6}$; $Fs_{11.4}Wo_{40.4}$).
Classification: Carbonaceous chondrite (CK6).
Specimens: 21.76 g including one polished thick section at *PSF*; main mass with *Kuntz*.

Northwest Africa 8598 (NWA 8598)
(Northwest Africa)
Purchased: 2014 Jan
Classification: Ordinary chondrite (L6)
History: Purchased by F. Kuntz in January 2014 from a dealer in Smara, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Mostly recrystallized with rare chondrule remnants and fairly abundant, slightly stained metal.
Geochemistry: Olivine ($Fa_{24.9-25.0}$, N = 3), orthopyroxene ($Fs_{20.2-20.5}Wo_{1.5-1.4}$, N = 3), clinopyroxene ($Fs_{8.4-9.3}Wo_{41.1-44.3}$).
Classification: Ordinary chondrite (L6).
Specimens: 41.6 g including one polished thick section at *PSF*; main mass with *Kuntz*.

Northwest Africa 8599 (NWA 8599)
(Northwest Africa)
Purchased: 2014 Jun
Classification: Lunar meteorite
History: Purchased by F. Kuntz in June 2014 from a dealer in Zagora, Morocco.
Physical characteristics: Smooth-surfaced, fine grained, greenish-gray stone (36.5 g) with cross-cutting black veins.
Petrography: (A. Irving and S. Kuehner, *UWS*) Granuloblastic texture with larger grains of anorthite and very small grains of olivine, low-Ca pyroxene, high-Ca pyroxene, Al-bearing chromite, trolite and taenite.
Geochemistry: Olivine ($Fa_{23.3-23.5}$, FeO/MnO = 81-83), low-Ca pyroxene ($Fs_{18.9-19.6}Wo_{5.2-4.7}$; FeO/MnO = 53-58), high-Ca pyroxene ($Fs_{9.8}Wo_{40.6}$, FeO/MnO = 59), plagioclase ($An_{97.0-97.1}Or_{0.1}$). Bulk composition (R. Korotev, *WUSL*) INAA of subsamples gave the following mean abundances (in wt.%) FeO 5.4, Na_2O 0.23; (in ppm) Sc 7.1, Ni 140, La 0.71, Sm 0.37, Eu 0.55, Yb 0.34, Lu 0.05, Hf 0.23, Th 0.08.
Classification: Lunar (troctolitic granulitic breccia). On the basis of essentially identical texture, mineralogy and bulk composition, this specimen is paired with NWA 5744.
Specimens: 7.47 g including one polished slice at *PSF*; main mass with *Kuntz*.

Northwest Africa 8600 (NWA 8600)
(Northwest Africa)

Purchased: 2014 Jan
Classification: Ordinary chondrite (LL5)
History: Purchased by F. Kuntz in January 2014 from a dealer in Tan Tan, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Sparse chondrules are present in a recrystallized matrix.
Geochemistry: Olivine ($Fa_{27.4-27.5}$, N = 3), orthopyroxene ($Fs_{22.2-22.5}Wo_{1.8-1.2}$, N = 3), clinopyroxene ($Fs_{6.9-8.3}Wo_{46.2-45.3}$).
Classification: Ordinary chondrite (LL5).
Specimens: 26.49 g including one polished thick section at *PSF*; main mass with *Kuntz*.

Northwest Africa 8601 (NWA 8601)
(Northwest Africa)
Purchased: 2014 Jan
Classification: Ordinary chondrite (L5)
History: Purchased by F. Kuntz in January 2014 from a dealer in Rissani, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Sparse chondrules are present in a recrystallized matrix.
Geochemistry: Olivine ($Fa_{24.8-25.1}$, N = 3), orthopyroxene ($Fs_{20.7-21.3}Wo_{1.5-1.6}$, N = 3), clinopyroxene ($Fs_{6.8-8.3}Wo_{46.1-44.8}$).
Classification: Ordinary chondrite (L5).
Specimens: 43.96 g including one polished thick section at *PSF*; main mass with *Kuntz*.

Northwest Africa 8602 (NWA 8602)
(Northwest Africa)
Purchased: 2014 Jan
Classification: Ordinary chondrite (LL4)
History: Purchased by F. Kuntz in January 2014 from a dealer in Zagora, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Well-formed, round, closely-packed chondrules (mean diameter 1.0 ± 0.7 mm, one 3.2 mm) in a matrix containing stained metal.
Geochemistry: Olivine ($Fa_{27.2-27.3}$, N = 3), orthopyroxene (core $Fs_{11.3}Wo_{0.2}$; $Fs_{22.0-22.1}Wo_{0.7-0.8}$, N = 2), clinopyroxene ($Fs_{11.9}Wo_{32.2}$; $Fs_{23.3}Wo_{35.0}$).
Classification: Ordinary chondrite (LL4).
Specimens: 27.98 g including one polished thick section at *PSF*; main mass with *Kuntz*.

Northwest Africa 8603 (NWA 8603)
(Northwest Africa)
Purchased: 2014 Jan
Classification: Ureilite
History: Purchased by Pierre-Marie Pele in January 2014 from a dealer in Erfoud, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular assemblage of olivine (with dark reduced rims) and pigeonite.
Geochemistry: Olivine (cores $Fa_{24.7-24.9}$, Cr_2O_3 = 0.8 wt.%; rim $Fa_{6.6}$), pigeonite ($Fs_{19.9-20.1}Wo_{6.4-6.2}$).
Classification: Ureilite.
Specimens: 8.49 g including one polished thin section at *PSF*; main mass with Mr. P. Pele.

Northwest Africa 8604 (NWA 8604)
(Northwest Africa)
Purchased: 2013
Classification: HED achondrite (Eucrite, polymict)
History: Six stones weighing a total of 603.7 g were purchased by Blaine *Reed* during the 2013 Tucson Gem and Mineral Show.
Physical characteristics: Samples are angular to irregular-shaped fragments devoid of fusion crust. One stone shows a rounded exterior side with desert patina. Some stones contain a caliche patina.

Petrography: Description and classification (A. Love, *App*): Sample is a light gray, grain-supported fragmental breccia composed of clasts of cumulate and basaltic eucrites, related clastic materials and ~1 vol% diognitic orthopyroxene. 400 μm - 3.0 mm clasts are rounded to angular in shape and include: fine to medium-grained, ophitic, weakly shocked and shock melted cumulate eucrites. Cumulate clasts and related debris are composed of orthopyroxene, exsolved pigeonite and plagioclase displaying albite and Carlsbad twinning. Accessory minerals include olivine, a silica polymorph, ilmenite, troilite, minor chromite, and apatite.
Geochemistry: (A.Love, *App*) Orthopyroxene ($Fs_{43.8\text{-}57.2}Wo_{1.2\text{-}3.3}$), pigeonite host ($Fs_{38.5\text{-}56.7}Wo_{6.7\text{-}17.7}$), with clinopyroxene exsolution lamellae ($Fs_{26.4\text{-}32.7}Wo_{38.9\text{-}22.8}$); Ca-rich clinopyroxene ($Fs_{26.2}Wo_{38.6}$), Plagioclase ($An_{88.9}$), diogenitic orthopyroxene ($Fs_{33.4}Wo_{3.2}$).
Classification: HED Achondrite (polymict eucrite)
Specimens: 28.3 g and 2 polished thin sections are on deposit at *App*

Northwest Africa 8606 (NWA 8606)
(Northwest Aftica)
Purchased: 2014
Classification: HED achondrite (Eucrite, monomict)
History: Purchased by Adam Aaronson in Morocco, 2014.
Physical characteristics: Single stone, no fusion crust, dark brown, irregular, sandblasted exterior. A saw cut reveals a fragmental breccia with some white feldspathic clasts set in a dark brown groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of polished, saw-cut surface of deposit sample, shows a fragmental breccia with gabbroic and feldspathic clasts, and 200-300 μm pyroxene fragments set in a fine grained, cataclastic groundmass, some domains contain plumose quench melt. Many pyroxenes show exsolution lamellae. Accessory chromite, ilmenite, and silica.
Geochemistry: (C. Agee and N. Muttik, *UNM*). Low-Ca pyroxene $Fs_{60.0\pm4.0}Wo_{6.0\pm3.7}$, Fe/Mn=33±1, n=24; augite $Fs_{30.2\pm1.8}Wo_{41.3\pm2.6}$, Fe/Mn=34±2, n=17; plagioclase $An_{89.0\pm0.6}Ab_{10.4\pm0.7}Or_{0.6\pm0.1}$, n=6.
Classification: Achondrite (eucrite, monomict breccia), moderately weathered, high shock stage.
Specimens: A total of 24.2 g including a probe mount on deposit at *UNM*. *Aaronson* holds the main mass.

Northwest Africa 8607 (NWA 8607)
(Northwest Aftica)
Purchased: 2014
Classification: Lunar meteorite
History: Purchased by Adam Aaronson in Morocco, 2014.
Physical characteristics: Single stone, no fusion crust, irregular sandblasted exterior. A saw cut and polished surface reveal a breccia with multiple textural lithologies and prominent shock melt veining.
Petrography: (C. Agee, *UNM*) Microprobe examination of polished, saw-cut surface of deposit sample shows a breccia with multiple lithologies: Lithology A (olivine gabbro-norite), Lithology B (olivine gabbroic anorthosite), Lithology C (fragmental feldspathic breccia), Lithology D (shock melt). Fe-Ni metal, sulfide, chromite, ilmenite, and phosphate are ubiquitous accessory phases throughout this meteorite.
Geochemistry: (C. Agee and N. Muttik, *UNM*). Lithology A (olivine gabbro-norite): olivine $Fa_{29.2\pm1.6}$, Fe/Mn=98±6, n=13; low-Ca pyroxene $Fs_{25.6\pm1.5}Wo_{3.8\pm0.6}$, Fe/Mn=57±6, n=15; pigeonite $Fs_{25.0\pm5.1}Wo_{12.3\pm7.7}$, Fe/Mn=59±8, n=8; augite $Fs_{9.9\pm4.4}Wo_{42.6\pm2.8}$, Fe/Mn=40±7, n=2; plagioclase $An_{95.7\pm0.6}Ab_{4.0\pm0.6}Or_{0.3\pm0.1}$, n=8. Lithology B (olivine gabbroic anorthosite): olivine $Fa_{25.9\pm1.5}$, Fe/Mn=97±11, n=29; pigeonite $Fs_{19.5\pm2.0}Wo_{8.4\pm2.7}$, Fe/Mn=50±4, n=33; augite $Fs_{13.8\pm3.1}Wo_{38.1\pm1.8}$, Fe/Mn=44±7, n=8; plagioclase $An_{92.6\pm3.0}Ab_{6.7\pm2.8}Or_{0.7\pm0.2}$, n=12. Shock melt (20 μm defocused electron beam, proxy for bulk meteorite composition): SiO_2=44.18±2.80, TiO_2=0.58±0.35, Al_2O_3=24.44±4.70, Cr_2O_3=0.16±0.09, MgO=6.99±2.41, FeO=6.89±2.97, MnO=0.10±0.05, CaO=13.94±1.98, NiO=0.02±0.03, Na_2O=0.54±0.35, K_2O=0.15±0.07 (all wt%), Fe/Mn=84±29, Mg#=64.6±6.3, n=24.
Classification: Achondrite (lunar polymict breccia)

Specimens: A total of 21.4 g including a probe mount on deposit at *UNM*. *Aaronson* holds the main mass.

Northwest Africa 8608 (NWA 8608)
(Northwest Africa)
Purchased: 2003 Feb 8
Classification: Ordinary chondrite (H6)
History: A single stone was purchased by Dick Pugh at the Tucson Gem show in 2003 and donated to the Cascadia Meteorite Laboratory.
Physical characteristics: Physical: A faceted individual lacking obvious fusion crust. Abundant fine-grained metal is visible on the smooth medium-gray surface. Low areas filled with yellow brown to red brown sediment. Parallel grooves occur on one side. A prominent fracture occurs perpendicular to the grooves.
Petrography: (M. Hutson and A. Ruzicka, *Cascadia*) In thin section, the sample is crosscut by numerous parallel to sub-parallel fractures containing aligned metal and sulfide grains and weathering product. The silicates are granular with coarse recrystallized interstitial areas. Approximately 10 relict chondrules (mostly barred olivine) are barely discernable. Olivine grains typically show slight undulose extinction. Large (>100 μm) plagioclase feldspar grains show slight undulose extinction. Sample shows minimal staining with approximately 40% of metal grains replaced by weathering product.
Geochemistry: Compositions of olivine ($Fa_{19.7\pm0.4}$, n=21) and pyroxene ($Fs_{17.3\pm0.2}Wo_{1.4\pm0.2}$, n=17) grains are uniform, indicating that the sample is equilibrated.
Classification: H6 chondrite indicated by mineral chemistry and texture.
Specimens: 65.8 g in two pieces and one polished thin section are on deposit at *Cascadia*.

Northwest Africa 8609 (NWA 8609)
(Northwest Africa)
Purchased: 2014
Classification: Lunar meteorite (feldspathic breccia)
History: Purchased by Matt Morgan and Lee Morgan in 2014, reported found in Morocco.
Physical characteristics: Single stone, dark brown, irregular weathered surface. Saw cut reveals a range of light and dark mm-size clasts and mineral fragments set in a dark-gray matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows a fragmental breccia of plagioclase, olivine, and pyroxene grains, also feldspathic clasts, melt clasts, and microgabbro clasts. Accessory Fe-Ni metal, ilmenite, and apatite.
Geochemistry: (C. Agee and N. Muttik, *UNM*). Olivine $Fa_{28.4\pm3.1}$, Fe/Mn=102±9, n=22; pigeonite $Fs_{22.9\pm5.4}Wo_{10.1\pm2.0}$, Fe/Mn=53±5, n=11; low-Ca pyroxene $Fs_{26.5\pm6.0}Wo_{4.0\pm0.8}$, Fe/Mn=59±5, n=9; plagioclase $An_{93.2\pm3.2}Ab_{6.2\pm2.9}Or_{0.6\pm0.3}$, n=7.
Classification: Achondrite (Lunar feldspathic breccia), moderately weathered, high shock stage.
Specimens: A total of 9.0 g, including a probe mount, is on deposit at *UNM*, *MtMorgan* and Lee Morgan hold the main mass.

Northwest Africa 8610 (NWA 8610)
(Northwest Africa)
Purchased: 2014
Classification: HED achondrite (Eucrite)
Petrography: The brecciated meteorite displays an overall basaltic texture of dominantly lath-shaped calcic plagioclase and exsolved pyroxene. Accessory minerals include chromite, SiO_2 polymorphs, and rare trolite. Contains abundant shock melt veins and pockets.
Geochemistry: Low-Ca pyroxene: $Fs_{57.2\pm2.4}Wo_{4.2\pm1.7}$ ($Fs_{53.2\text{-}64.5}Wo_{2\text{-}7.6}$, n=16), FeO/MnO=31-35; Ca-pyroxene: $Fs_{27.1\pm1.7}Wo_{43.9\pm0.6}$ ($Fs_{24.9\text{-}29.8}Wo_{42.8\text{-}44.8}$, n=18), FeO/MnO=29-35; calcic plagioclase: $An_{89.1\pm2.2}$ ($An_{85.5\text{-}91.4}$, n=13)

Northwest Africa 8611 (NWA 8611)
(Northwest Africa)
Purchased: 23 June 2012
Classification: HED achondrite (Eucrite)
History: Purchased at Sainte-Marie-aux-Mines Mineral Show from a Moroccan mineral dealer
Petrography: This meteorite shows a highly brecciated texture consisting of granular clast (20%), basaltic clast (20%), and fine-grained matrix (60%). All these lithologies display nearly the same modal abundances of minerals, 47% plagioclase, 40% pyroxene (orthopyroxene with augite), and 6% a silica mineral, with chromite, ilmenite and rare troilite. Plagioclase typically shows lath-shaped morphology, and does not show zoning. Pyroxenes do not contain lamellae, and are homogeneous in composition. Some silica grains are identified as cristobalite.
Geochemistry: Plagioclase $An_{88\pm0.8}$ (n=30); orthopyroxene, $Fs_{60.8\pm0.7}Wo_{2.0\pm0.2}$ (n=30, FeO/MnO=32.8); augite, $Fs_{26.2\pm0.7}Wo_{43.5\pm0.6}$ (n=10).

Northwest Africa 8613 (NWA 8613)
(Northwest Africa)
Purchased: 2013 Sep 13
Classification: Carbonaceous chondrite (CV3)
History: Purchased at Denver Mineral Show from a Moroccan mineral dealer.
Geochemistry: Abundant CAIs (Type A dominant) and AOIs were observed. The modal abundance of the matrix is 40 vol.%. Chondrules are large, 0.7 mm in size, and most of them are Type I. Phenocrysts in chondrules are magnesian without zoning. The secondary alteration to form nepheline, phyllosilicate and others is not observed. Magnetite was not encountered, and Fe-Ni metal is common.

Northwest Africa 8614 (NWA 8614)
(Northwest Africa)
Purchased: 2002 Feb
Classification: Primitive achondrite (Winonaite)
History: Purchased February 2002 at the Gem and Mineral show in Tucson by Edwin *Thompson* from a Moroccan trader. Donated to *Cascadia* on May 24, 2002.
Physical characteristics: Small rounded specimen, has fusion coat on two flat faces. Elsewhere a dark colored exterior with abundant metal and a few chondrules visible.
Petrography: (K. Farley, A. Ruzicka, K. Armstrong, *Cascadia*) Dominantly granoblastic texture with over a dozen indistinct chondrules visible in two small thin sections. Apparent chondrule diameter is 0.48±0.27 mm (N=13). Mineralogy determined by EDS mapping suggests the following mode (area%): 44.3 low-Ca pyroxene, 12.3 olivine, 10.1 feldspar, 4.6 high-Ca pyroxene, 6.9 troilite, 10.6 kamacite, 1.4 taenite, 0.2 schreibersite, 0.4 chromite, 0.7 phosphate, 0.2 daubreelite, 8.4 weathering product. Roughly 40% of the metal has been weathered.
Geochemistry: (K. Farley and A. Ruzicka, *Cascadia*) Olivine ($Fa_{6.5\pm0.5}$, Fe/Mn = 13±2 at., N=18), low-Ca pyroxene ($Fs_{7.8\pm0.3}Wo_{1.4\pm0.2}En_{90.9\pm0.5}$, Fe/Mn = 8.8±0.8 at., N=28), high-Ca pyroxene ($Fs_{3.5\pm0.5}Wo_{45.5\pm0.3}En_{50.9\pm0.5}$, N=19), feldspar ($Ab_{79.9\pm2.0}Or_{6.4\pm1.2}An_{13.6\pm1.2}$, N=23). Oxygen isotope compositions (acid-treated samples to remove weathering product, K. Ziegler, *UNM*) of six subsamples spread along a mass fractionation line with average $\delta^{17}O = 1.416\pm0.166$, $\delta^{18}O = 3.543\pm0.297$, $\Delta^{17}O = -0.455\pm0.046$ (linearized values).
Classification: Winonaite. Oxygen $\Delta^{17}O$ values lie on an extension of the Clayton and Mayeda (1996) winonaite line and are distinct from acapulcoites and lodranites. Mineralogy and phase compositions are consistent with winonaites. The sample is unusual among winonaites in containing many identifiable chondrules.
Specimens: *Cascadia* holds the entire sample which includes 21.6 g, 3 polished thin sections, and 2 butts.

Northwest Africa 8615 (NWA 8615)

(Northwest Africa)
Purchased: April 1, 2014
Classification: HED achondrite (Howardite)
History: Purchased by Steve Witt from a dealer in Morocco on April 1, 2014.
Physical characteristics: Two matching stones, weathered exterior with some caliche. A saw-cut reveals a breccia of light and dark clasts set in dark brown matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows a highly brecciated texture with ~50% diogenitic pyroxenes, ~25% gabbroic eucrite pyroxenes showing Fe zoning, and ~25% equilibrated basaltic eucrite clasts showing clear separation between augite and pigeonite, with coarse exsolution lamellae. Accessory Fe-Ni metal, troilite, Ti-rich chromite, chromite, and ilmenite throughout.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Diogenite orthopyroxene $Fs_{28.8\pm6.2}Wo_{2.4\pm1.4}$, Fe/Mn=34±6, n=10; gabbroic eucrite low-Ca pyroxene $Fs_{47.1\pm3.7}Wo_{4.7\pm3.7}$, Fe/Mn=36±6, n=8, basaltic eucrite augite $Fs_{44.3\pm11.0}Wo_{27.0\pm12.6}$, Fe/Mn=34±1, n=3; basaltic eucrite pigeonite $Fs_{62.9\pm1.2}Wo_{6.6\pm1.9}$, Fe/Mn=33±2, n=3; plagioclase $An_{89.3\pm2.5}Ab_{10.2\pm2.3}Or_{0.5\pm0.2}$, n=6.
Classification: Achondrite (howardite) with three lithologies: 1) diogenite, 2) unequilibrated gabbroic eucrite with zoned pyroxenes, 3) equilibrated basaltic eucrite.
Specimens: 22.0 g including a probe mount on deposit at *UNM*, Steve Witt holds the main mass.

Northwest Africa 8616 (NWA 8616)
(Northwest Africa)
Purchased: February 2013
Classification: Carbonaceous chondrite (CV3)
Physical characteristics: The studied mass of 32 g (the type specimen) shows rather large chondrules and some relatively large white inclusions
Petrography: In thin section, many chondrules of various kinds (BO, PO, POP; about 1 mm in apparent diameter), fine-grained, olivine-rich aggregates and CAIs are embedded in a fine-grained, dark brown matrix (roughly 40 vol%). The matrix is quite porous and rich in olivine. Fe,Ni-rich metal and troilite are less abundant; severe weathering has replaced about 50% of the metal by terrestrial weathering products (W2-3). The shock stage is S2 due to the undulatory extinction and the lack of planar fractures in olivine.
Geochemistry: Chondrule olivine: $Fo_{94.1\pm5.1}$ (mostly $Fo_{95\text{-}100}$; range: $Fo_{75.7\text{-}99.7}$, n=37); mean matrix olivine: $Fo_{45.3\pm2.7}$ (n=20); chondrule low-Ca pyroxene, $En_{97.3\pm1.3}$ (mostly $En_{95\text{-}98}$; range: $En_{92.6\text{-}98.4}Fs_{0.7\text{-}4.1}Wo_{0.3\text{-}3.3}$, n=21).

Northwest Africa 8617 (NWA 8617)
(Northwest Africa)
Purchased: 2014
Classification: HED achondrite (Howardite)
History: Purchased by Habib Naji in Guelmin, Morocco, October 2014.
Physical characteristics: Single stone, weathered exterior, partial fusion crust, broken surface reveals a fresh-looking breccia of fine-grained light and dark clasts set in light gray matrix.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows a highly brecciated texture with ~60% diogenitic pyroxenes, ~20% equilibrated cumulate eucrite pyroxenes, and ~20% equilibrated basaltic eucrite pyroxenes. Accessory Fe-Ni metal, troilite, chromite, silica, and ilmenite throughout.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Diogenite orthopyroxene $Fs_{28.1\pm2.7}Wo_{2.5\pm0.7}$, Fe/Mn=32±2, n=24; cumulate eucrite low-Ca pyroxene $Fs_{41.9\pm2.1}Wo_{4.1\pm1.4}$, Fe/Mn=27±1, n=5, cumulate eucrite augite $Fs_{23.9}Wo_{29.7}$, Fe/Mn=29, n=1; basaltic eucrite low-Ca pyroxene $Fs_{53.7\pm4.4}Wo_{6.3\pm2.8}$, Fe/Mn=28±2, n=3; basaltic eucrite augite $Fs_{29.4\pm3.0}Wo_{39.3\pm2.8}$, Fe/Mn=32±1, n=5; olivine $Fa_{35.4}$, Fe/Mn=54, n=1; plagioclase $An_{87.8\pm4.5}Ab_{11.5\pm4.2}Or_{0.7\pm0.3}$, n=14.
Classification: Achondrite (howardite) with three lithologies: 1) diogenite, 2) equilibrated cumulate eucrite, 3) equilibrated basaltic eucrite. Low weathering grade, high shock stage.

Specimens: 20.1 g including a probe mount on deposit at *UNM*, H. Naji holds the main mass.

Northwest Africa 8618 (NWA 8618)
Morocco
Purchased: 2014
Classification: Carbonaceous chondrite (CM2)
History: Purchased in 2014 in Layoune
Physical characteristics: Two partially crusted dark stones. Cut surface reveals a dark gray interior with sparse small whitish chondrules
Petrography: (J. Gattacceca, *CEREGE*) Chondrules and mineral fragments in a fine-grained Fe-rich matrix. Abundant sulfides and magnetite, rare metal. Many chondrules have accretionary dust mantles. Average chondrule size 320±160 μm. Matrix: chondrules+mineral fragments abundances are 7:3 (by point counting, N=235).
Geochemistry: Olivine $Fa_{14.6\pm19.4}$ ($Fa_{0.5\text{-}46.6}$, N=13). Cr_2O_3 in ferroan olivine 0.34±0.15 wt% (N=6). Orthopyroxene $Fs_{1.9\text{-}37.8}Wo_{1.0\text{-}1.7}$ (N=2). Magnetic susceptibility log χ = 4.29 (χ in 10^{-9} m^3/kg).
Classification: Carbonaceous chondrite (CM2)
Specimens: 6 g in *CEREGE*, main mass with *Labenne*

Northwest Africa 8619 (NWA 8619)
Morocco
Purchased: 2014
Classification: Carbonaceous chondrite (CM2)
History: Purchased in 2014 in Erfoud
Physical characteristics: One dark stone, partially crusted. Cut surface reveal a dark interior with sparse small wihitish condrules.
Petrography: (J. Gattacceca, *CEREGE*) Chondrules, mineral fragments and CAIs in a fine-grained Fe-rich matrix. Abundant sulfides, rare metal. Many chondrules have accretionary dust mantles. Average chondrule size 510±160 μm. Matrix:chondrules+mineral fragments abundances are 5:1 (by point couting, N=128).
Geochemistry: Olivine $Fa_{11.4\pm12.7}$ ($Fa_{0.5\text{-}30.3}$, N=8). Cr_2O_3 in ferroan olivine 0.46±0.10 wt% (N=6). Orthopyroxene $Fs_{0.9\pm0.1}Wo_{1.1\pm0.0}$ (N=2). Magnetic susceptibility log χ = 3.85 (χ in 10^{-9} m^3/kg).
Classification: Carbonaceous chondrite (CM2)
Specimens: 5 g in *CEREGE*, main mass with *Labenne*

Northwest Africa 8620 (NWA 8620)
Morocco
Purchased: 2013
Classification: HED achondrite (Eucrite)
History: Purchased in 2013 in Agadir
Physical characteristics: Full crusted stone. The fusion crust is unusually dull for a eucrite. Cut surface reveals a homogeneous, fine-grained, light-gray interior with rare mm-sized darker clasts.
Petrography: (J. Gattacceca, *CEREGE*) Igneous rock with ophitic to subopthitic texture. A few mm-sized clasts with quenched texture (grain size <1 μm). Main minerals are pyroxene (mostly exsolved, less commonly zoned) and plagioclase with typical grain size 50 μm. Accessory minerals: chromite, ilmenite (to 50 μm), SiO_2, FeS (to 30 μm). Rare FeNi (to 20 μm)
Geochemistry: Pyroxene $Fs_{33.8\text{-}57.0}Wo_{8.3\text{-}16.3}$, FeO/MnO = 32.6±2.0 (N=6). Plagioclase $An_{83.6\pm0.4}Ab_{15.5\pm0.3}Or_{0.9\pm0.1}$ (N=4). Magnetic susceptibility log χ = 2.83 (χ in 10^{-9} m^3/kg).
Classification: Achondrite (basaltic eucrite). Low weathering
Specimens: 2.5 g in *CEREGE*, main mass with *Labenne*

Northwest Africa 8621 (NWA 8621)

Morocco
Purchased: 2014
Classification: Carbonaceous chondrite (CK5)
History: Purchased in 2014 in Layoune
Physical characteristics: Cut surface reveals a dark grey interior.
Petrography: (J. Gattacceca, *CEREGE*) Millimeter-sized chondrules in a recrystallized matrix. Olivine is the dominant silicate. Plagioclase in matrix is typically 20-40 μm. Opaques are mainly troilite and magnetite
Geochemistry: Olivine $Fa_{29.8\pm0.33}$ ($Fa_{29.3\text{-}30.1}$, N=6), FeO/MnO=117±20, NiO 0.44±0.07 wt.%. Pyroxene $Fs_{22.5}Wo_{11.7}$ (N=1). Magnetite contains 3.3±0.1 wt.% Cr_2O_3, 0.67 wt.% Al_2O_3, 0.23 wt.% NiO (N=3). Magnetic susceptibility log χ = 4.65 (χ in 10^{-9} m^3/kg).
Classification: Carbonaceous chondrite (CK5). Moderate weathering
Specimens: 6 g in *CEREGE*, main mass with *Labenne*

Northwest Africa 8622 (NWA 8622)
Morocco
Purchased: 2013
Classification: Ureilite
History: Purchased in 2013 in Agadir
Physical characteristics: Full oriented stone. Light gray fusion crust with flow lines.
Petrography: (J. Gattacceca, *CEREGE*) Consists mostly of euhedral olivine with reduced margin. Grain size 1.5 mm. Metal and weathering products around grains and as micrometrer-sized blebs in the olivine. Carbon (graphite or diamond) clusters are present.
Geochemistry: Olivine cores $Fa_{21.4\pm0.1}$ (N=4), FeO/MnO=46.0. Olivine CaO 0.37 wt.%, Cr_2O_3=0.75 wt.%. Olivine rim $Fa_{12.4}$ (N=1). Pigeonite $Fs_{14.7}Wo_{7.2}$ (N=1). Magnetic susceptibility log χ = 4.39 (χ in 10^{-9} m^3/kg).
Classification: Ureilite. Strong weathering
Specimens: 20 g in *CEREGE*, main mass with *Labenne*

Northwest Africa 8623 (NWA 8623)
Morocco
Purchased: 2012
Classification: Ordinary chondrite (LL6, melt breccia)
History: Purchased in 2012 in Erfoud
Physical characteristics: A single crusted stone. Cut surface reveals gray cm-sized clasts in a black groundmass.
Petrography: (J. Gattacceca, *CEREGE*) Cm-sized chondritic clasts in a melt matrix.
Geochemistry: Olivine $Fa_{30.9\pm0.2}$ (N=3), orthopyroxene $Fs_{24.7\pm0.1}Wo_{2.1\pm0.2}$ (N=2). Magnetic susceptibility log χ =3.67 (χ in 10^{-9} m^3/kg).
Classification: LL6-melt breccia
Specimens: 21 g in *CEREGE*, main mass with *Labenne*

Northwest Africa 8624 (NWA 8624)
Morocco
Purchased: 2014
Classification: Rumuruti chondrite (R5)
History: Purchased in 2014 in Layoune
Physical characteristics: Six crusted stones. Cut surface reveals a dark interior with light chondrules.
Petrography: (J. Gattacceca, *CEREGE*) Chondrules in a recrystallized matrix (about 1:1). Chondrule mean size 580±180 μm. Olivine is the dominant silicate. Plagioclase in matrix is up to 50 μm but typically 20-30 μm. Opaques are mainly sulfides.

Geochemistry: Olivine $Fa_{39.6\pm0.0}$ (N=3), NiO 0.22±0.06 wt.%, FeO/MnO=81±1. Ca-pyroxene $Fs_{14.0}Wo_{42.5}$ (N=1). Plagioclase $An_{8.3}Ab_{87.7}Or_{4.0}$ (N=1). Chromite Cr#=0.85 TiO_2=2.2 wt.%. Magnetic susceptibility log χ =3.39 (χ in 10^{-9} m^3/kg)
Classification: R5
Specimens: 34 g in *CEREGE*, main mass with *Labenne*

Northwest Africa 8625 (NWA 8625)
(Northwest Africa)
Purchased: 2014 May 8
Classification: Mesosiderite (group A)
History: Purchased in Erfoud May 8, 2014.
Physical characteristics: Many rusted stones without fusion crust. Cut surface reveals a dark interior with abundant mm-sized metal grains.
Petrography: Coarse crystalline rock with recrystallized texture evidenced by triple junctions and lobate silicates, and subhedral troilite and metal. Pyroxene and plagioclase up to 2.5 mm, troilite and metal to mm. Modal abundances (point counting, N=394): pyroxene 51%, plagioclase 27%, troilite 11%, metal and its weathering products 10%.
Geochemistry: Orthopyroxene $Fs_{30.0\pm0.6}Wo_{3.4\pm0.2}$, FeO/MnO=27.8 (N=3). Plagioclase $An_{93.8}Ab_{5.9}Or_{0.3}$ (N=3). Magnetic susceptibility log χ = 5.27 (χ in 10^{-9} m^3/kg)
Classification: Mesosiderite-A
Specimens: 24 g and a polished section in *CEREGE*. Main mass with P. Thomas

Northwest Africa 8626 (NWA 8626)
(Northwest Africa)
Purchased: 2014 May 6
Classification: HED achondrite (Eucrite, anomalous)
History: Purchased in Rissani May 6, 2014.
Physical characteristics: A single stone with a dull fusion crust. Cut surface reveals a light gray fine-grained interior with coarser mm-sized clasts.
Petrography: Brecciated igneous rock with ophitic to subophitic texture. Main minerals are zoned pyroxene and plagioclase. Typical grain size is 200 μm in the finer host lithology and up to mm sized in the coarser lithology. Accessory metal, chromite, ilmenite, silica. Metal is unusually abundant for a eucrite, in agreement with the high magnetic susceptibility. About 40% of the metal is replaced by weathering products. Saturation magnetization of a 380 mg sample indicates a bulk metal content of 2.1 wt% (about 0.75 vol%).
Geochemistry: Pyroxene $Fs_{50.0\pm7.1}$ $Wo_{15.9\pm6.9}$ ($Fs_{36.7\text{-}60.6}Wo_{8.9\text{-}25.3}$, FeO/MnO=30.5±2.8, N=9). Plagioclase $An_{80.9\pm1.7}Or_{1.4\pm0.4}$ (N=4). Magnetic susceptibility log χ = 3.95 (χ in 10^{-9} m^3/kg) indicate a metal content an order of magnitude above the usual eucrite (log χ =2.95±0.30, N=70 in Rochette et al., 2009) almost to the level of Pomozdino.
Classification: Metal-rich eucrite (basaltic, brecciated)
Specimens: 21 g and a polished section in *CEREGE*. Main mass with P. Thomas

Northwest Africa 8627 (NWA 8627)
(Northwest Africa)
Purchased: 2014 May 5
Classification: HED achondrite (Eucrite, brecciated)
History: Purchased in Erfoud May 5, 2014.
Physical characteristics: A single small stone partially covered with with a thin translucent fusion crust.
Petrography: Igneous brecciated and partial melt rock. Main minerals are exsolved pyroxene, plagioclase. Accessory chromite, Ca-phosphate, silica, troilite. Rare metal.

Geochemistry: Pyroxenes: pigeonite $Fs_{49.5\pm13.3}Wo_{6.2\pm4.4}$ ($Fs_{44.1\text{-}58.2}Wo_{7.3\text{-}17.8}$, N=3), augite exsolution $Fs_{31.4}Wo_{39.5}$ (N=1), FeO/MnO=31.9±2.8 (N=4). Plagioclase $An_{91.4\pm0.8}Or_{0.1\pm0.1}$ (N=5). Chromite Cr#=0.80 (N=2). Magnetic susceptibility log χ = 3.07 (χ in 10^{-9} m^3/kg).
Classification: Eucrite (brecciated)
Specimens: 1.2 g and a polished section in *CEREGE*. Main mass with P. Thomas

Northwest Africa 8630 (NWA 8630)
(Northwest Africa)
Purchased: 2012
Classification: Ordinary chondrite (LL7)
History: Purchased in Agadir in 2012
Physical characteristics: A single stone with fusion crust. Cut surface reveals a light gray interior
Petrography: Main minerals are olivine, pyroxene (with typical grain size 100 μm), plagioclase (to 200 μm). The texture is recrystallized with triple junctions and lobate grains. Rare relict chondrules. Plagioclase is found as euhedral grains and as veins between the other silicates. Ca-phosphates to 200 μm. Chromite to 50 μm. Metal as small blebs or elongated grains in the olivine.
Geochemistry: Olivine $Fa_{32.0\pm0.4}$ (N=4). Orthopyroxene $Fs_{26.4\pm0.2}Wo_{1.9\pm0.5}$ (N=3). Plagioclase $An_{10.4}Or_{5.1}$ (N=3). Chromite Cr#=0.88. Magnetic susceptibility log χ =3.55 (χ in 10^{-9} m^3/kg).
Classification: LL7 based on texture, Ca content of orthopyroxene, and plagioclase size. Weathering grade W1.
Specimens: 6.8 g and a polished section in *CEREGE*. Main mass with Jean Redelsperger

Northwest Africa 8631 (NWA 8631)
(Northwest Africa)
Purchased: 2012
Classification: Carbonaceous chondrite (CO3.0)
History: Purchased in Erfoud in 2012
Physical characteristics: A single stone partly covered with fusion crust. Cut surface reveals a dark brown interior with small brown-orange chondrules.
Petrography: Chondrules and mineral fragments in a fine grained Fe-rich matrix. Chondrules are mostly of type I, some armored by opaques. Sulfides and metal are found in chondrules and matrix including blebs in the matrix (to 200 μm for metal, to 50 μm for sulfides. Modal abundances (by point counting N=448): matrix 53%, chondrules and mineral fragments 40%, opaques and their weathering products 7% (including ~2% metal, in agreement with magnetic susceptibility). Average chondrule size 240±130 μm (N=67).
Geochemistry: Olivine $Fa_{13.2\pm17.0}$ (PMD=118%, $Fa_{0.4\text{-}46.9}$, N=22). Type I chondrules olivine $Fa_{1.0\pm0.4}$ (N=14), type II chondrules olivine $Fa_{34.5\pm9.0}$ (N=8). Cr_2O_3 in ferroan olivine is 0.35±0.06 (N=8). Orthopyroxene $Fs_{2.0\pm0.8}Wo_{1.6\pm0.9}$ ($Fs_{1.2\text{-}3.3}$, PMD-FeO=34%, N=5). Magnetic susceptibility log χ =4.65 (χ in 10^{-9} m^3/kg).
Classification: Carbonaceous chondrite (CO3.0). Sub-type from Cr_2O_3 content of ferroan olivine and olivine Fa range. Matrix abundance is higher and chondrules larger than the usual CO chondrite. Moderate weathering.
Specimens: 7.5 g and a polished section in *CEREGE*. Main mass with Jean Redelsperger

Northwest Africa 8632 (NWA 8632)
Morocco
Purchased: 2014 Jun
Classification: Lunar meteorite (basalt)
History: Purportedly found near Chwichiya in 2013 and purchased by Luc Labenne in June 2014 from a dealer in Ouarzazate, Morocco.

Physical characteristics: A single, small, dense black stone (23.8 g) with a flat, squarish shape and no fusion crust. Magnetic susceptibility log χ = 3.08 (X in nm3/kg) (J. Gattacceca, *CEREGE*).
Petrography: (A. Irving and S. Kuehner, *UWS*) Porphyritic texture. Subhedral zoned olivine phenocrysts (up to 2.3 mm long, yellowish in thin section) are set in a groundmass composed mainly of elongate, zoned clinopyroxene grains (clear with pink rims), smaller olivine grains and interstitial regions (opaque in thin section) consisting of ilmenite needles, Ti-chromite, fine clinopyroxene, fayalite and glass. No plagioclase was found. Small patches and veinlets of pale yellow devitrified glass are present.
Geochemistry: Olivine phenocrysts (cores $Fa_{32.5\text{-}32.8}$, FeO/MnO = 90-100, N = 3; rim $Fa_{48.8}$, FeO/MnO = 98), groundmass olivine ($Fa_{72.6\text{-}74.1}$, FeO/MnO = 91-97, N = 3), augite ($Fs_{23.7\text{-}27.1}Wo_{40.1\text{-}40.5}$, FeO/MnO = 53-55, TiO_2 = 2.4-2.6 wt.%, Al_2O_3 = 5.9- 6.1 wt.%, N = 2), subcalcic augite ($Fs_{26.6\text{-}27.0}Wo_{30.8\text{-}36.1}$, FeO/MnO = 54-60, TiO_2 = 1.9-2.1 wt.%, Al_2O_3 = 4.7-5.6 wt.%, N = 2), ferroan subcalcic augite rim ($Fs_{41.9}Wo_{34.1}$, FeO/MnO = 63, TiO_2 = 3.2 wt.%, Al_2O_3 = 8.1 wt.%). Bulk composition (R. Korotev, *WUSL*) INAA of subsamples gave the following mean abundances (in wt.%) FeO 22.6, Na_2O 0.28; (in ppm) Sc 51.1, Ni 70, La 7.8, Sm 4.7, Eu 0.89, Yb 4.1, Lu 0.58, Hf 3.4, Th 1.25.
Classification: Lunar (mare basalt).
Specimens: 4.6 g including one polished thin section, one polished thick section and one polished mount at *UWB*. The main mass is held by *Labenne*.

Northwest Africa 8633 (NWA 8633)
(Northwest Africa)
Purchased: 2014 Apr
Classification: HED achondrite (Diogenite)
History: Purchased in Temara, Morocco by Adam Aaronson in April 2014.
Petrography: (A. Irving and S. Kuehner, *UWS*) Very fresh monomict diogenite breccia composed predominantly of orthopyroxene with accessory Mg-bearing chromite, troilite and kamacite.
Geochemistry: Orthopyroxene ($Fs_{28.4\text{-}28.5}Wo_{3.5\text{-}4.4}$, FeO/MnO = 29-30, N = 3).
Classification: Diogenite (monomict breccia).
Specimens: 21 g including one polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8634 (NWA 8634)
(Northwest Africa)
Purchased: 2009 Apr
Classification: Ordinary chondrite (L5)
History: Purchased in Rissani, Morocco by Adam Aaronson in April 2009.
Petrography: (A. Irving and S. Kuehner, *UWS*) Sparse, medium-sized chondrules are set in a matrix containing stained metal.
Geochemistry: Olivine ($Fa_{25.0\text{-}25.2}$, N = 3), orthopyroxene ($Fs_{21.3\text{-}23.0}Wo_{1.6\text{-}1.3}$, N = 3), clinopyroxene ($Fs_{6.7}Wo_{46.6}$).
Classification: Ordinary chondrite (L5).
Specimens: 26.1 g including one polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8635 (NWA 8635)
(Northwest Africa)
Purchased: 2014 Aug
Classification: Ureilite
History: Purchased in Temara, Morocco, by Adam Aaronson in April 2014.
Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular aggregate of olivine with dark reduced rims and pigeonite.
Geochemistry: Olivine (cores $Fa_{20.2\text{-}20.4}$, Cr_2O_3 = 0.7 wt.%; rim $Fa_{8.6}$, N = 3), pigeonite ($Fs_{17.4\text{-}17.6}Wo_{5.8\text{-}5.9}$, N = 2).
Classification: Ureilite.

Specimens: 20.1 g including one polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8636 (NWA 8636)
L5, (Northwest Africa)
Purchased: 2014 Aug
Classification: Ordinary chondrite (L5)
History: Purchased in Temara, Morocco by Adam Aaronson in April 2014.
Petrography: (A. Irving and S. Kuehner, *UWS*) Sparse, medium-sized chondrules are set in a matrix containing stained metal.
Geochemistry: Olivine ($Fa_{25.1\text{-}25.6}$, N = 3), orthopyroxene ($Fs_{21.1.\text{-}21.3}Wo_{1.4\text{-}1.6}$, N = 3), clinopyroxene ($Fs_{9.3}Wo_{44.6}$; $Fs_{15.2}Wo_{41.4}$).
Classification: Ordinary chondrite (L5).
Specimens: 124 g including one polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8637 (NWA 8637)
(Northwest Africa)
Purchased: 2014 May
Classification: Martian meteorite (Shergottite)
History: Purchased from a Moroccan dealer by John Higgins in May 2014.
Physical characteristics: A small dark, medium-grained stone (4.2 g) with visible maskelynite and dark pyroxene.
Petrography: (A. Irving and S. Kuehner, *UWS*) Medium-grained (0.4-0.9 mm), subequigranular aggregate of ~40 vol.% olivine, ~40 vol.% intermediate plagioclase (maskelynite) and ~20 vol.% augite with minor pigeonite, Ti-chromite, ilmenite and pyrrhotite. Constituent minerals exhibit little compositional variation.
Geochemistry: Olivine ($Fa_{39.9\text{-}41.8}$, FeO/MnO = 50-55, N = 3), augite ($Fs_{17.2\text{-}18.5}Wo_{38.0\text{-}36.2}$, FeO/MnO = 24-28, N = 3), pigeonite ($Fs_{31.0\text{-}31.2}Wo_{8.9\text{-}13.9}$, FeO/MnO = 30-33, N = 3) and plagioclase (maskelynite) ($An_{51.4\text{-}54.8}Or_{4.7\text{-}4.0}$, N = 3).
Classification: Martian (shergottite, microgabbroic).
Specimens: 1.0 g including a polished probe mount at *UWB*. The remainder is held by J. Higgins.

Northwest Africa 8638 (NWA 8638)
(Northwest Africa)
Purchased: 2014 Apr
Classification: Ureilite
History: Purchased in Temara, Morocco, by Adam Aaronson in April 2014.
Physical characteristics: Extremely hard, black specimen (2130 g).
Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular aggregate of olivine with relatively thick, dark reduced rims and pigeonite with minor orthopyroxene.
Geochemistry: Olivine (cores $Fa_{25.0\text{-}25.1}$, Cr_2O_3 = 0.6 wt.%; rim $Fa_{5.5}$, N = 3), pigeonite ($Fs_{19.8}Wo_{11.0}$), orthopyroxene ($Fs_{15.5}Wo_{4.9}$).
Classification: Ureilite
Specimens: 21 g including one polished thin section at *UWB*. The remainder is held by *Aaronson*.

Northwest Africa 8639 (NWA 8639)
LL6, (Northwest Africa)
Purchased: 2012 Jan
Classification: Ordinary chondrite (LL6)
History: Purchased by Dr. David Gregory in January 2012 from a Moroccan dealer at the Tucson Gem and Mineral Show.

Petrography: (A. Irving and S. Kuehner, *UWS*) Largely recrystallized with very sparse remnant chondrules in a pale brown, stained matrix.
Geochemistry: Olivine ($Fa_{28.4-28.9}$, N = 3), orthopyroxene ($Fs_{24.5-24.6}Wo_{1.1-1.4}$, N = 3), clinopyroxene ($Fs_{11.2-14.0}Wo_{44.2-43.8}$).
Classification: Ordinary chondrite (LL6).
Specimens: 21 g including one polished thin section at *UWB*. The remainder is held by *Gregory*.

Northwest Africa 8640 (NWA 8640)
(Northwest Africa)
Purchased: 2005 Jan
Classification: HED achondrite (Eucrite, polymict)
History: Purchased by Dr. David Gregory from a Moroccan dealer in January 2005.
Petrography: (A. Irving and S. Kuehner, *UWS*) Polymict breccia composed predominantly of clasts of basaltic, diabasic and gabbroic eucrite, all of which contain clinopyroxene that is pale clove brown in thin section. In most clasts both the pyroxene and calcic plagioclase are polycrystalline, but in some clasts they are not. Accessory minerals in eucrite clasts are silica polymorph, ilmenite, Ti-chromite, troilite and stained Ni-free metal. Diogenitic orthopyroxene is present as sparse grains (< 1 vol.%). Some thin veinlets of secondary calcite are present.
Geochemistry: Diogenitic orthopyroxene ($Fs_{30.0}Wo_{3.40}$, FeO/MnO = 35), host orthopyroxene ($Fs_{57.7-60.1}Wo_{4.0-2.8}$, FeO/MnO = 32-33, N = 3), clinopyroxene exsolution lamellae ($Fs_{36.2-39.9}Wo_{25.9-23.6}$, FeO/MnO = 31-33, N = 3), pigeonite ($Fs_{41.1}Wo_{20.6}$, FeO/MnO = 32).
Classification: Eucrite (polymict).
Specimens: 22 g including two polished thin sections at *UWB*. The remainder is held by *Gregory*.

Northwest Africa 8641 (NWA 8641)
(Northwest Africa)
Purchased: 2014 May
Classification: Lunar meteorite (feldspathic breccia)
History: Purchased in May 2014 by Darryl Pitt from a dealer in Erfoud, Morocco.
Physical characteristics: A large (5895 g) rounded, ellipsoidal dark gray stone with white clasts visible and with a beige, clayey coating on one side.
Petrography: (A. Irving and S. Kuehner, *UWS*) Breccia composed of light colored clasts in a darker matrix. Major minerals are olivine, orthopyroxene, pigeonite, augite and anorthite. Minor constituents include symplectitic intergrowths of fayalite+hedenbergite+silica polymorph, ilmenite, Ti-rich chromite, troilite, and rare exsolved pigeonite, kamacite and secondary barite.
Geochemistry: Olivine ($Fa_{23.3-31.8}$; FeO/MnO = 94-97, N = 3), orthopyroxene ($Fs_{29.7}Wo_{3.1}$; FeO/MnO = 64), pigeonite ($Fs_{24.1}Wo_{6.4}$; FeO/MnO = 59), augite ($Fs_{13.6-39.4}Wo_{39.4-43.5}$; FeO/MnO = 44-45, N = 2), plagioclase ($An_{94.6-99.7}Or_{0.3-0.1}$, N = 3). Bulk composition (R. Korotev, *WUSL*) INAA of subsamples gave the following mean abundances (in wt.%) FeO 5.35, Na_2O 0.48; (in ppm) Sc 12.3, Ni 140, Ba 320, La 6.4, Sm 2.9, Eu 1.05, Yb 2.0, Lu 0.287, Hf 2.1, Th 0.90.
Classification: Lunar (feldspathic regolithic breccia).
Specimens: 20.5 g including a polished endcut at *UWB*. The remainder is held by *DPitt*.

Northwest Africa 8642 (NWA 8642)
(Northwest Africa)
Purchased: 2002 Feb
Classification: Ordinary chondrite (L6)
History: Purchased February 2002 at the Gem and Mineral show in Tucson by Edwin *Thompson* from a Moroccan trader. Donated to *Cascadia* on May 24, 2002.
Physical characteristics: Faceted specimen is covered with a slightly abraded fusion coating; metal is visible on projecting surfaces.

Petrography: (K. Farley, A. Ruzicka, *Cascadia*) Granoblastic textured rock with poorly defined chondrules were found in thin section. Few chondrules were distinct enough for their sizes to be measured. Among these, chondrule diameter ranged up to ~600 μm. Roughly 15% of the metal has been weathered.
Geochemistry: Olivine ($Fa_{26.5\pm0.3}$, N=8), low-Ca pyroxene ($Fs_{21.7\pm0.1}$, $Wo_{2.3\pm0.1}En_{75.9\pm0.09}$, N=10), feldspar ($Ab_{82.5\pm0.4}Or_{6.0\pm0.4}An_{11.4\pm0.1}$, N=7).
Classification: L6 chondrite based on mineral chemistry and texture. Chondrules are very well-integrated with the matrix.
Specimens: *Cascadia* holds the entire sample which includes 48.6 g, 1 polished thin section, and 1 stub.

Northwest Africa 8643 (NWA 8643)
(Northwest Africa)
Purchased: 2002 Feb
Classification: Ordinary chondrite (L6)
History: Purchased February 2002 at the Gem and Mineral show in Tucson by Edwin *Thompson* from a Moroccan trader. Donated to *Cascadia* on May 24, 2002.
Physical characteristics: Small medium gray specimen completely lacking fusion crust, with numerous dark grains protruding from surface often surrounded by rust halos.
Petrography: (K. Farley, A. Ruzicka, *Cascadia*) Thin section reveals granoblastic texture with well-integrated chondrules. Rust staining occurs in clumps around some metal and sulfide grains. Individual chondrules are difficult to distinguish, but the 7 most distinct have a mean chondrule diameter of ~0.45 mm. Roughly 10% of the metal has been weathered.
Geochemistry: Olivine ($Fa_{25.5\pm0.2}$, N=20), low-Ca pyroxene ($Fs_{21.5\pm0.2}Wo_{1.5\pm0.2}En_{77.0\pm0.2}$, N=22), high-Ca pyroxene ($Fs_{7.5\pm0.8}Wo_{45.5\pm1.0}En_{47.0\pm0.3}$, N=6), feldspar ($Ab_{82.6\pm1.0}Or_{6.6\pm0.9}An_{10.8\pm0.1}$, N=4).
Classification: L6 chondrite based on mineral chemistry and texture.
Specimens: *Cascadia* holds the entire sample which includes 6.4 g in two pieces, 1 polished thin section, and 1 butt.

Northwest Africa 8644 (NWA 8644)
(Northwest Africa)
Purchased: 2002 Feb
Classification: Ordinary chondrite (L6)
History: Purchased by Dick Pugh February 2002 as an "NWA meteorite" from a Moroccan trader at the Gem and Mineral show in Tucson. Donated to *Cascadia* in February, 2002.
Physical characteristics: Two sides of the specimen display good fusion crust and thumbprints. Another side shows broken interior, which is weathered dark.
Petrography: (K. Farley, A. Ruzicka, *Cascadia*) Granoblastic textured rock with poorly-defined chondrules found in thin section. Roughly 5% of the metal has been weathered.
Geochemistry: Olivine ($Fa_{25.5\pm0.3}$, N=12), low-Ca pyroxene ($Fs_{21.5\pm0.5}Wo_{1.8\pm0.3}En_{76.6\pm0.5}$, N=10), feldspar ($Ab_{82.1\pm0.8}Or_{7.0\pm1.0}An_{10.9\pm0.3}$, N=6).
Classification: L6 chondrite based on mineral chemistry and texture.
Specimens: *Cascadia* holds the entire sample which includes 50.6 g and 1 polished thin section.

Northwest Africa 8645 (NWA 8645)
(Northwest Africa)
Purchased: 2014 Mar 7
Classification: Ordinary chondrite (L5)
History: Donated to *Cascadia* by Dick Pugh, who purchased the meteorite on March 7, 2014, from Edwin *Thompson*, who obtained the sample from a Moroccan trader.
Physical characteristics: A faceted medium brownish gray specimen has remnant patches of fusion crust on its exterior. A large (>1 cm) discrete, light-colored inclusion is visible on an exterior surface.

Petrography: (A. Ruzicka and M. Hutson, *Cascadia*) Two light-colored regions containing euhedral olivine grains typical of an igneous lithology occur along edges of the thin section. The chondritic host is darkened by weathering product and an orange staining of the silicates. Chondrules are readily identifiable, with partially integrated margins and lacking glass in their interiors. Feldspar grains are typically 10-30 μm across. Eighteen out of 23 olivine grains examined have mosaic extinction and 2 sets of planar fractures. Isolated small patches of shock melt are present.
Geochemistry: Olivine ($Fa_{26.2\pm1.0}$, N=34), low-Ca pyroxene ($Fs_{22.4\pm1.6}Wo_{1.9\pm0.5}$, N=14), feldspar ($Ab_{80.1\pm1.7}Or_{8.3\pm2.4}An_{11.6\pm1.9}$, N=10).
Classification: Based on the texture and composition, this is an L5 ordinary chondrite.
Specimens: *Cascadia* holds the entire sample which includes 44.7 g and 1 polished thin section.

Northwest Africa 8649 (NWA 8649)
(Northwest Africa)
Purchased: 2014
Classification: Ordinary chondrite (LL3.05)
History: Purchased by Aziz Habibi in Morocco, 2014.
Physical characteristics: A single stone with fusion crust, weathered exterior. Saw cut reveals many densely packed chondrules of variable size; iron-oxidation present.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount and polished deposit sample shows numerous unequilibrated chondrules, apparent mean diameter 602±386 μm (n=105), many with porphyritic, igneously zoned olivines and pyroxenes, most with glass or mesostasis. Abundant fine-grained matrix throughout.
Geochemistry: (C. Agee, N. Muttik, *UNM*) All chondrule olivine $Fa_{16.9\pm8.7}$ ($Fa_{0.8\text{-}39.4}$, n=92); ferroan olivine $Fa_{17.5\pm8.4}$, Fe/Mn=46±17, Cr_2O_3=0.41±0.15 wt%, n=88; low-Ca pyroxene $Fs_{13.3\pm9.2}Wo_{1.1\pm1.1}$, Fe/Mn=28±19, n=47; pigeonite $Fs_{17.3\pm5.4}Wo_{8.9\pm2.8}$, Fe/Mn=29±19, n=3; high-Ca pyroxene $Fs_{17.8\pm15.1}Wo_{28.8\pm6.0}$, Fe/Mn=13±11, n=5. Oxygen isotopes (K. Ziegler, *UNM*) 12 acid-washed samples of 1.5, 2.1, 1.6, 2.1, 1.8, 1.4, 1.3, 1.3, 2.3, 1.6, 2.1, and 3.5 mg gave $\delta^{17}O$ = 2.875, 3.300, 3.713, 2.938, 2.543, 2.623, 3.249, 2.807, 3.217, 3.302, 3.563, 3.518, $\delta^{18}O$ = 4.896, 5.022, 5.094, 4.609, 4.203, 4.464, 4.779, 4.639, 4.669, 4.585, 5.659, 5.766, $\Delta^{17}O$ = 0.290, 0.648, 1.023, 0.504, 0.324, 0.266, 0.726, 0.358, 0.752, 0.881, 0.575, 0.474 (linearized, all permil).
Classification: Ordinary chondrite (LL3.05), type 3.05 based on ferroan olivine mean Cr_2O_3 content and sigma from Grossman and Brearley (2005), similar values to MET 00526. Oxygen isotopes appear to be relatively heterogeneous and fall within the same range of $\delta^{17}O$ and $\delta^{18}O$ as NWA 7731 (Ziegler et al., LPSC, 2014). Weathering grade (W3). Low shock stage.
Specimens: 53.4 g including a probe mount on deposit at *UNM*, Aziz Habibi holds the main mass.

Northwest Africa 8650 (NWA 8650)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite (LL6)
History: Single, mostly crusted stone weighing 441.1 g was purchased in Erfoud in 2013. David Holden acquired the sample from a meteorite prospector in 2013.
Physical characteristics: Weathered fusion crust covers 99% of the stone. The exterior has an irregular surface perhaps from relict regmapglypts. One surface displays slickensides. The interior is yellowish brown.
Petrography: (A. Love, *App*): Sample is dark orange in color and displays a recrystallized chondritic texture composed of relict slightly elongated chondrules (average diameter 1054 μm, n=22) in a recrystallized groundmass and weathered irregular-shaped grains of FeNi and FeS.
Geochemistry: (A. Love, *App*) Olivine $Fa_{27.8\pm0.6}$, N=12; Low Ca pyroxene $Fs_{22.0\pm0.6}Wo_{2.2\pm0.4}$, N=10.
Classification: Ordinary Chondrite (LL6, S2, W3)
Specimens: 24.43 g and 1 polished thin section are on deposit at *App*

Northwest Africa 8651 (NWA 8651)
Mauritania
Found: April 2014
Classification: Lunar, granulitic troctolitic breccia
Physical characteristics: A single, gray-colored stone lacking fusion crust. Small white clasts are visible in a pale, finer grained matrix.
Petrography: Fragments of plagioclase (300 to 500 μm) set in recrystallized matrix of fine-grained (~20 μm) olivine, pigeonite, and plagioclase. Olivine fragments (~100 μm) are less abundant. Plagioclase 60-65 vol%, olivine 20 vol%. Accessory phases include troilite, schreibersite, and FeNi metal.
Geochemistry: Plagioclase, $An_{95.3\pm1.1}Ab_{4.4\pm0.9}Or_{0.3\pm0.2}$ ($An_{94.4\text{-}97.4}Ab_{2.6\text{-}5.2}Or_{0\text{-}0.6}$, n=7); olivine, $Fa_{25.6\pm0.4}$ ($Fa_{25\text{-}26.2}$, FeO/MnO = 86.1-112.4, n=8); pigeonite, $Fs_{20.7\pm1.4}Wo_{6.7\pm1.8}$ ($Fs_{18\text{-}22.4}Wo_{4.4\text{-}10.7}$, FeO/MnO = 50-55.8, n=10).
Classification: Lunar, granulitic troctolitic breccia

Northwest Africa 8652 (NWA 8652)
Morocco
Found: April 2013
Classification: Primitive achondrite (Acapulcoite)
Physical characteristics: A single stone with well-preserved fusion crust.
Petrography: The specimen is recrystallized into homogeneous polygonal and subhedral grains with a grain size of 30-400 μm. Major phases include olivine, pyroxene and plagioclase.
Geochemistry: Plagioclase, $An_{15.1\pm0.4}Ab_{80.8\pm0.6}$ ($An_{14.4\text{-}15.8}Ab_{80.2\text{-}82.0}$, n=8); olivine, 10.8±0.2 ($Fa_{10.3\text{-}11.2}$, FeO/MnO = 16.7-21, n=10); orthopyroxene $Fs_{10.2\pm0.3}Wo_{1.5\pm0.3}$ ($Fs_{9.7\text{-}10.6}Wo_{1.0\text{-}1.9}$, FeO/MnO = 11.5-12.6, n=9); diopside $Fs_{4.4\pm0.3}Wo_{44.8\pm0.6}$ ($Fs_{3.8\text{-}4.7}Wo_{44.2\text{-}46.2}$, FeO/MnO = 7.5-9.7, n=12).

Northwest Africa 8653 (NWA 8653)
Mauritania
Purchased: Sept 2014
Classification: Martian meteorite (Shergottite)
Physical characteristics: Three pieces of partly fusion-crusted stones were found. Minimal weathering.
Petrography: Microprobe examination of a polished section shows 60% pyroxene, 35% maskelynite, minor merrillite, trace chlorapatite and pyrrhotite. Pyroxenes show core-to-rim zonation. Grain size of mm.
Geochemistry: Two distinct pyroxene compositional trends. Pigeonite, $Fs_{59.7\pm1.4}Wo_{18.3\pm3.6}$ ($Fs_{57.7\text{-}62}Wo_{14.7\text{-}22.9}$, Fe/Mn=37±1, N=7); augite, $Fs_{29.7\pm10.5}Wo_{32.7\pm2.1}$ ($Fs_{21\text{-}51}Wo_{27\text{-}35}$, Fe/Mn=30±4, N=11); maskelynite, $An_{48.0\pm5.1}Ab_{49.9\pm4.6}Or_{2.1\pm0.8}$ ($An_{38.2\text{-}51.9}Ab_{46.1\text{-}59.9}Or_{1.1\text{-}4.1}$, N=11).

Northwest Africa 8654 (NWA 8654)
(Northwest Africa)
Purchased: 2014 May
Classification: Ordinary chondrite (LL6)
History: Purchased by John Higgins in May 2014 from a dealer in Laayoune, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Breccia composed of angular, extensively recrystallized, small clasts in a matrix of related crystal debris. A few remnants of relatively large chondrules are present.
Geochemistry: Olivine ($Fa_{29.9\text{-}30.1}$, N = 3), orthopyroxene ($Fs_{24.9\text{-}25.0}Wo_{1.9\text{-}1.8}$, N = 3), clinopyroxene ($Fs_{10.0\text{-}10.4}Wo_{44.6\text{-}44.2}$).
Classification: Ordinary chondrite (LL6 breccia).
Specimens: 20.1g including one polished thin section at *UWB*. The remaining material is held by J. Higgins.

Northwest Africa 8656 (NWA 8656)
Northwest Africa
Purchased: 2014 Jan
Classification: Martian meteorite (Shergottite)
History: Purchased by Darryl Pitt in January and February 2014 from a group of dealers in Mauritania.
Physical characteristics: Exterior mostly wind-ablated with a few remnant patches of dull black fusion crust. Cut interior surfaces are overall greenish-gray with clear, glassy maskelynite evident, and sporadically-distributed dark glass pockets and veinlets.
Petrography: (A. Irving and S. Kuehner, *UWS*) Diabasic texture. Complexly zoned, prismatically-twinned clinopyroxene (up to 3.5 mm long) and maskelynite laths (up to 1.6 mm long) are the major constitutents along with accessory ilmenite, ulvöspinel, pyrrhotite, merrillite and vesicular glass, plus very minor barite.
Geochemistry: Subcalcic augite ($Fs_{22.6-26.9}Wo_{34.3-26.0}$, FeO/MnO = 28-29, N = 4), ferroan subcalcic augite ($Fs_{40.7-42.6}Wo_{29.4-30.6}$, FeO/MnO = 33-36, N = 2; $Fs_{58.5}Wo_{23.6}$, FeO/MnO = 37), pigeonite ($Fs_{38.1-45.8}Wo_{13.8-15.5}$, FeO/MnO = 31-37, N = 2), ferropigeonite rims ($Fs_{63.2-65.9}Wo_{14.0-17.2}$, FeO/MnO = 35-40, N = 4), plagioclase (maskelynite) ($An_{50.3-56.6}Or_{2.9-1.5}$, N = 4). Oxygen isotopes (K. Ziegler, *UNM*): analyses of four acid-washed subsamples by laser fluorination gave, respectively, $\delta^{17}O$ 2.772, 2.534, 2.623, 2.480; $\delta^{18}O$ 4.692, 4.276, 4.417, 4.075; $\Delta^{17}O$ 0.295, 0.276, 0.291, 0.328 (all values in per mil).
Classification: Martian (shergottite, diabasic). Likely paired with NWA 8657.
Specimens: 41.3g including two polished thin sections at *UWB*. The remaining material is held by *DPitt*.

Northwest Africa 8657 (NWA 8657)
(Northwest Africa)
Purchased: 2014 Sep
Classification: Martian meteorite (Shergottite)
History: Purchased by Eric Twelker from a Moroccan dealer at the Denver Show in September 2014.
Physical characteristics: Wind-ablated exterior with some small patches of dull black fusion crust. Cut interior surfaces are overall greenish-gray with clear, glassy maskelynite evident, and sporadically distributed dark glass pockets and veinlets
Petrography: (A. Irving and S. Kuehner, *UWS*) Diabasic texture. Composed predominantly of complexly zoned, prismatically-twinned clinopyroxene (up to 3.8 mm long) and maskelynite laths (up to 1.8 mm long) with accessory ilmenite, ulvöspinel, pyrrhotite, merrillite, chlorapatite and vesicular glass. Minor components are anorthoclase (containing blades of silica polymorph) and symplectitic intergrowths of ferrosilite+silica.
Geochemistry: Subcalcic augite ($Fs_{20.8-21.8}Wo_{36.4-34.1}$, FeO/MnO = 28-30, N = 2), ferroan subcalcic augite ($Fs_{39.1}Wo_{30.7}$, FeO/MnO = 39), pigeonite ($Fs_{33.7-53.1}Wo_{11.8-11.6}$, FeO/MnO = 38-39, N = 2), ferropigeonite rims ($Fs_{65.1-67.1}Wo_{18.7-14.4}$, FeO/MnO = 37-41, N = 3), ferrosilite ($Fs_{75.4}Wo_{2.0}$, FeO/MnO = 41), plagioclase (maskelynite) ($An_{42.3-45.3}Or_{2.8-2.7}$, N = 2), anorthoclase ($An_{33.4}Or_{15.0}$).
Classification: Martian (shergottite, diabasic). Likely paired with NWA 8656.
Specimens: 20.9 g plus one polished thin section at *UWB*. The remaining material is held by E. Twelker.

Northwest Africa 8668 (NWA 8668)
(Northwest Africa)
Purchased: 2014 Jun
Classification: Lunar meteorite (feldspathic breccia)
History: Purchased by Fabien Kuntz in June 2014 from a dealer in Ouarzazate, Morocco.
Physical characteristics: Dark gray, mottled stone (166.3 g) with some larger light gray clasts and interstital black regions.

Petrography: (A. Irving and S. Kuehner, *UWS*) Relatively fine grained fragmental breccia composed of mineral clasts of anorthite, olivine and pigeonite, with accessory merrillite, Mg-ilmenite, Ti-rich chromite, kamacite, Cr-Mg-Zr-Fe titanate, baddeleyite, and rare troilite and barite.
Geochemistry: Olivine ($Fa_{27.0-29.7}$, FeO/MnO = 81-83, N = 3), pigeonite ($Fs_{22.5-47.8}Wo_{9.8-12.5}$, FeO/MnO = 55-69, N = 3), plagioclase ($An_{91.4-96.0}Or_{1.1-0.3}$, N = 2). Bulk composition (R. Korotev, *WUSL*) INAA of subsamples gave the following mean abundances (in wt.%) FeO 5.7, Na_2O 0.49; (in ppm) Sc 9.4, Ni 460, La 14.5, Sm 6.5, Eu 1.31, Yb 4.4, Lu 0.60, Hf 5.1, Th 2.1.
Classification: Lunar (feldspathic breccia). Close similarities in texture, mineralogy and bulk composition suggest that this specimen is paired with NWA 8455.
Specimens: 20.3 g including one polished endcut at *UWB*; main mass with *Kuntz*.

Northwest Africa 8669 (NWA 8669)
(Northwest Africa)
Purchased: 2014 May
Classification: Ureilite
History: Purchased from a Moroccan dealer by John Higgins in May 2014.
Petrography: (A. Irving and S. Kuehner, *UWS*) Coarse grained assemblage of olivine and pyroxene, both of which have been recrystallized to very fine grained, polygonal aggregates. Olivine grains have fairly thick reduced rims containing fine grained iron metal, which has been heavily oxidized to iron oxyhydroxides during terrestrial weathering.
Geochemistry: Olivine (cores $Fa_{19.0-19.2}$, Cr_2O_3 = 0.7 wt.%, N = 2; rim $Fa_{10.2}$), orthopyroxene ($Fs_{14.2}Wo_{2.8}$), pigeonite ($Fs_{10.4}Wo_{5.0}$).
Classification: Ureilite
Specimens: 21 g including one polished thin section at *UWB*. The remaining material is held by Mr. J. Higgins.

Northwest Africa 8670 (NWA 8670)
(Northwest Africa)
Purchased: 2014 May
Classification: Carbonaceous chondrite (CK6)
History: Purchased by John Higgins in May 2014 from a dealer in Laayoune, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Largely recrystallized with few obvious chondrules and abundant Cr-bearing magnetite with marginal secondary iron hydroxides. Olivine is stained pale brown; other minerals are clinopyroxene, intermediate plagioclase and pentlandite.
Geochemistry: Olivine ($Fa_{34.1-34.8}$, FeO/MnO = 111-116, N = 3), orthopyroxene ($Fs_{9.3-10.3}Wo_{48.0-47.1}$, N = 3).
Classification: Carbonaceous chondrite (CK6).
Specimens: 10.8 g including one polished thin section at *UWB*. The remaining material is held by Mr. J. Higgins.

Northwest Africa 8672 (NWA 8672)
(Northwest Africa)
Purchased: 2014 May
Classification: Carbonaceous chondrite (CK5)
History: Purchased by John Higgins in May 2014 from a dealer in Laayoune.
Petrography: (A. Irving and S. Kuehner, *UWS*) Sparse chondrules are present within a recrystallized matrix containing stained Cr-bearing magnetite. Other minerals are olivine and clinopyroxene with accessory orthopyroxene and intermediate plagioclase.
Geochemistry: Olivine ($Fa_{30.0-30.6}$, FeO/MnO = 119-124, N = 3), clinopyroxene ($Fs_{8.9-10.6}Wo_{45.3-42.6}$, N = 3).
Classification: Carbonaceous chondrite (CK5).

Specimens: 20.1 g including one polished thin section at *UWB*. The remaining material is held by Mr. J. Higgins.

Northwest Africa 8673 (NWA 8673)
(Northwest Africa)
Purchased: 2014 Aug
Classification: Lunar meteorite (feldspathic breccia)
History: Purchased by *GHupé* in August 2014 from a dealer in Erfoud, Morocco.
Physical characteristics: Dark gray stone (263 g) lacking fusion crust. Interior slices exhibit dispersed, small beige clasts and specks of metal.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental breccia composed of mineral clasts of anorthite, pigeonite, augite and olivine with accessory troilite and kamacite, plus sparse mare basalt clasts, in a finer matrix.
Geochemistry: Olivine ($Fa_{23.0\text{-}29.3}$, FeO/MnO = 87-98, N = 3), orthopyroxene ($Fs_{20.6}Wo_{3.5}$, FeO/MnO = 58), pigeonite ($Fs_{28.7\text{-}29.8}Wo_{8.1\text{-}12.0}$, FeO/MnO = 55-62, N = 2), ferroan pigeonite in mare basalt clast ($Fs_{51.4}Wo_{24.1}$, FeO/MnO = 56), plagioclase ($An_{93.9\text{-}97.8}Or_{0.1\text{-}0.2}$, N = 2). Bulk composition (R. Korotev, *WUSL*) INAA of subsamples gave the following mean abundances (in wt.%) FeO 7.3, Na_2O 0.31; (in ppm) Sc 18, Ni 370, La 4.2, Sm 1.9, Eu 0.73, Yb 1.75, Lu 0.24, Hf 1.5, Th 0.82.
Classification: Lunar (feldspathic fragmental breccia).
Specimens: 20.1 g including one polished endcut at *UWB*; main mass with *GHupé*.

Northwest Africa 8674 (NWA 8674)
(Northwest Africa)
Purchased: 2012
Classification: Martian meteorite (basaltic breccia)
History: Purchased by Jay Piatek from Morocco, 2012.
Physical characteristics: Single stone, shiny, black exterior, saw cut reveals breccia with numerous dark and light colored fragmental crystals and polycrystalline lithologies, scattered spherules and spherical objects of variable size and texture, set in a dark gray, fine-grained groundmass, some opaques visible.
Petrography: (A. Santos and C. Agee, *UNM*) Microprobe examination of the polished deposit sample shows a polymict breccia with fragmental feldspar and pyroxene crystals up to 5 mm, although a few are euhedral. Basaltic, trachytic, andesitic, phosphate-rich clasts, iron-oxide-rich spherules, silicate-rich spherules, spherical matrix-rich objects, all set in a very fine-grained ground mass composed of feldspar, pyroxene, oxides, phosphates, zircon, and sulfide. Ubiquitous larger grains of magnetite + maghemite, Cl-apatite, chromite, and ilmenite throughout, two olivine grains found in one igneous clast.
Geochemistry: (A. Santos and C. Agee, *UNM*) Large fragmental feldspars: plagioclase $Ab_{51.4\pm5.2}An_{46.4\pm5.8}Or_{2.2\pm0.6}$, n=21; K-feldspar $Ab_{13.4\pm2.4}An_{2.0\pm0.9}Or_{84.7\pm3.1}$, n=8; albite $Ab_{88.4\pm5.5}An_{4.3\pm2.9}Or_{7.3\pm3.1}$, n=8. Igneous clast feldspars: plagioclase $Ab_{60.5\pm8.3}An_{36.4\pm9.6}Or_{3.1\pm1.5}$, n=206; K-feldspar $Ab_{20.0\pm8.2}An_{3.0\pm2.0}Or_{77.0\pm9.6}$, n=35; albite $Ab_{83.9\pm11.2}An_{7.3\pm6.0}Or_{8.8\pm6.1}$, n=23. Large fragmental pyroxenes: low-Ca pyroxene $Fs_{36.8\pm7.3}Wo_{3.7\pm0.4}$, Fe/Mn=33±3, n=19; pigeonite $Fs_{40.3\pm5.9}Wo_{7.9\pm5.3}$, Fe/Mn=34±3, n=42; augite $Fs_{34.9\pm9.3}Wo_{38.4\pm3.6}$, Fe/Mn=29±5, n=45. Igneous clast pyroxenes: low-Ca pyroxene $Fs_{35.2\pm5.7}Wo_{3.1\pm1.0}$, Fe/Mn=34±6, n=121; pigeonite $Fs_{31.2\pm4.5}Wo_{10.1\pm3.9}$, Fe/Mn=34±4, n=81; augite $Fs_{19.9\pm2.6}Wo_{40.9\pm5.1}$, Fe/Mn=33±6, n=32. Olivine $Fa_{32.5\pm0.7}$, Fe/Mn=57±4, NiO=0.009±0.003 (wt%), n=2.
Classification: Martian (basaltic breccia). Paired with NWA 7034.
Specimens: 2.5 g on deposit at *UNM*, Jay Piatek holds the main mass.

Northwest Africa 8675 (NWA 8675)
(Northwest Africa)
Purchased: 2014 May
Classification: HED achondrite (Eucrite, monomict)
History: Purchased by John Higgins in May 2014 from a dealer in Laayoune, Morocco.

Petrography: (A. Irving and S. Kuehner, *UWS*) Fresh monomict breccia composed of clasts of diabasic eucrite and related crystalline debris. Pyroxene has a clove-brown color in thin section, and shows unusual compositional zoning, with distinct cores of more magnesian low-Ca pyroxene mantled concentrically by much more ferroan low-Ca pyroxene. Grain boundary regions around pyroxene grains contain fayalitic olivine. Other minerals are subcalcic augite, calcic plagioclase, silica polymorph, Al-bearing chromite, ilmenite, troilite, Ni-free metal and rare, tiny grains of zircon.
Geochemistry: Low-Ca pyroxene (cores $Fs_{34.2-35.4}Wo_{8.6-9.1}$, FeO/MnO = 30, N = 2; rims $Fs_{62.5-66.3}Wo_{7.0-3.4}$, FeO/MnO = 31-32, N = 2), fayalite ($Fa_{84.6-85.2}$; FeO/MnO = 42, N = 2), subcalcic augite ($Fs_{8.9-10.6}Wo_{45.3-42.6}$; FeO/MnO = 30-33, N = 2).
Classification: Eucrite (monomict, diabasic).
Specimens: 23.2 g including one polished thin section at *UWB*. The remaining material is held by Mr. J. Higgins.

Northwest Africa 8677 (NWA 8677)
(Northwest Africa)
Purchased: 2014 May
Classification: HED achondrite (Eucrite)
History: Purchased in Morocco by Ali and Mohammed Hmani in May 2014, and said to have been found near Foum El Hisn, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Breccia composed of clasts of recystallized basaltic eucrite (now overprinted by a granulitic texture) and subordinate clasts of gabbroic eucrite in a finer grained matrix of related debris. Both lithologies consist predominantly of compositionally-similar exsolved pigeonite and calcic plagioclase, with accessory silica polymorph, ilmenite and zircon. Plagioclase in the gabbroic clasts exhibits multi-domain structure and undulose extinction. A glassy shock vein was observed.
Geochemistry: Orthopyroxene host ($Fs_{58.3-58.5}Wo_{3.4-3.2}$, FeO/MnO = 31-32, N = 3), clinopyroxene exsolution lamellae ($Fs_{25.3-25.4}Wo_{44.2-44.3}$, FeO/MnO = 30-31, N = 3).
Classification: Eucrite (genomict, shocked).
Specimens: 21.7 g including one polished thick section at *UWB*. The remainder is held by *Hmani*.

Northwest Africa 8678 (NWA 8678)
(Northwest Africa)
Purchased: 2014 May
Classification: Ureilite
History: Purchased by John Higgins in May 2014 from a dealer in Laayoune.
Petrography: (A. Irving and S. Kuehner, *UWS*) Protogranular aggregate of olivine and pigeonite with accessory blades of graphite. Olivine grains have marginal and cross-cutting zones of more magnesian olivine plus fine grained iron metal. Some thin calcite veins are present.
Geochemistry: Olivine (cores $Fa_{20.7-20.8}$, Cr_2O_3 = 0.7 wt.%, N = 2; rim $Fa_{11.9}$), pigeonite ($Fs_{17.2-17.3}Wo_{6.9-7.1}$, N = 2).
Classification: Ureilite.
Specimens: 24.5 g including one polished thin section at *UWB*. The remaining material is held by Mr. J. Higgins.

Northwest Africa 8679 (NWA 8679)
(Northwest Africa)
Purchased: 2014 Sep
Classification: Martian meteorite (Shergottite)
History: Purchased by Dr. David Gregory in September 2014 from a Moroccan dealer at the Denver Show.

Physical characteristics: (I. Nicklin and K. Tait, *ROM*) Ellipsoidal stone (285 g) partly covered by black fusion crust. Wire-saw cutting revealed the fresh, gray interior, which is relatively fine-grained with visible glassy maskelynite.
Petrography: (A. Irving and S. Kuehner, *UWS*) Intersertal texture. Composed predominantly of prismatic grains (up to 1.8 mm long) of clinopyroxene (exhibiting complex, patchy compositional zoning) and lath-shaped grains (up to 1.2 mm long) of maskelynite, with accessory ulvöspinel, ilmenite, pyrrhotite and rare merrillite.
Geochemistry: (S. Kuehner and A. Irving, *UWS*) Subcalcic augite ($Fs_{21.1\text{-}37.2}Wo_{31.6\text{-}33.9}$, FeO/MnO = 28-37, N = 8), pigeonite ($Fs_{29.9\text{-}59.7}Wo_{9.8\text{-}16.9}$, FeO/MnO = 32-38, N = 12), plagioclase (maskelynite) ($An_{47.9\text{-}54.1}Or_{1.5\text{-}1.3}$, N = 3). Oxygen isotopes (K. Ziegler, *UNM*): analyses of four acid-washed subsamples by laser fluorination gave, respectively, $\delta^{17}O$ 2.742, 2.896, 2.845, 2.642; $\delta^{18}O$ 4.680, 4.974, 4.934, 4.562; $\Delta^{17}O$ 0.271, 0.270, 0.240, 0.233 (all values in per mil).
Classification: Martian (shergottite).
Specimens: 23 g plus one polished thin section, one polished thick section and a polished epoxy mount at *ROM*. The remainder is held by *Gregory*.

Northwest Africa 8682 (NWA 8682)
(Northwest Africa)
Purchased: 2014 Aug
Classification: Lunar meteorite (feldspathic breccia)
History: Purchased by Steve Arnold in August 2014 from a dealer in Zagora, Morocco.
Physical characteristics: A batch of identical stones (total weight 82 g), each of which is partly coated by pale tan, clayey soil. Interiors consist of small white to beige clasts in gray matrix.
Petrography: (A. Irving and S. Kuehner, *UWS*) Breccia composed of a variety of mineral clasts and sparse, small mare basalt clasts in a finer grained, vesicular matrix. Minerals are olivine (including unusually forsteritic grains associated with Cr-pleonaste), orthopyroxene, pigeonite, augite, anorthite, intermediate plagioclase, silica polymorph, fayalite, ilmenite, baddeleyite, troilite, kamacite, merrillite, zirconolite, and minor secondary barite and calcite. One unusual clast consists of K-feldspar + silica polymorph with accessory zirconolite and an unknown Th-Zr-Ti mineral.
Geochemistry: Olivine ($Fa_{6.8}$, FeO/MnO = 60; $Fa_{27.4\text{-}50.3}$, FeO/MnO = 91-103, N = 4), orthopyroxene ($Fs_{24.5\text{-}39.8}Wo_{4.2\text{-}4.1}$, FeO/MnO = 57-69, N = 2), subcalcic augite ($Fs_{16.0\text{-}34.4}Wo_{36.4\text{-}36.0}$, FeO/MnO = 45-55, N = 3), fayalite ($Fa_{93.2}$, FeO/MnO = 79), anorthite ($An_{95.1\text{-}96.6}Or_{0.3}$, N = 2), plagioclase ($An_{49.1}Or_{1.1}$; $An_{70.7}Or_{1.8}$).
Classification: Lunar (feldspathic regolithic breccia).
Specimens: 16.4 g including one polished endcut at *UWB*. The remaining material is held by Mr. S. Arnold.

Northwest Africa 8683 (NWA 8683)
(Northwest Africa)
Purchased: 2012
Classification: Ordinary chondrite (L5)
History: Purchased from a meteorite dealer, May 26, 2012.
Physical characteristics: Single stone. Smooth weathered exterior with a few cracks, light brown patina. A saw cut reveals fine-grained metal/sulfide set in a fine-grained dark brown matrix, many faint chondrules visible.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows scattered equilibrated chondrules, plagioclase grains size up to 50 μm. Kamacite, taenite, troilite, and chromite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{25.5\pm0.3}$, Fe/Mn=50±4, n=12; low-Ca pyroxene $Fs_{21.2\pm0.2}Wo_{1.5\pm0.3}$, Fe/Mn=29±2, n=12; plagioclase $Ab_{83.4\pm0.6}$, n=3.
Classification: Ordinary chondrite (L5, W2, S3).
Specimens: 20.6 g including a probe mount on deposit at *UNM*, Bernt Askildsen holds the main mass.

Northwest Africa 8684 (NWA 8684)
(Northwest Africa)
Purchased: 2014
Classification: Ordinary chondrite (L6)
History: Purchased by Aziz Habibi in Morocco, 2014.
Physical characteristics: Single stone with brown-gray sandblasted exterior. A saw cut reveals numerous chondrules, some up to 3 mm, scattered metal/sulfide grains, all set in a dark-gray groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished epoxy mount shows equilibrated chondrules, also poikilitic textures, tiny metal/sulfide blebs throughout, also a few scattered larger metal/sulfide domains up to 500 μm, plagioclase grains up to ~200 μm.
Geochemistry: (C. Agee and N. Muttik, *UNM*) EMPA. Olivine $Fa_{22.9\pm0.5}$, Fe/Mn=46±3, n=5; low-Ca pyroxene $Fs_{18.9\pm1.4}Wo_{4.0}$?1.2, Fe/Mn=29±5, n=8; Oxygen Isotopes, laser fluorination (K. Ziegler, *UNM*), analyses on 3 acid-washed aliquots, 1.2, 1.7, 1.9 mg, gave values $\delta^{17}O$=3.964, 3.943, 3.738, $\delta^{18}O$=5.310, 5.243, 4.907, $\Delta^{17}O$=1.160, 1.175, 1.147 (linearized, all permil).
Classification: Ordinary chondrite (L6). This meteorite has olivine and pyroxene compositions consistent with L6, however oxygen isotopes are consistent with LL (S3, W1).
Specimens: 42 g including microprobe mount on deposit *UNM*, Aziz Habibi holds the main mass.

Northwest Africa 8685 (NWA 8685)
(Northwest Africa)
Purchased: 2014
Classification: Primitive achondrite (Acapulcoite)
History: Purchased by Aziz Habibi in Morocco, 2014.
Physical characteristics: Single stone with dark brown, weathered fusion crust, broken surface reveals dark, very fine, shiny, grains.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished epoxy mount shows of the silicate fraction: ~85% olivine, ~5% pyroxene, ~5% plagioclase. Accessory apatite and troilite. Metal (kamacite and taenite) make up approximately 15% of this meteorite. Olivine and pyroxene grain size ranges from ~50-300 μm.
Geochemistry: (C. Agee and N. Muttik, *UNM*) EMPA. Olivine $Fa_{10.2\pm0.1}$, Fe/Mn=21±1, n=7; low-Ca pyroxene $Fs_{10.0\pm0.1}Wo_{1.7}$?0.1, Fe/Mn=13±0, n=9; plagioclase $Ab_{80.4\pm0.8}An_{14.9\pm0.4}Or_{4.6\pm0.5}$, n=3. Oxygen Isotopes, laser fluorination (K. Ziegler, *UNM*), analyses on 3 acid-washed aliquots, 1.6, 1.7, 2.1 mg, gave values $\delta^{17}O$=0.898, 1.025, 0.759, $\delta^{18}O$=3.841, 3.932, 3.536, $\Delta^{17}O$=-1.130, -1.051, -1.108 (linearized, all permil).
Classification: Primitive Achondrite (Acapulcoite), moderately weathered.
Specimens: 22.5 g including microprobe mount on deposit *UNM*, Aziz Habibi holds the main mass.

Northwest Africa 8686 (NWA 8686)
(Northwest Africa)
Purchased: 2014
Classification: Martian meteorite (Shergottite)
History: Purchased by Aziz Habibi in Morocco, 2014.
Physical characteristics: Single stone with weathered fusion crust, some light colored desert sediment coating, broken surface reveals-fine grained, light gray-green basaltic texture.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished epoxy mount shows ~10% olivine, ~60% pyroxene, ~25% maskelynite, ubiquitous Cr-Ti-Fe oxides and troilite. Pyroxenes and olivines show igneous zonation in BSE images, heavily shocked, grain size ranges from ~50-500 μm.
Geochemistry: (C. Agee and N. Muttik, *UNM*) EMPA. Olivine $Fa_{49.9\pm4.9}$, Fe/Mn=55±1, n=24; pigeonite $Fs_{31.8\pm4.6}Wo_{10.1\pm2.2}$, Fe/Mn=31±2, n=36; augite $Fs_{24.0\pm2.6}Wo_{29.4\pm5.0}$, Fe/Mn=29±2, n=7; maskelynite $Or_{3.1\pm0.5}Ab_{48.5\pm3.0}An_{48.3\pm3.4}$, n=12. Oxygen Isotopes, laser fluorination (K. Ziegler, *UNM*), analyses on 3

acid-washed aliquots, 0.9, 1.3, 1.5 mg, gave values $\delta^{17}O$=2.879, 2.723, 2.511, $\delta^{18}O$=4.984, 4.671, 4.417, $\Delta^{17}O$=0.247, 0.257, 0.179 (linearized, all permil).
Classification: Achondrite (Martian basalt), olivine-phyric shergottite, zoned olivines and pigeonites show significant iron-enrichment trend.
Specimens: 20.4 g including microprobe mount on deposit *UNM,* Aziz Habibi holds the main mass.

Northwest Africa 8687 (NWA 8687)
(Northwest Africa)
Purchased: 2014
Classification: Lunar (troctolite)
History: Purchased by Adam Aaronson in Morocco, 2014.
Physical characteristics: Five pieces, no fusion crust, smooth, light green-tan color, sandblasted exterior, saw cut and polished surface reveals fine-grained, pale green interior with fine shock melt veining.
Petrography: (C. Agee, *UNM*) Microprobe examination of a ~30 × 15 mm, polished, saw-cut surface of the deposit sample, shows a monomict breccia with approximately 70% plagioclase, 25% olivine, 3% orthopyroxene. Primarily fine grained plagioclase, olivine, and orthopyroxene 5-50 μm, scattered larger plagioclase and olivine 200-500 μm, some poikioblastic plagioclase with fine-grained olivines and pyroxenes. Shock melt veins are found throughout. Scatterered Ti-chromite grains up to 100 μm, other accessory phases include FeNi-metal, troilite, ilmenite, and apatite. Minor pigeonite and augite present.
Geochemistry: (C. Agee and N. Muttik, *UNM*). olivine $Fa_{21.7\pm2.2}$, Fe/Mn=88±5, n=24; low-Ca pyroxene $Fs_{19.6\pm2.3}Wo_{3.5\pm1.4}$, Fe/Mn=54±3, n=11; pigeonite $Fs_{16.8}Wo_{19.1}$, Fe/Mn=41, n=1; augite $Fs_{11.3}Wo_{37.2}$, Fe/Mn=41, n=1; plagioclase $An_{96.7\pm0.8}Ab_{3.1\pm0.8}Or_{0.2\pm0.0}$, n=7; Shock melt (20 μm defocused electron beam, proxy for bulk meteorite composition): SiO_2=43.01±0.66, TiO_2=0.14±0.03, Al_2O_3=23.85±2.94, Cr_2O_3=0.15±0.05, MgO=12.11±3.05, FeO=5.20±1.17, MnO=0.06±0.01, CaO=13.48±1.32, NiO=0.02±0.02, Na_2O=0.25±0.05, K_2O=0.03±0.00 (all wt%), Fe/Mn=84±29, Mg#=80.5±0.8, n=5.
Classification: Achondrite (lunar troctolite), low weathering grade, high shock stage, likely paired with NWA 5744.
Specimens: A total of 21.5 g including a probe mount on deposit at *UNM*. *Aaronson* holds the main mass.

Northwest Africa 8688 (NWA 8688)
(Northwest Africa)
Purchased: 2014
Classification: Ordinary chondrite (H6)
History: Purchased by Adam Aaronson in Morocco, 2014.
Physical characteristics: Single stone, no fusion crust, irregular sandblasted exterior, saw cut reveals numerous small metal/sulfide grains and small chondrules set in a dark brown groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination polished mount shows equilibrated, recrystallized chondrules, plagioclase up to 100 μm. Kamacite, taenite, troilite, merrilite, Cl-rich apatite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{19.1\pm0.2}$, Fe/Mn=39±2, n=9; low-Ca pyroxene $Fs_{17.0\pm0.3}Wo_{1.4\pm0.2}$, Fe/Mn=24±1, n=14; plagioclase $An_{12.5\pm0.2}Ab_{82.0\pm0.8}Or_{5.6\pm0.6}$, n=3.
Classification: Ordinary chondrite (H6). W1, S3.
Specimens: A total of 20 g including a probe mount on deposit at *UNM*, *Aaronson* holds the main mass.

Northwest Africa 8689 (NWA 8689)
(Northwest Africa)
Purchased: 2014 June 21
Classification: Ordinary chondrite (L3)
History: The stone was bought by R. Lenssen in June 2014 in Ensisheim, France.
Physical characteristics: A single round crusted stone. Cut surface reveals closely packed, well delineated chondrules in a light brown matrix.

Petrography: Well delineated chondrules set in a partially recrystallized matrix. Chondrule average apparent diameter 730±370 μm (N=39). Chondrule mesostasis is devitrified. Olivines are zoned.
Geochemistry: Olivine $Fa_{23.5\pm7.8}$ ($Fa_{6.4\text{-}32.2}$, PMD 29%, N=15). Low-Ca pyroxene $Fs_{16.8\pm8.9}Wo_{1.1\pm1.2}$ ($Fs_{1.3\text{-}32.3}$, PMD=49, n=19). Cr_2O_3 in ferroan olivine 0.21±0.31 wt% (N=15)
Classification: L group from chondrule size and magnetic susceptibility (interpreted in the light of weathering grade).
Specimens: 32 g at *CEREGE*. Main mass with R. Lenssen

Northwest Africa 8690 (NWA 8690)
Morocco
Purchased: 2014 Apr 22
Classification: HED achondrite (Eucrite, cumulate)
History: The stone was bought by R. Lenssen from a Moroccan meteorite dealer in Agadir in 2014
Physical characteristics: A single stone, almost fully covered by fresh fusion crust, showing regmaglypts. Cut surface reveals a light gray interior with a few cm-sized, slightly lighter clasts
Petrography: Igneous rock with cumulate texture. Typical grain size 500 μm to 1 mm. Main minerals are orthopyroxene with augite exsolution and plagioclase. Sulfide, chromite, and silica polymorphs are present. Rare metal.
Geochemistry: Pyroxenes: orthopyroxene $Fs_{37.3\pm0.3}Wo_{1.9\pm0.1}$ (N=4), augite exsolution $Fs_{13.8\pm0.2}Wo_{45.5\pm0.4}$ (N=2), FeO/MnO=27.1±2.6 (N=6). Plagioclase $An_{89.6}Ab_{10.0}Or_{0.3}$ (N=3). Chromite Cr/(Cr+Al)= 0.83. Magnetic susceptibility log $\chi = 2.95$ (χ in 10^{-9} m^3/kg).
Classification: Eucrite-cm (brecciated)
Specimens: 25 g at *CEREGE*. Main mass with R. Lenssen

Northwest Africa 8692 (NWA 8692)
(Northwest Africa)
Purchased: 2013
Classification: Ordinary chondrite (LL6)
History: 1 crusted stone weighing 361.2 g was found and purchased in Agadir in 2013. David Holden acquired the sample from a meteorite prospector in 2013.
Physical characteristics: Dark brown weathered fusion crust fusion crust covers 99% of the rounded ellipsoidal stone.
Petrography: Description and classification (A. Love, *App*): Sample is light orange in color and displays a chondritic texture composed of large (avg. diameter 1727 μm), relict chondrules (some of which are flattened) in a recrystallized groundmass.
Geochemistry: (A.Love, *App*) Olivine $Fa_{30.1\pm0.7}$, N=12; Low Ca pyroxene $Fs_{23.1\pm0.9}Wo_{2.5\pm0.4}$, N=8.
Classification: Equilibrated ordinary chondrite breccia, LL6, S3, W4
Specimens: 4 slices weighing 20.99 g and polished thin section are currently on deposit at *App*.

Northwest Africa 8693 (NWA 8693)
(Northwest Africa)
Purchased: Feb 2010
Classification: LL3.6/3.7
Petrography: The sample is an LL3 chondrite, probably LL3.6/3.7. Ferroan olivine grains have a mean Cr_2O_3 content of 0.07±0.04 wt.%, indicating that the petrologic type is higher than type 3.2. The absence of glass in the chondrules means that it is higher than type 3.5. The heterogeneous nature of the olivine and low-Ca pyroxene indicates that it is less equilibrated than type 3.8 (for example, Dhajala). Chondrules are large, typically 400 - 1500 μm in diameter, indicative of LL chondrites. Kamacite: The mean kamacite Co value is 2.3±0.2 wt.% (n=14). This is in the LL range and is far from the H or L ranges. The low-Ca pyroxene grains exhibit polycrystalline twinning. The shock stage is S4; the rock exhibits weak mosaicism. Weathering is W1; most metal grains lack oxide rims.

Geochemistry: $Fa_{16.8\pm7.7}$, n=30; $Fs_{8.2\pm7.6}Wo_{0.6\pm0.7}$, n=15.

Northwest Africa 8701 (NWA 8701)
Mali
Purchased: 2014 Sep
Classification: Lunar meteorite (feldspathic breccia)
History: Purchased by Stefan Ralew in September 2014 in Erfoud, Morocco.
Physical characteristics: Single stone (72 g) lacking fusion crust and composed of angular, mostly whitish clasts in a very dark gray matrix with some crosscutting veins of vesicular glass.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fragmental olivine-poor breccia composed of mineral clasts in a finer matrix. Minerals include anorthite, pigeonite, orthopyroxene, augite, ilmenite and merrillite, along with rare olivine, Cr-armalcolite and kamacite.
Geochemistry: Orthopyroxene ($Fs_{27.0}Wo_{2.6}$; FeO/MnO = 70, N = 1), ferroan pigeonite ($Fs_{53.0}Wo_{16.8}$, FeO/MnO = 65, N = 1), pigeonite (core $Fs_{26.5}Wo_{19.8}$; FeO/MnO = 54; rim $Fs_{71.6}Wo_{25.2}$; FeO/MnO = 85), augite ($Fs_{23.4}Wo_{41.0}$, FeO/MnO = 58, N = 1), olivine ($Fa_{30.4}$, FeO/MnO = 92; $Fa_{11.3}$, FeO/MnO = 117, N = 2), plagioclase ($An_{96.1\text{-}96.5}Or_{0.1\text{-}0.5}$, N = 2). Bulk composition (R. Korotev, *WUSL*) INAA of subsamples gave the following mean abundances (in wt.%) FeO 5.2, Na_2O 0.44; (in ppm) Sc 11.8, La 6.0, Sm 2.5, Eu 0.85, Yb 2.3, Lu 0.32, Th 1.7.
Classification: Lunar (feldspathic fragmental breccia). This specimen contains much less olivine than most lunar feldspathic breccias, but some of the olivine that is present is very magnesian.
Specimens: 14.4 g including one polished endcut at *UWB*; main mass with *Ralew*.

Northwest Africa 8703 (NWA 8703)
(Northwest Africa)
Purchased: 2014 Jul
Classification: HED achondrite (Diogenite)
History: Purchased by Stefan Ralew in July 2014 from a dealer in Foum El Hisn, Morocco.
Petrography: (A. Irving and S. Kuehner, *UWS*) Breccia composed of angular grains of orthopyroxene (up to 5.1 mm, with inclusions of chromite) in a matrix dominated by orthopyroxene with accessory clinopyroxene, chromite, troilite and rare Ni-free metal (stained).
Geochemistry: Orthopyroxene ($Fs_{28.4\text{-}28.7}Wo_{3.6\text{-}3.9}$, FeO/MnO = 29, N = 3), clinopyroxene ($Fs_{11.3\text{-}12.0}Wo_{44.6\text{-}42.4}$, FeO/MnO = 20-24, N = 2).
Classification: Diogenite.
Specimens: 20.1 g including one polished thin section at *UWB*; main mass with *Ralew*.

Northwest Africa 8704 (NWA 8704)
(Northwest Africa)
Purchased: 2014 Oct
Classification: HED achondrite (Eucrite)
History: Purchased in Morocco by Stefan Ralew in October 2014.
Physical characteristics: Single stone (503 g) lacking fusion crust with a mottled light gray and black appearance.
Petrography: (A. Irving and S. Kuehner, *UWS*) Very fine grained (grainsize < 0.3 mm) with granuloblastic texture. Minerals are unexsolved orthopyroxene, clinopyroxene, calcic plagioclase, ilmenite, Ti-chromite and troilite.
Geochemistry: Orthopyroxene ($Fs_{59.6\text{-}61.0}Wo_{1.7\text{-}2.3}$, FeO/MnO = 33-35, N = 3), clinopyroxene ($Fs_{25.1\text{-}26.1}Wo_{43.6\text{-}43.1}$, FeO/MnO = 31-35, N = 3).
Classification: Eucrite (granoblastic).
Specimens: 20.2 g in the form of one polished endcut at *UWB*; main mass with *Ralew*.

Northwest Africa 8705 (NWA 8705)

(Northwest Africa)
Purchased: 2014 Oct
Classification: Martian meteorite (Shergottite)

History: Purchased by Stefan Ralew in October 2014 from a dealer in Zagora, Morocco.

Physical characteristics: Very fresh specimen (6.2 g) partly coated by black fusion crust and crosscut by some vesicular glass veins. Mostly very pale green in color with small black opaque grains and evident glassy maskelynite.

Petrography: (A. Irving and S. Kuehner, *UWS*) Porphyritic texture. Anhedral olivine macrocrysts (up to 1.8 mm, some with partial pigeonite rims) are set in a finer grained groundmass of predominantly zoned pigeonite and maskelynite with minor olivine, Mg-bearing merrillite, chromite (with variable Ti contents), Cr-bearing ilmenite and Ni-bearing pyrrhotite.

Geochemistry: Olivine macrocrysts ($Fa_{30.7\text{-}34.7}$, FeO/MnO = 50-56, N = 3), groundmass olivine ($Fa_{38.4}$, FeO/MnO = 54), pigeonite rim on olivine ($Fs_{24.6}Wo_{7.6}$, FeO/MnO = 32), pigeonite ($Fs_{25.3\text{-}33.3}Wo_{8.1\text{-}7.4}$, FeO/MnO = 29-36, N = 3), plagioclase ($An_{59.7\text{-}62.4}Or_{1.5\text{-}1.8}$, N = 3).

Classification: Martian (shergottite, olivine-phyric).

Specimens: 1.3 g including one polished thick section at *UWB*. The remaining material is held by *Ralew*.

Northwest Africa 8706 (NWA 8706)
Morocco
Purchased: Oct. 2012
Classification: Primitive achondrite (Acapulcoite)

History: Purchased by S. Kawakami in Erfoud, Morocco, in Oct. 2012

Physical characteristics: Two weathered stones of 103 g (75 g and 28 g), partly covered with rusted brown fusion crust

Petrography: (T. Mikouchi, *UTok* and S. Kawakami, Gifu University). Equigranular texture, consisting largely of olivine and pyroxene with minor plagioclase, Fe-Ni metal, and troilite. Some large pyroxene oikocrysts contain small olivine chadacrysts. Blocky olivine grains are 0.2 mm in average size. Mineral abundances (vol%) are 39.8 low-Ca pyroxene, 39.5 olivine,7.0 high-Ca pyroxene, 8.0 plagioclase, 5.7 Fe-Ni metal, and <0.1% of apatite

Geochemistry: (T. Mikouhi, *UTok* and S. Kawakami, Gifu University). The silicate compositions cluster tightly near: low-Ca pyroxene, $Fs_{11.8\pm0.3}Wo_{2.2\pm0.2}$ with FeO/MnO=14.1; olivine $Fa_{11.9\pm2.5}$; high-Ca pyroxene, $Fs_{4.9\pm0.4}Wo_{44.4\pm0.6}$; plagioclase, $An_{22.3\pm1.1}Or_{2.6\pm0.2.}$

Classification: Acapulcoite

Specimens: 20.9 g at *UTok*. Main mass with S. Kawakami

Northwest Africa 8708 (NWA 8708)
(Northwest Africa)
Purchased: 2005 Oct 1
Classification: Ordinary chondrite (L6)

History: A single unclassified NWA stone was purchased by Edwin Thompson at the Munich show in October 2005.

Physical characteristics: Prior to cutting (with alcohol), the sample consisted of a completely fusion coated faceted individual forming a roughly triangular shape. Fusion coating in places is black and shiny; elsewhere brownish or covered by patches of caliche, with numerous shrinkage cracks. Cut faces are medium brownish gray, with distinct lighter colored chondrules visible. Surfaces also show abundant irregular bright white objects, as well as numerous pits/pores.

Petrography: (M. Hutson and A. Ruzicka, *Cascadia*) In reflected light, most of the thin section lacks visible metal and contains moderately weathered troilite, with pits filled with a complex mixture of calcium suflate, iron oxide/hydroxide, and a material that is dominantly silica. These secondary minerals appear to be the bright white objects observed in hand specimen. Elaborate layers of weathering product ring the pits. Although most plagioclase feldspar grains are <50 μm across, 100 μm grains are relatively

common and chondrules and grains grade into each other, consistent with a type 6 chondrite. Overall, roughly 60-70% of the opaques in the section have been replaced, indicative of a W3 weathering grade. Olivine grains are abundant and relatively heavily fractured, but have uniform to very slightly undulose extinction. It is estimated that slightly less than 25% of the grains show slight undulose extinction, indicative of an S1 shock stage.
Geochemistry: Olivine ($Fa_{25.1\pm1.1}$, N=15) and low-Ca pyroxene ($Fs_{21.0\pm1.1}Wo_{1.7\pm0.6}$, N=12). Iron values may be slightly high due to extensive FeO weathering veins which cut through all grains, making it difficult to obtain clean analyses.
Classification: Based on texture and mineral chemistry this stone is a fairly heavily weathered L6 chondrite.
Specimens: 39.2 g as well as polished thin section and the corresponding stub are on deposit at *Cascadia*. The main mass is held by Patrick Thompson of ET Meteorites.

Nova 013
United States?
Found: 2006
Classification: Ureilite
History: Possibly found by a mineral collector near Road 53, west of the town Zuni, New Mexico, in 2006.
Petrography: (K. Metzler, *IfP*): Coarse-grained ultramafic rock (grain sizes up to 5 mm) with aligned texture. It consists of about 70 vol% olivine and about 30 vol% pyroxene. Both olivine and pyroxene grains show a mosaicized texture due to strong recrystallization with subgrain sizes on the order of 20 μm. Low-Ni metal (mostly oxidized) occurs along grain boundaries together with troilite and elongated graphite units.
Geochemistry: Olivine cores $Fa_{18.4\pm1.6}$ ($Fa_{15\text{-}20}$, n=16) with reverse zoning towards grain boundaries (Fa_5). Pyroxene cores, $Fs_{11.5\pm1.5.}$

Novato 38.10900°N, 122.61053°W
Marin County, California, United States
Fell: 17 Oct 2012, 19:44 PDT (UT-7)
Classification: Ordinary chondrite (L6)
History: (P. Jenniskens, *SETI*): A bright fireball was widely observed and photographed from locations in and around the San Francisco Bay Area. The fireball passed the video camera fields of the NASA Cameras for Allsky Meteor Surveillance (CAMS) project. The calculated trajectory had an apparent entry speed at 89 km of 14 km/s. The downward projected path calculated by J. Albers predicted 1 g fragments fell near Bodega, 100 g fragments near Novato and 1 kg fragments near Sonoma. The trajectory was published in the San Francisco Chronicle, which led reader L. Webber of Novato to search her yard on Oct. 20. She remembered hearing the sound of an object hitting the roof of her garage that Wednesday night. At the side of the garage, she found a dense 61.9 g stone (numbered as stone N01), which was strongly attracted to a magnet. During investigation of this potential find, neighbor L. Rivera identified an impact divot on the roof of the Webber residence, shaped and positioned consistent with a meteorite from this fall hitting the roof and landing at the recovery site. A second 65.8 g stone was found in Novato (N02) by Brien Cook on Oct. 22, initially thrown out, but based on the Webber find, retrieved, cut, and recognized as a meteorite on Oct. 24. As of Oct. 30, 2012, four confirmed meteorites had been recovered with a total mass of 314 g. A tally is maintained at the Novato Meteorite Consortium website.
Physical characteristics: The stones are difficult to differentiate from terrestrial rocks. Even the freshly fallen meteorites have a thin brownish and irregular layered fusion crust and irregular dark and light interior. The recovered stones have a rounded shape. They are dense and respond to magnets.
Petrography: (A. Rubin, *UCLA*): A slice of stone N02 contains ~55 vol.% chondritic clasts and ~45 vol.% shock-darkened material. The fragment examined for petrography was from stone N01. Silicates have weak mosaic extinction. Plagioclase grains range from 50-200 μm. There are numerous troilite veins

traversing large portions of the rock (silicate darkening). Chromite grains are fractured; many have troilite veins transecting them. There are a few chromite-plagioclase assemblages. One 12 × 20 μm grain of metallic Cu was found. Some of the troilite grains are polycrystalline. There are some patches where plagioclase has been melted and mobilized. There is localized melting around some of the metal and sulfide grains. There are a few silicate shock melt veins replete with small metal and sulfide blebs. The chondritic clasts have far fewer veins and contain moderately large, highly recrystallized barred olivine and porphyritic olivine-pyroxene chondrules that are well integrated into the matrix. These chondritic clasts are much lighter-colored in transmitted light than the matrix of the rock.
Geochemistry: Olivine $Fa_{24.1\pm0.4}$ (n=21); low-Ca pyx $Fs_{20.7\pm0.5}Wo_{1.5\pm0.2}$ (n=22); Ca-pyx $Fs_{8.0\pm0.7}Wo_{44.7\pm0.8}$ (n=5). The chromite grains (n=11) are somewhat richer in Al_2O_3 (6.4 wt.%) and MgO (3.4 wt.%) than unshocked ordinary-chondrite chromite, but are more characteristic of shocked and shock-melted chromite grains. Most of the metallic Fe-Ni is taenite with 77.7±5.0 wt.% Fe, 21.4±5.4 wt.% Ni and 0.51±0.18 wt.% Co (n=18). Only one kamacite grain was identified (7.2 wt.% Ni and 1.1 wt.% Co). The Co content of this single grain is intermediate between the ranges for L (0.70-0.95 wt.% Co) and LL (1.42-37.0 wt.% Co) chondrites, but is closer to L. Plagioclase: $Ab_{86.0\pm0.6}Or_{7.0\pm0.4}$ (n=14) is richer in alkalis than typical ordinary-chondrite plagioclase, and probably reflects shock melting. Troilite (n=10) is essentially pure FeS; it contains no detectable Cr, Co or Ni.
Classification: L6 breccia, unweathered W0, and moderately shocked S4.
Specimens: The Webber and Rivera families made 56 g of stone N01 available for study in the Novato meteorite consortium. 20 g of stone N01 is currently preserved at *UCLA*, unless material from other stones eventually replaces this material as part of the type specimen.

Oued Awlitis 001 (OA 001) 25.954°N, 12.493°W
Western Sahara
Found: 2014 Jan 15
Classification: Lunar meteorite
History: (A. Irving and M. Aid) In January 2014 a group of eight people traveling in two cars were returning northward after an unsuccessful meteorite hunting trip to southern Morocco, when they stopped near Oued Awlitis to cook dinner by the roadside. During a search for firewood, Mr. Zaid Oussaid found a buried piece of dead tree trunk, but he could not excavate it by hand. With the use of a pickaxe he was able to pull the wood out of the ground, but he then noticed beside it in the cavity a flat ellipsoidal, brownish gray rock coated by glossy translucent crust with anastomozing wrinkle ridges. Upon returning to his home (at Dwar Ait Gazo, 30 km west of Tagounite), Mr. Oussaid showed the 382 g specimen to Mr. Mohamed Aid, who organized a return trip to the find site on February 21, 2014, and after a search of the area an additional 50.5 g piece which fits exactly onto the main stone was found about 50 m away.
Physical characteristics: (A. Wittmann, *WUSL*, and A. Irving, *UWS*) A very fresh specimen (total weight 432.5 g, approximate dimensions 7.7 × 6.6 × 3.5 cm) with a pale yellow-brown, translucent fusion crust exhibiting a darker network of anastomozing wrinkle ridges on the surface. Small, yellow-white components are visible through the fusion crust, and chipped parts of the stone reveal a whitish-gray interior. A cut sample surface exhibits a fine-grained, wavy texture of gray mineral phases in a groundmass consisting of intergrown domains of anhedral, grayish-white minerals. Rare rounded, up to 2 mm, white domains occur that appear homogenous, and represent possible vesicle fills of secondary minerals.
Petrography: (A. Wittmann, *WUSL*; A. Irving, *UWS*) Crystallized, clast-rich melt rock with a poikilitic texture of intensely fractured olivine and pyroxene crystals that fill interstitial spaces between 5 to 50 μm, euhedral plagioclase phenocrysts. This crystallized melt groundmass envelops partly assimilated, strongly undulous, <1 mm plagioclase clasts that are distinguished by irregular and sub-planar fractures in lensoid, relict domains. In places, these plagioclase clasts contain 10 μm, euhedral domains of silica polymorph and commonly contain planar deformation features. Up to 10 μm kamacite and taenite crystals, and up to 70 μm troilite crystals that are in places intergrown, occur in the plagioclase clasts and in the poikilitic groundmass. Euhedral, <10 μm grains of ilmenite and Ti-Fe rich spinel are in some regions intergrown

and contain <<1 μm domains of FeNi metal. Small shock melt pockets occur as <0.1 mm pods, or as <10 μm thick veins that offset the crystal fabric. Light brown, vesicular fusion crust (up to 150 μm thick on one side of the studied thin section and 0.5 mm thick on the other side) is composed of glass containing sparse whisker phenocrysts. A single ~10 μm wide, irregular fracture is filled with brown clay minerals, but no other terrestrial alteration phases were observed in the thin section.
Geochemistry: (A. Wittmann, P. Carpenter and R. Korotev, *WUSL*; S. Kuehner, *UWS*) Plagioclase phenocrysts in crystallized melt groundmass, $An_{95–97}Or_{0–0.2}$, n=13; plagioclase in relict clasts, $An_{88–97}Or_{0–0.3}$, n=18; olivine, $Fa_{30–44}$, molar Fe/Mn=81–151, n=13; pigeonite, $Fs_{26–40}Wo_{6–19}$, molar Fe/Mn=45–74, n=10; subcalcic augite, $Fs_{20–24}Wo_{25–34}$, molar Fe/Mn=41–61, n=5; spinel, (Mg0.07–0.11Mn0.01Fe2+0.87–0.92) (Fe3+0.73-0.88Al0.13–0.22 Si0.01-0.05Ti0.65–0.8Cr0.16–0.34), n=5; ilmenite, 2.1 wt% MgO, n=2; troilite, 0.08–0.1 wt% Ni, n=3; kamacite, 6.8–7.6 wt% Ni, 0.8–0.9 wt% Co, n=3; taenite, 11.5–24.1 wt% Ni, 0.7–1.2 wt% Co, n=5.
Classification: Lunar (anorthositic melt rock).
Specimens: 20.1 g including one polished thin section at *UWB*. The remaining material is held by M. Aid.

Paposo 017 25°0’ S, 70°28’ W
Antofagasta, Chile
Found: 2010
Classification: Carbonaceous chondrite (CR2)
History: Found March 6, 2010, by Eric Christensen while searching for meteorites. Two pieces that fit together (238.6 g and 113.1 g) were found ~1 m apart.
Physical characteristics: Exterior with patches of frothy, bubbly flat-black fusion crust. Some cracks present. Sawn surface shows many large (to 3 mm though most 0.5 to 1 mm), well-defined chondrules (some stained red) in a fine-grained dark matrix. Sparsely distributed white calcium-aluminum-rich inclusions (to 1 mm) visible in a four cm2 slice. Metal weathered in patches; where present, is abundant in matrix and decorating chondrule rims. Stone moderately weathered.
Petrography: Thin section shows packed rounded to irregularly shaped chondrules separated by opaque matrix. Fine-grained sulfide and metal abundant in matrix. Metal ~60% weathered to iron oxides. Wide variety of chondrule types present including PO, POP, PP, RP, and BO, including many with igneous rims, for example, BO core with POP rim and large single-crystal olivine grain with POP rim. Low-Ca pyroxene with polysynthetic twinning common in some PP chondrules. Olivine shows planar fractures and undulatory extinction consistent with moderate shock.
Geochemistry: (P. Castleberry, D. Van Hoy and L. Garvie, *ASU*) Chondrule olivines show wide Fa range from $Fa_{0.5-55.5}$, n=38, with Cr_2O_3 to 1.1 wt%. Forsteritic olivines $Fa_{1.2±0.7}$, CaO=0.39±0.07 wt%, n=6. Low-Ca pyroxene has a wide Fs range from $Fs_{2.9-28.7}$, mean $Fs_{16.1±11.4}Wo_{1.3±1.3}$, Fe/Mn=19.7±7.8, Al_2O_3=0.4±0.3, n=18; pigeonite $Fs_{13.4}Wo_{15.3}$, n=1; augite $Fs_{15.4}Wo_{31.1}$, Cr_2O_3=1.6 wt%, n=1. Plagioclase $Or_{8.0}Ab_{12.9}An_{79.2}$, n=1.
Classification: Carbonaceous chondrite (CR2). Low microprobe totals from the matrix is consistent with type 2.
Specimens: 32.9 g and one polished thin section at *ASU*.

Qatar 002 25.299°N, 51.041°E
Al Jumayliyah, Qatar
Found: 2011 Oct
Classification: Ordinary chondrite (L5)
History: Found by F. Kuntz in October 2011 while exploring in the desert of Qatar.
Petrography: (A. Irving and S. Kuehner, *UWS*) Sparse chondrules. Olivine, orthopyroxene, augite, sodic plagioclase, chromite, troilite and altered kamacite.
Geochemistry: Olivine ($Fa_{25.3-25.4}$), orthopyroxene ($Fs_{21.2-21.3}Wo_{1.6-0.9}$), augite ($Fs_{8.4-12.1}Wo_{44.1-42.4}$).
Classification: Ordinary chondrite (L5).

Specimens: 20.1 g including one polished thin section at *PSF*; remainder with *Kuntz*.

Qulumat al Harsha 003 (QaH 003) 19°26.557'N, 51°02.337'E
Ash Sharqiyah, Saudi Arabia
Found: 14 Feb 2013
Classification: HED achondrite (Eucrite)
History: Found by Nasir Al Jahdli during search for meteorites on small patch of desert soil between dunes on February 14, 2013.
Physical characteristics: Single rounded complete individual of 3.85 g, no fusion crust.
Petrography: Metamorphosed breccia, consisting of recrystallized plagioclase, pyroxene displaying shock and/or exsolution lamellae, ilmenite, chromite and sparse troilite. Clast size up to 3 mm with 0.5-1 mm sized mineral grains.
Geochemistry: (N. Greber, *Bern*) Orthopyroxene compositions are $Fs_{58.3\text{-}62.4}Wo_{1.7\text{-}3.4}$, median $Fs_{61.4}Wo_{1.9}$ (n=17), clinopyroxene compositions are $Fs_{26.6\text{-}55.0}Wo_{12.3\text{-}44.3}$, median $Fs_{43.6}Wo_{25.1}$ (n=17), plagioclase compositions are $An_{81.2\text{-}95.7}Or_{0.1\text{-}4.8}$, median $An_{89.8}Or_{0.4}$ (n=25). Bulk analysis of cut surface by XRF (wt%): Fe 15.54, Mn 0.46 (Fe/Mn 33.9).
Classification: Based on petrography and geochemistry, the meteorite is a brecciated eucrite.
Specimens: 0.85 g and one polished thin section at *MHNGE*. Remaining material at *SGS*.

Ramlat Fasad 006 19°2.163'N, 53°19.205'E
Zufar, Oman
Found: 27 Jan 2012
Classification: Carbonaceous chondrite (CO3)
History: Found by Salim Al-Shahri, Urs Eggenberger, Martin Fisch, Nicolas Greber and Florian Zurfluh during a search for meteorites on Jan. 27, 2012.
Physical characteristics: Two dark brown fragments with a total of 16.85 g, no fusion crust preserved.
Petrography: (E. Gnos, *MHNGE* and B. Hofmann, *NMBE*) The meteorite consists of up to 0.6 mm sized chondrules (average size 0.22±0.11 mm n=128) constituting appprox. 65 vol%, and dark matrix (approx. 35 vol%). Abundant troilite shows little oxidation, iron metal is partially oxidized.
Geochemistry: (N. Greber, *Bern*) Olivine compositions are $Fa_{5.7\text{-}50.4}$, median $Fa_{37.8}$ (n=40), pyroxene compositions are $Fs_{1.1\text{-}41.9}Wo_{1.0\text{-}44.3}$, median $Fs_{4.0}Wo_{1.9}$ (n=13). Oxygen isotopes: (R. Greenwood, *OU*) gave $\delta^{18}O$=0.38, $\delta^{17}O$=-3.93, $\Delta^{17}O$= -4.13 (all per mil).
Classification: CO3 based on petrography, matrix abundance, mean chondrule size and oxygen isotopes.
Specimens: All at *NMBE*.

Santo Antônio do Descoberto 16°6'38"S, 48°18'58"W
Goias, Brazil
Found: 2011 Dec 28
Classification: Iron meteorite (IIAB)
History: A mass weighing 52.15 kg was found by some farm workers while they were leveling the soil. The meteorite was buried about 60 cm below the surface.
Physical characteristics: A pear shape weathered mass of about 20 × 30 × 55 cm.
Petrography: M.E. Zucolotto, *Rio*: Etched sections show a normal hexahedrite structure with some sets of Neumann lines and areas of bright and frosty kamacite. The rhabdite precipitates are small and very numerous on the frosty areas, but larger and idiomorphic on the bright sides. Also common are long plate-shaped rhabdites in directions probably related to the {221} planes of kamacite. Sulfides are common as irregular troilite, daubreelite and metal mosaic aggregates and nodules; in some places full shock melting has occurred, and troilite has dissolved partly into adjacent metal and invaded the kamacite matrix.
Geochemistry: 5.76% Ni; 0.46% Co; 500 ppm Cr; 138 ppm Cu; 456 ppm Re; 4.61 As; 60.1 ppm Ga; 6.03 ppm Ir; 0.594 ppm Au (INAA, J.T. Wasson, *UCLA*).
Classification: Iron, IIAB (J.T. Wasson, *UCLA*)

Specimens: 125 g *Rio*

Sapopema 23°52’32"S, 50°33’12"W
Parana, Brazil
Found: 2010
Classification: Iron meteorite (IVA)
History: The iron was found in a eucalyptus plantation by a teenager and his father. As the teenager collected rocks and minerals, the meteorite caught his attention for being very heavy. His cousin suspected that it could be a meteorite because she had watched a Brazilian TV program which discussed how to recognize meteorites.
Physical characteristics: A semi-regular weathered mass of about 20 × 15 × 12 cm, weighing about 13 kg.
Petrography: (M.E. Zucolotto, *Rio*) The etched sections exhibit a fine Widmanstätten structure of straight, long (~10-20 mm) kamacite lamellae with a width of (0.30±0.05 mm). Taenite and plessite cover about 40% by area.
Geochemistry: (J.T. Wasson, *UCLA*) INAA: 7.96% Ni; 0.39% Co; 1.95 ppm Ga; 2.34 ppm Ir; 1.047 ppm Au. Composition of Major phases (I.P. Ludka, *IGEO-UFRJ*) WDS/EPMA: kamacite (Ni=8.3±0.4; Co=0.54; N=20), taenite (Ni=29.4±1.4; Co=0.18; N=16), all wt%.
Classification: This IVA iron is compositionally unresolvable from two other Brazilian IVA irons, Para de Minas and Cratheus (1931). The discovery location appears to be well documented, and is far from Para de Minas and Cratheus (J. Wasson *UCLA*).
Specimens: Main mass with finder, 32 g *Rio*.

Sayh al Uhaymir 528 (SaU 528) 20°31.376’N, 56°31.260’E
Al Wusta, Oman
Found: 2009 Sep 30
Classification: Ordinary chondrite (H, melt rock)
History: Numerous small individuals lacking any fusion crust were found during a field trip to the Arabian desert, Oman.
Petrography: Most regions of the meteorite appear to be molten and recrystallized and contain small FeNi metal and sulfide droplets; only few unmelted chondrule fragments are present. Degree of shock in chondrule fragments is S4.
Geochemistry: Mineral composition in chondrule fragments: olivine Fa_{16} (N=16), low-Ca pyroxene: $Fs_{14.4}Wo_{1.2}$ (N=12)

Sayh al Uhaymir 565 (SaU 565) 20.552°N, 56.692°E
Al Wusta, Oman
Found: 2011 Mar
Classification: Ordinary chondrite (LL3)
History: Found by an anonymous prospector in March 2011.
Petrography: (A. Irving and S. Kuehner, *UWS*) Fairly large chondrules (0.5-1.9 mm) in a stained matrix.
Geochemistry: Olivine ($Fa_{6.1\text{-}45.3}$), orthopyroxene ($Fs_{10.8}Wo_{2.5}$; $Fs_{19.9}Wo_{0.6}$), clinopyroxene ($Fs_{6.5\text{-}6.6}Wo_{46.9\text{-}46.3}$). Oxygen isotopes (K. Ziegler, *UNM*) Analyses of acid-washed subsamples by laser fluorination gave, respectively $\delta^{17}O$ 3.770, 3.671; $\delta^{18}O$ 4.950, 4.941; $\Delta^{17}O$ 1.156, 1.062 per mil.
Classification: Ordinary chondrite (LL3).
Specimens: Type specimen plus one polished thin section at *PSF*; main mass with anonymous collector.

Sayh al Uhaymir 582 (SaU 582) 20º17’55.8"N, 56º44’20.7"E
Al Wusta, Oman
Found: 2010 Mar 12
Classification: Ordinary chondrite (L5)

History: Robert Ward found a collection of large individual stones and some small fragments within a small circumference on the desert floor.
Physical characteristics: Many stones and fragments, largest individual is 700 g, weathered dark exterior, saw cut reveals scattered fine-grained metal set in a dark brown groundmass.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows a numerous equilibrated chondrules, ubiquitous kamacite, oxidized iron and oxide veinlets, troilite, and fine-grained plagioclase.
Geochemistry: (C. Agee, *UNM*) EMPA. Olivine $Fa_{25.8\pm0.5}$, Fe/Mn=52±3, n=12, low Ca-pyroxene $Fs_{21.7\pm0.7}Wo_{2.1\pm1.2}$, Fe/Mn=31±1, n=7.
Classification: Ordinary chondrite (L5), weathering grade (W2).
Specimens: 21.8 g including a probe mount on deposit at *UNM*, D. Gheesling holds 7 kg.

Sayh al Uhaymir 586 (SaU 586) 20°9.984'N, 56°32.7583'E
Al Wusta, Oman
Found: 2011 Jan
Classification: Ordinary chondrite (H4-5)
Petrography: (C. Herd, *UAb*) Petrographic microscope examination of thin section revealed two distinct textures of different petrologic type: one with well-defined chondrules and another with less well-defined chondrules and coarser plagioclase. A type 4-5 breccia.
Geochemistry: Electron microprobe data from type 5 textural area.
Specimens: 24.4 g type specimen on deposit at *UAb*. Main mass, including thin section, at *SQU*.

Sayh al Uhaymir 586 (SaU 586) 20°9.984'N, 56°32.7583'E
Al Wusta, Oman
Found: 2011 Jan
Classification: Ordinary chondrite (H4-5)
Petrography: (C. Herd, *UAb*) Petrographic microscope examination of thin section revealed two distinct textures of different petrologic type: one with well-defined chondrules and another with less well-defined chondrules and coarser plagioclase. A type 4-5 breccia.
Geochemistry: Electron microprobe data from type 5 textural area.
Specimens: 24.4 g type specimen on deposit at *UAb*. Main mass, including thin section, at *SQU*.

Tartak 54°5'8.23"N, 23°5'2.24"E
Suwalki, Poland
Found: 2008
Classification: Iron meteorite (IIIAB)
History: The metorite was found during a search for military armaments from WW II.
Petrography: This structural description mainly based on a heavily etched slab with a total area (on opposite sides) of 40 cm^2. Neumann lines in different orientations are densely spaced in the kamacite. Small FeS inclusions are common, typically 3×1 mm. Kamacite shows evidence of impact-associated reheating. Swathing kamacite around FeS has recrystallized to small (mm-size) grains. Sample is moderately weathered near the surface; one dark oxide grain has dimensions of 5×8 mm. No heat-altered zone has been recognized. Examination of a small polished section showed tiny rhabdites to be common with some coarser schreibersite (typically 20×400 μm). Troilite grains commonly show daubreelite lamellae. Cu metal has been noted as an inclusion near troilite. Cohenite was found as a rim on a μm-size troilite-daubreelite nodule.
Geochemistry: Composition: Co, 5.01 mg/g; Ni, 73.7 mg/g; Ga, 19.8 μg/g; Ge, <100 μg/g; As, 9.2 μg/g; Ir, 4.0 μg/g; and Au, 0.606 μg/g. The meteorite plots in IIIAB fields for all elements. It differs in detailed composition from all European IIIAB irons but is similar to Ssyromolotovo, which was recovered in Siberia to the east. Although Tartak contains cohenite, the compositional data do not plot in IIIE Co-Au or Ga-Au fields.

Tazizilet 17°38.628’N, 9°26.485’E
Agadez, Niger
Found: 2006
Classification: Ordinary chondrite (L5)
History: Acquired by Jen Winter and her late husband from an eclipse tour guide in March 2006. The guide traveled with them in November 2006 to the location where the stone was found, but a search for additional pieces at the location was unsuccessful. The guide referenced the find location based on a landmark tree position. The area where the stone was found was in an open, flat plain with many other small rock types.
Physical characteristics: Complete individual, some weathered fusion crust, axe-head shaped stone. Saw cut reveals numerous chondrules in a brown-green, medium-grained groundmass, metal/sulfide scattered throughout, also some metal veinlets.
Petrography: (C. Agee, *UNM*) Microprobe examination of a polished mount shows many equilibrated chondrules, most with fine-grained plagioclase. Ubiquitous kamacite, taenite, troilite, and chromite.
Geochemistry: (C. Agee and N. Muttik, *UNM*) EMPA. Olivine $Fa_{25.1\pm0.7}$, Fe/Mn=49±4, n=9; low Ca-pyroxene $Fs_{21.3\pm1.0}Wo_{1.5\pm0.3}$, Fe/Mn=30±2, n=7.
Classification: Ordinary Chondrite (L5), weathering grade W1, shock stage S3.
Specimens: 32.26 g including a probe mount on deposit at *UNM*, Jen Winter hold the main mass.

Tequisquiapan 20°30’N, 99°58’W
Queretaro de Arteaga, Mexico
Found: 2012
Classification: IAB complex
History: In spring 2012, Roberto Gonzalez tripped over a small dense rock. He collected the sample and gave the material to a geography teacher, Elvia Muñiz. In February 2013, she donated the meteorite to *CU*.
Physical characteristics: This meteorite is a single mass of 2311.9 g, with a prismatic shape (9.3 × 7.4 × 7.85 cm). The surface of the meteorite shows minor oxidation, and poorly developed regmaglypts.
Petrography: (K. Cervantes and E. Gomez, *CU*) This meteorite is a medium octahedrite; kamacite has an average bandwidth of 0.77±0.15 mm. Plessite fields and taenite occupy 33% of the area of the section, while phosphides occupy less than 0.5%. The most common accessory mineral is schreibersite, with habits ranging from rhabdites to irregular shapes. Carbides present; weak Neumann bands.
Geochemistry: (E. Hernández-Álvarez and O. Morton-Bermea, Instituto de Geofísica-*CU*) ICP-MS. Composition of 0.4 g of shavings and small fragments: Ni 64619; Ge 105.7; Ga 44.42; Ir 1.43; Mo 121.37; Rh 0.68; Pd 3.69; Sn 11.55; Co 3897; Cr 138.8; Pt 1.2; In 0.099; Re 0.088 (all ppm).
Classification: Iron, medium octahedrite. Based on Ge/Ga=2.6, the meteorite is IAB complex; see Wasson and Kallemeyn (2002). Low weathering.
Specimens: Main mass of 2311.9 g including a polished section (3.8 g) are held by *CU*.

Thiel Mountains 07003 (TIL 07003) 85°09.43’S, 94°36.39’W
Antarctica
Found: 2007 Dec 24
Classification: Carbonaceous chondrite (CV3)
Physical characteristics: The stone is almost completely covered with dark-black fusion crust; the interior is relatively fresh.
Petrography: The rock consists of chondrules (~64 vol.%), AOAs (~2 vol.%), one large CAI (~3 vol.%) and fine grained matrix (~ 31 vol%). Chondrules, AOAs the CAI are elongated and aligned in the same direction and numerous micro-faults are present. Opaque minerals are Fe-Ni metal and troilite; no magnetite was found in the section. The petrographic characteristics are very similar to TIL 07007. Chondrules are mostly type-I PO or POP chondrules and many of them were surrounded by coarse-

grained igneous rims. Typical sizes of the chondrules are 0.89 mm × 0.58 mm. One CAI (2.78 mm × 0.94 mm) in the section mostly consist of melilite, spinel and Al-diopside. AOAs mainly consist of olivine (Fa content <2.6 %) with minor amount of melilite and Al-Ti-diopside.
Geochemistry: Olivine: $Fa_{0.3-5.7}$ (av. $Fa_{1.1}$). Low-Ca pyroxene: $Fs_{0.6-3.1}Wo_{0.3-3.3}$ (av. $Fs_{1.2}Wo_{1.5}$). High-Ca pyroxene: $Fs_{0.3}Wo_{47.4.}$ Melilite in CAI: Ak content from 9.8 to 20.5.

Thiel Mountains 07014 (TIL 07014) 85°21.02'S, 87°10.24'W
Antarctica
Found: 2007 Jan 2
Classification: HED achondrite (Eucrite)
Physical characteristics: The rock is completely covered with dark shiny fusion crust. The interior is very fresh and almost free of terrestrial weathering.
Petrography: The rock mostly consists of pyroxene (~53 vol.%) and plagioclase (~44 vol.%) with minor amounts of silica (~2.7 vol.%). Trace amounts of ilmenite, Ca-phosphate and troilite are also found. The rock is a breccia having clasts of basaltic and cumulate textures.
Geochemistry: Mineral compositions: low-Ca pyroxene $En_{40.4}Wo_{3.6}$, high-Ca pyroxene $En_{32.2}Wo_{35.5}$ and plagioclase $An_{87.3}$ in the gabbroic clasts while low-Ca pyroxene $En_{37.9}Wo_{5.7}$, high-Ca pyroxene $En_{31.9}Wo_{36.7}$ and plagioclase $An_{89.2}$ in the basaltic clasts. Oxygen isotopic composition: $\delta^{18}O = 5.27‰$, $\delta^{17}O = 2.51‰$ and $\Delta^{17}O = 0.23‰$ measured at *UCLA*. CI normalized REE abundance pattern (measured by ICP at *KOPRI*) of the gabbroic clast is similar to, e.g., Nuevo Laredo that is nearly flat with negative Eu anomaly, while that of the basaltic clast is similar to those of basaltic eucrites., i.e., relatively depleted in LREE with positive Eu anomaly.

Thiel Mountains 07016 (TIL 07016) 85°20.24'S, 87°56.69'W
Antarctica
Found: 2007 Jan 4
Classification: Pallasite
Petrography: The rock consists of nearly equal proportion of metal (kamacite and taenite) and rounded olivine grains with iron sulfide, schreibersite and chromite as minor minerals.
Geochemistry: Siderophiles in metal measured by INAA (*UCLA*, J.T. Wasson): Ni 124 mg/g, Ga 20 µg/g, Ge 46 µg/g, As 23 µg/g, Ir 0.19 µg/g and Au 2.6 µg/g. Olivine: $Fa_{12.1.}$ Oxygen isotopic composition: $\delta^{18}O = 3.31‰$, $\delta^{17}O = 1.57‰$ and $\Delta^{17}O = -0.16‰$ measured at *UCLA*

Three Little Hills 32.078357°N, 107.504152°W
New Mexico, United States
Found: late 1980s
Classification: Ordinary chondrite (H5)
History: Found in the late 1980s by a local rancher while hunting for pot shards, and acquired by Paul Sipiera in July 1994. The find location is approximately 30 km SE of Deming, and 8 km ESE of Three Little Hills.
Physical characteristics: Complete oriented stone with black-brown fusion crust.
Petrography: Sparse chondrules and abundant stained metal.
Geochemistry: Olivine ($Fa_{18.9-19.3}$), orthopyroxene ($Fa_{16.5-16.6}Wo_{1.3-1.4}$), subcalcic augite ($Fs_{10.0}Wo_{35.4}$), augite ($Fs_{6.5}Wo_{44.7}$).
Classification: Ordinary chondrite (H5). This specimen is very similar in composition, texture and degree of weathering to Deming, which was found about 35 km to the west, and it is possible that both stones are from the same ancient fall. The Columbus, New Mexico, meteorite was found in relatively close proximity to this meteorite.
Specimens: The whole cut stone plus a polished thin section prepared from it are at *PSF*.

Tinajdad 31°36'33.2"N, 5°11'38.7"W

Centre-South, Morocco
Fell: 2014 Sept 9
Classification: Ordinary chondrite (H5)

History: On Tuesday, 9 Sept 2014, around 7:30 pm local time, a fireball was seen and heard in the southern part of Morocco by many people. The observation was quickly reported (during the 77th Meteoritical Society meeting in Casablanca) and hunters began searching in the field. One meteorite weighing 1860 g (broken into 1 big piece and a few small ones) was found the day after the fall by Aicha, the daughter of a nomad named Zaid, about 100 m from their tent. The family was in the tent at sunset and heard a noise like thunder and one boom. In the morning, they tried to locate whatever produced the noise and Aicha found a black rock broken into several pieces that was not there the day before. She collected the rock and gave it to her father. After a few days, he showed it to people from Goulmima during the weekly souk (market), who recognized it as a meteorite. The fall occurred about 16 km WNW of the city of Tinajdad on a plateau called Amirdoul N-Dar Ighourane close to a track. H. Chennaoui-Aoudjehane, M. Aoudjehane, and Y. Oulmaleh organized a field party on 20 September to determine the coordinates of the fall. The testimonies of many eyewitnesses from Alnif, Tineghir, Tinajdad, Todra Gorges, Azag N-Ouchchan and other villages point to a yellow colored, bright object moving horizontally for about 2 s and a sound like thunder.

Physical characteristics: One meteorite in pieces of 1035, 37 and 81 g, plus many small pieces. Very fresh, W0. Mostly covered by a black matte fusion crust and with a gray interior. The silicate grains are homogeneous in size, very few chondrules are detectable. The metal and sulphide grains are very small (H. Chennaoui-Aoudjehane). Magnetic susceptibility (P. Rochette, *CEREGE*): log $\chi = 5.29$ (χ in 10^{-9} m^3/kg).

Petrography: Abundant olivine and orthopyroxene. Textural distribution of metal and troilite indicates type 5, and the fine interstitial plagioclase is consistent with this. Rare relict barred olivine chondrules. Minor minerals include chromite, phosphates and tetrataenite (B. Zanda and R. Hewins, *MNHNP*).

Geochemistry: (R. Hewins, *MNHNP*). Olivine $Fa_{19.5\pm0.4}$, n=5; orthopyroxene, $En_{81.6\pm0.2}Fs_{16.9\pm0.1}Wo_{1.5\pm0.1}$, n=4; plagioclase, $An_{10\text{-}25}Ab_{72\text{-}84}Or_{3\text{-}16}$, n=4; Chromite, $Sp_{13}Cr_{80}Usp_6Mgt_1$; metal, kamacite with 6.8±0.3% Ni and taenite with 16-30% Ni plus tetrataenite. Phosphates are merrillite and chlorapatite.

Classification: Ordinary chondrite (H5), W0.

Specimens: 19.0 g *FSAC*, 0.9 g *MNHNP*, 0.5 g *CEREGE*

Tirhert 28.935°N, 8.905°W
Guelmim-Es-Semara, Morocco
Fell: 2014 Jul 9
Classification: HED achondrite (Eucrite, unbrecciated)

History: (H. Chennaoui Aoudjehane, A. Aaronson, M. Aoudjehane, A. Bouferra, A. Bouragaa) On Wednesday, 9 July 2014 around 9:30 pm, residents of Tirhert, Foum El Hisn, Douar Imougadir and nearby villages in southern Morocco, witnessed an intense fireball moving horizontally in a NW to SE direction and lasting about 4 s, shortly followed by multiple sonic booms. The fireball was seen by people from cities and villages more than 220 km around the fall site near Tirhert. Immediately following the fireball event the mayor and the authorities of the area organized a field search with police to check for possible security problems. The first meteorites were recovered the following day close to the road between Foum El Hisn and Assa. Thousands of people moved to the site from surrounding cities and villages to search, but many soon left because of the difficulties of searching during the hot 50°C daytime temperatures. The positions of many of the pieces were recorded from eyewitness testimonials, forming a roughly 6 × 3 km strewnfield trending NW to SE. The largest recorded mass around 1300 g was collected close to Tirhert at the coordinates listed for this entry. Recovered pieces weighed from 1 to 1300 g, with an estimated total mass of 8 to 10 kg. Most pieces are covered by a very shiny, black fusion crust.

Physical characteristics: Glassy black fusion crust with translucent patches revealing plagioclase grains beneath. Broken surface shows mm-size white plagioclase and honey brown pyroxene grains, also some scattered mm-size opaque grains. Friable.

Petrography: (C. Agee and N. Muttik, *UNM*) Microprobe examination of a polished mount shows texturally equilibrated pyroxene and plagioclase, granoblastic to poikilitic with many triple junctions. Pyroxenes show exsolution lamellae. Plagioclase and pyroxene grain size up to ~1-2 mm. Silica, ilmenite, chromite, troilite, and Fe-metal (low Ni) present. Fusion crust ~50-100 μm thick, vesicles up to 20 μm present, glassy with compositional gradients and swirls. (A. Irving, *UWS*) Optical petrographic examination of a thin section of a different specimen shows that it is composed of subequal amounts of pyroxene and twinned plagioclase with accessory opaque oxides and minor troilite. The overall texture is equigranular, but plagioclase occurs as aggregates of multiple subgrains, and some plagioclase contains clusters of tiny pyroxene inclusions. Magnetic susceptibility: Log χ = 2.53
Geochemistry: (C. Agee and N. Muttik, *UNM*) Low-Ca pyroxene $Fs_{53.6\pm4.8}Wo_{9.3\pm5.9}$, Fe/Mn=32±1, n=29; augite $Fs_{30.3\pm1.3}Wo_{39.2\pm1.0}$, Fe/Mn=33±2, n=15; plagioclase $An_{89.9\pm0.9}Ab_{9.6\pm0.9}Or_{0.4\pm0.1}$, n=7. Fusion crust, proxy for bulk composition (mean value from EMPA with 20 μm beam) SiO_2=48.25±0.99, TiO_2=0.54±0.17, Al_2O_3=12.15±3.48, Cr_2O_3=0.22±0.04, FeO=19.32±2.82, MnO=0.58±0.09, MgO=7.72±1.21, CaO=10.09±1.14, Na_2O=0.44±0.12 (all wt%), Mg#=41.6±0.5, n=23. Oxygen isotopes (Karen Ziegler, *UNM*): six acid-washed aliquots of bulk sample (1.3, 1.3, 2.4, 1.6, 1.7, 1.4 mg) analyzed by laser fluorination gave, respectively, $\delta^{17}O$ = 1.524, 1.474, 1.106, 1.451, 1.286, 1.314, $\delta^{18}O$ = 3.415, 3.233, 2.588, 3.268, 2.866, 2.961, $\Delta^{17}O$ = -0.279, -0.233, -0.260, -0.275, -0.227, -0.249 (linearized, all permil).
Classification: Achondrite (unbrecciated gabbroic eucrite). Highly equilibrated with clear compositional separation of the low and high calcium pyroxenes consistent with type 6 eucrites (Takeda and Graham, 1991).
Specimens: 14 g at *FSAC* (0.6 g provided by A. Bouferra, 13.4 g provided by *Aaronson*); 41.4 g including a probe mount at *UNM*; 9 g including one polished thin section at *UWB*; 64.4 g in total for type specimens, and 72 g at *ASU*. Main masses are held by *Aaronson* and various private collectors. A. Habibi provided 25 g to *UNM*.

Tule Valley Hardpan 007 (TVH 007) 38°59.629'N, 113°22.909'W
Utah, USA
Found: 2014 May 14
Classification: Enstatite chondrite (EL6)
History: Found visually, partly exposed in dry lake hardpan by W. Wooddell, with J. Wooddell and D. Libszowski.
Physical characteristics: Single stone. Irregular weathered exterior, dark brown. Dimensions 20 × 10.5 × 7.5 mm. Saw cut reveals numerous sub-millimeter metal grains set in a dark brown fine-grained groundmass. No visible chondrules.
Petrography: (C. Agee, *UNM*) Microprobe and optical examination of a thin section shows silicates: 98% enstatite and 2% plagioclase; no chondrules observed in BSE or with petrographic microscope. Many enstatite grains in the size range 100-300 μm, bounded and crosscut by numerous metal/oxide veins. Abundant kamacite; taenite and troilite present.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Enstatite $Fs_{0.6\pm0.3}Wo_{1.3\pm0.0}$, n=22; plagioclase $Ab_{80.9\pm0.9}An_{14.5\pm0.7}Or_{4.5\pm0.3}$, n=4; kamacite Si=1.25±0.03, Ni=6.09±0.14, (wt%), n=2; taenite Si=0.12, Ni=20.76, (wt%).
Classification: Enstatite chondrite (EL6), weathering grade W2.
Specimens: 1.6 g and thin section on deposit at *UNM*. Polished mount held by W. Wooddell.

Tule Valley Hardpan 008 (TVH 008) 38°59.501'N, 113°22.866'W
Utah, United States
Found: 2014 May 14
Classification: Ordinary chondrite (L6)
History: Found slightly embedded on a dry lake hardpan by David Libszowski while he was hunting with Jim and Wendy Wooddell.

Physical characteristics: 5 g fragment used for type specimen measured 22.75 × 13.59 × 9 mm. No fractures, surface reveals both primary and secondary fusion crust, dark gray in color.
Petrography: (C. Agee, *UNM*) Microprobe and optical examination of a thin section shows texturally equilibrated olivines and pyroxenes, plagioclase grains up to 150 μm, faint chondrules. Kamacite, taenite, troilite, chromite and apatite observed.
Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{24.8\pm0.2}$, Fe/Mn=50±2, n=13; low-Ca pyroxene $Fs_{21.1\pm0.5}Wo_{1.4\pm0.2}$, Fe/Mn=29±2, n=11; augite $Fs_{8.3}Wo_{44.5}$, Fe/Mn=22, n=1; pigeonite $Fs_{18.8}Wo_{8.5}$, Fe/Mn=27, n=1.
Classification: Ordinary chondrite (L6), weathering grade W1.
Specimens: 3 g and thin section on deposit at *UNM*, 10 g held by D. Libszowski, polished mount held by J. Wooddell.

Turgut 38°37.0163'N, 32°0.0962'E
Konya, Turkey
Found: April 1999
Classification: Iron meteorite (ungrouped)
History: A 152 kg piece of iron was discovered by Mr. Cemil Gunay in April 1999, while he was plowing a field. The specimen was 30 cm deep. Mr. Gunay took the specimen to his home where he attempted to cut it. He applied rust-proofing spray. It was then kept outside in a hot and dry environment in his garden for approximately 10 years, when the existence of the specimen was noted by Turkish meteorite collector Mesut Kasikci (a resident of France), who then informed academic research institutions about the find. The specimen was brought by Mesut Kasikci to Dr. Catherine Caillet Komorowski of the *MNHNP*.
Physical characteristics: The specimen measures approximately 40 × 60 × 25 cm and has a sculpted appearance, with large irregular cavities on one side and smooth regmaglypts on the other. Weathering is minimal.
Petrography: (C. Caillet Komorowski, *MNHNP*): SEM investigation reveals a well-developed Widmanstätten pattern consistent with a finest octahedrite. Plessite is common. Fractured schreibersite grains are present and represent about 1.3% of the mode. Sulfide, silicate, or graphite inclusions are absent. No tetrataenite was found, also confirmed by magnetic properties (P. Rochette, *CEREGE*). Lack of Neumann lines indicates relatively low shock. Electron microprobe analyses indicate that schreibersite contains high Ni (about 31.5 wt%). Kamacite contains 7.4-6.5 wt% Ni.
Geochemistry: Bulk composition: INAA data (J. Duke and C. Herd, *UAb*): Ni = 9.04±0.07 wt%, Co = 0.420±0.003 wt%; Ir = 2.15±0.03, Au = 0.434±0.009; Ga <0.8; As = 2.37±0.09; W = 1.03±0.04; Re = 0.17±0.01; Cr <15; Cu <21; Ge <60 (all μg/g). Magnetic Properties (P. Rochette, *CEREGE*): results indicate the absence of tetrataenite.
Classification: (C. Herd, *UAb*): Ungrouped, finest octahedrite. Ga content is too low for most irons with the exception of the IVA and IVB groups. However, Au is too low for IVA, and Ni is too low for IVB.
Specimens: Type specimen of 1626 g total at *MNHNP* consists of 1231 g and 394.8 g specimens, and a polished section. A 2.4 g specimen, used for INAA, and a 24.4 g specimen are at *UAb*. A 350 g specimen is at Istanbul Turkish University (Mehmet Özel). Main mass (140 kg) with finder; 9 kg specimen with Mesut Kasikci.

Vicência 7°42.5'S, 35°25.66'W
Pernambuco, Brazil
Fell: 21 Sept 2013
Classification: Ordinary chondrite (LL3.2)
History: Fell, September 21, 2013, ~15:00 hours local time (18:00 UTC), village Borracha near Vicência, Pernambuco, Brazil. Landed <1 m from Mr. Adeildo Silva. Mr. Adeildo Silva claims that when he picked up the meteorite immediately after the fall, one side was warm, whereas the other was cold. Purchased by Maria E. Zucolotto and Andre Moutinho on September 30, 2013.

Physical characteristics: Single stone of 1.547 kg and ~13.7 × 12 × 8.5 cm. Pronounced chondritic texture, with abundant chondrules up to ~7 mm in diameter. Bulk density 3.13 g/cm3; grain density 3.28 g/cm3, porosity of 4.75%.
Petrography: Unshocked (S1), well-developed chondritic texture and mineralogy and mineral compositions of a highly unequilibrated ordinary chondrite. Major minerals olivine ($Fa_{0.4\text{-}58.9}$), low-Ca pyroxene ($Fs_{0.4\text{-}29.8}$). Mean Cr_2O_3 ferroan olivine 0.14±0.09 wt.%, n=115.
Geochemistry: R. Greenwood and I. Franchi, OU. Bulk oxygen isotopic composition is $\delta^{17}O$ = 3.768 ± 0.042‰, $\delta^{18}O$ = 5.359 ± 0.042‰, $\Delta^{17}O$ = 0.981 ±0.020 ‰.
Classification: LL group based on chondrule mean apparent diameter (0.9 mm), bulk oxygen isotopic composition, content of metallic Fe,Ni (1.8 vol%), Co content of kamacite (1.73 wt%), ratios of metallic FeO/total iron (0.105) vs. total Fe/Mg (1.164), and of Ni/Mg (0.057) vs. total Fe/Mg. Petrologic type 3.2 classification is based on chondritic texture, plot of the standard deviation (0.09) vs the mean Cr_2O_3 content (0.14 wt. %) of ferroan olivine, trapped ^{132}Xe of ~32×10^{-10} cm^3STP/g consistent with petrologic type 3.2.

White River 37°44.510'N, 115°07.768'W
Nevada, United States
Found: 24 June 2013
Classification: Ordinary chondrite (L6)
History: A 1688 g specimen was found by Terry Scott while visually searching for meteorites. Two smaller pieces were found within a 10 m radius.
Petrography: The rock is highly recrystallized; chondrules are well-integrated with the matrix material, consistent with petrologic type 6. Plagioclase grains average 60-70 μm. The rock is highly shocked; plagioclase has been partly maskelynitized. Olivine has strong mosaic extinction, consistent with shock-stage S5. Silicates are transected by 10-60 μm-wide opaque melt veins containing small mineral fragments surrounded by tiny troilite grains.

Willcox Playa 008 32°5.75'N, 109°53.32'W
Cochise County, Arizona, USA
Found: 2006 Feb 05
Classification: Ordinary chondrite (L6)
History: Found on intermediate shoreline on a dry lake during a meteorite-recovery team effort led by Robert Verish.
Physical characteristics: A single rusty-brown, weathered stone.
Petrography: (A. Rubin, *UCLA*) Equilibrated, groundmass contains calcite.
Geochemistry: L6 W3 S2; $Fa_{24.7\pm0.2}$, (n=8); $Fs_{21.0}Wo_{1.5}$, (n=8)
Classification: Ordinary chondrite (L6).
Specimens: A total of 6.6 g and one polished thin section are on deposit at *UCLA*. The main mass is held by *Verish*.

Wolcott 41°36.452'N, 73°0.742'W
Connecticut, United States
Fell: 19 April 2013
Classification: Ordinary chondrite (L5)
History: Shortly after 10 PM on 19 April 2013, a loud boom was heard east to west across southern Connecticut, from Ledyard to Milford. The police departments in Ledyard, Madison, Guilford, Branford, East Haven and Milford received calls from the public reporting the booms. At that time, Lawrence L. Beck, Jr., was watching TV in his home in Wolcott, Connecticut, when he heard a loud noise coming from the attic and saw holes forming in his dining room ceiling. The next day (Saturday, 20 April 2013) Mr. Beck went to the attic to check out what happened, and found a rock split in two, a damaged copper pipe and a hole in the roof. He reported the damage to the Wolcott Police Department. The same day Mr.

Beck also contacted John J. Bagioni, a family friend with a background in science. Upon seeing the rock, Mr. Bagioni suggested it might be a meteorite. He also suggested the nature of the rock be checked with the Yale Peabody Museum of Natural History in New Haven, Connecticut. On Monday, April 22, 2013 a Wolcott police officer brought the smaller of the two pieces to the *YPMNH* where it was confirmed to be an ordinary chondrite. Both pieces were later sold by Mr. Beck to Darryl Pitt of The Macovich Collection who later resold the main mass to the *MMGM*.
Physical characteristics: The total mass of the meteorite was 838 g. The rock split upon impact in two large pieces and a few small ones; the largest piece weighs 597 g, the smaller one is 221 g. The two large pieces fit together and establish that the piece was completely covered by black fusion crust. Fresh surface is light gray.
Petrography: (Stefan Nicolescu, *YPMNH*). Composed of sparse, recrystallized chondrules, up to 2.5 mm across (size range: 0.6 - 2.5 mm; average size: 1.0 mm) in fully crystallized silicate matrix interspersed with kamacite, taenite and troilite. Both barred and porphyritic chondrules are present. Feldspar is mostly microcrystalline (<5 μm) with very few large (up to 0.2 mm) crystals in the matrix.
Geochemistry: Mineral compositions and geochemistry: Mineral chemistry by EMP. Olivine ($Fa_{24.2-25.1}$; N=10), orthopyroxene ($Fs_{20.5-21.4}Wo_{0.9-1.6}$; N=10), clinopyroxene ($Fs_{7.3-8.2}Wo_{44.8-45.5}$; N=4), plagioclase ($An_{9.3-11.5}Or_{4.3-6.4}$; n=10)
Classification: Ordinary chondrite (L5)
Specimens: 20 g, including two polishe-thin sections and one polished mount at *YPMNH*; the main mass is held by *MMGM*.

Yarovoye 52°55.78'N, 78°35.34'E
Altay territory, Slavgorod region, Yarov, Russia
Found: May 1991
Classification: Iron meteorite (IIIAB)
History: The meteorite was found in May 1991 during the plowing of virgin soil land on the outskirts of Yarovoye town. Maximum depth of plowing was 40 cm.
Physical characteristics: Meteorite consists of single mass of 10.7 kg. The meteorite has a crescent shape and regmaglypted surface with reddish-brown color. Fusion crust is absent.
Petrography: (C. A. Lorenz, *Vernad*) the meteorite consists of metal FeNi (taenite and kamacite) with accessory schreibersite. The Widmanstaetten pattern is mostly uniform with kamacite bandwidth 0.2 - 1 mm (fine octahedrite).
Geochemistry: Mineral compositions and geochemistry: Bulk composition (ICP, O.A. Tjutjunnyk and S.H. Nabiullina, *Vernad*) Ni = 9.45, Co = 5200, Ir = 0.7, Au = 1.68, Pt = 5.9, Pd = 4.5, As = 22.5, Cu = 170, Ga = 18.3 (Ni in wt%, others in ppm)
Classification: Iron, IIIAB.
Specimens: One sample of 2141.6 g, 9 cut fragments of 9.92 g in total, and polished section are on deposit at *Vernad*. An anonymous person holds the main mass of the meteorite.

Yuanyang 23°13'N, 102°50'E
Yunnan, China
Found: 2010
Classification: Iron meteorite (IAB-MG)
History: An iron meteorite was found by a local farmer in a mountain area of Yuanyang County, Yunnan Province.
Petrography: Mainly consists of kamacite. Taenite and schreibersite are also present.
Geochemistry: *UCLA* INAA data: Co 4.61 mg/g, Ni 70.2 mg/g, Ga 84.3 μg/g, As 13.4 μg/g,W 0.91 μg/g, Ir 1.00 μg/g, Pt 5.1 μg/g, Au 1.565 μg/g
Classification: IAB main group iron meteorite with an Og structure.

Yucca 030 34°46.063'N, 114°14.521'W

Arizona, United States
Found: 2011 Oct 8
Classification: Ordinary chondrite (H metal)

History: Found 8 cm below surface by J. Wooddell while he was metal-detecting in the Franconia strewn field.

Physical characteristics: Single metallic specimen.

Petrography: (C. Agee, *UNM*) Microprobe examination of a polished surface shows predominantly kamacite with minor amounts of taenite, ubiquitous troilite. About 5% of this sample consists of H-chondrite silicate minerals olivine, pyroxene, and albitic plagioclase; apatite also observed.

Geochemistry: (C. Agee and N. Muttik, *UNM*) Olivine $Fa_{18.9\pm0.2}$, Fe/Mn=38±1 n=7; low-Ca pyroxene $Fs_{17.1\pm0.2}Wo_{1.4\pm0.2}$, Fe/Mn=24±1, n=8; plagioclase $Ab_{80.6\pm0.3}An_{13.7\pm0.3}$, n=2. (C. Herd, UAB) bulk sample ICPMS: Fe=58.6±1.6, S=28.3±1.1, O=6.4±1.4 (all wt%); Co=5743±64, Cu=124±15, As=15.7±1.9, W=1.12±0.10, Re=0.16±0.03, Ir=0.58±0.04, Pt=1.68±0.20, Au=1.31±0.15 (all ppm).

Classification: H-metal

Specimens: Specimen including a thin section is on deposit at *UNM*.

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3. Alphabetical listing of all meteorites

Name	abbrev	country	date	mass	class
Abar al' Uj 002	AaU 002	Saudi Arabia	29 Jan 2012	224.475	H5
Abar al' Uj 003	AaU 003	Saudi Arabia	29 Jan 2012	794.779	H4
Abar al' Uj 004	AaU 004	Saudi Arabia	30 Jan 2012	284.211	H6
Abar al' Uj 005	AaU 005	Saudi Arabia	30 Jan 2012	57.351	H4-6
Abar al' Uj 006	AaU 006	Saudi Arabia	30 Jan 2012	83.679	L5
Abar al' Uj 007	AaU 007	Saudi Arabia	30 Jan 2012	952	L6
Abar al' Uj 008	AaU 008	Saudi Arabia	30 Jan 2012	37.049	H5
Abar al' Uj 009	AaU 009	Saudi Arabia	30 Jan 2012	93.987	H5
Abar al' Uj 010	AaU 010	Saudi Arabia	30 Jan 2012	386.471	L6
Abar al' Uj 011	AaU 011	Saudi Arabia	31 Jan 2012	61.628	H4
Abar al' Uj 012	AaU 012	Saudi Arabia	31 Jan 2012	122.78	Lunar
Abar al' Uj 013	AaU 013	Saudi Arabia	31 Jan 2012	185.62	H4-5
Abar al' Uj 014	AaU 014	Saudi Arabia	31 Jan 2012	429.35	CO3
Abar al' Uj 015	AaU 015	Saudi Arabia	1 Feb 2012	52.97	L5
Abar al' Uj 016	AaU 016	Saudi Arabia	1 Feb 2012	269.02	L6
Abar al' Uj 017	AaU 017	Saudi Arabia	1 Feb 2012	42.65	H4
Abar al' Uj 018	AaU 018	Saudi Arabia	1 Feb 2012	26.91	H4
Abar al' Uj 019	AaU 019	Saudi Arabia	1 Feb 2012	48.74	H4/5
Abar al' Uj 020	AaU 020	Saudi Arabia	1 Feb 2012	17.29	H4/5
Abar al' Uj 021	AaU 021	Saudi Arabia	1 Feb 2012	8.84	H4/5
Abar al' Uj 022	AaU 022	Saudi Arabia	1 Feb 2012	18.29	H4
Abar al' Uj 023	AaU 023	Saudi Arabia	1 Feb 2012	11.46	H4
Abar al' Uj 024	AaU 024	Saudi Arabia	1 Feb 2012	6.159	H4/5
Abar al' Uj 025	AaU 025	Saudi Arabia	1 Feb 2012	9.113	H4/5
Abar al' Uj 026	AaU 026	Saudi Arabia	1 Feb 2012	6.917	H4/5
Abar al' Uj 027	AaU 027	Saudi Arabia	1 Feb 2012	11.557	H4
Abar al' Uj 028	AaU 028	Saudi Arabia	1 Feb 2012	3.78	H4
Abar al' Uj 029	AaU 029	Saudi Arabia	1 Feb 2012	10.11	H4/5

Abar al' Uj 030	AaU 030	Saudi Arabia	1 Feb 2012	53.86	H4
Abar al' Uj 031	AaU 031	Saudi Arabia	1 Feb 2012	19.88	H4/5
Abar al' Uj 032	AaU 032	Saudi Arabia	1 Feb 2012	48.99	H4
Abar al' Uj 033	AaU 033	Saudi Arabia	1 Feb 2012	77.13	H4/5
Abar al' Uj 034	AaU 034	Saudi Arabia	1 Feb 2012	44.22	H4
Abar al' Uj 035	AaU 035	Saudi Arabia	1 Feb 2012	119.46	H4
Abar al' Uj 036	AaU 036	Saudi Arabia	1 Feb 2012	70.86	H4
Abar al' Uj 037	AaU 037	Saudi Arabia	1 Feb 2012	93.36	H4
Abar al' Uj 038	AaU 038	Saudi Arabia	3 Feb 2012	186.87	H4
Abar al' Uj 039	AaU 039	Saudi Arabia	3 Feb 2012	23.33	H4
Abar al' Uj 040	AaU 040	Saudi Arabia	3 Feb 2012	106.44	L6
Abar al' Uj 041	AaU 041	Saudi Arabia	3 Feb 2012	1374.23	H4
Abar al' Uj 042	AaU 042	Saudi Arabia	3 Feb 2012	137.45	L6
Al Haddar 001		Saudi Arabia	12 May 2011	365.13	L6
Al Hawaya 001		Saudi Arabia	15 Feb 2013	547.863	H6
Al Hawaya 002		Saudi Arabia	15 Feb 2013	7.606	Ureilite
Al Hawaya 003		Saudi Arabia	15 Feb 2013	3.916	H5
Al Hawaya 004		Saudi Arabia	16 Feb 2013	176.947	Eucrite-pmict
Al Hawaya 005		Saudi Arabia	16 Feb 2013	65.611	H4
Al Hawaya 006		Saudi Arabia	16 Feb 2013	15.198	LL4-6
Al Hawaya 007		Saudi Arabia	16 Feb 2013	176.4	H6
Al Hawaya 008		Saudi Arabia	16 Feb 2013	4.669	H4
Al Hawaya 010		Saudi Arabia	16 Feb 2013	3.91	Ureilite
Al Jawf 001	AJ 001	Saudi Arabia	2009 May 7	3158	H4-5
Alatage Mountain 001	AM 001	China	30 April 2013	170	L5
Alatage Mountain 002	AM 002	China	1 May 2013	967	L5
Alatage Mountain 003	AM 003	China	1 May 2013	41.7	L5
Alatage Mountain 004	AM 004	China	1 May 2013	12.2	L5
Alatage Mountain 006	AM 006	China	1 May 2013	17.4	L5
Alatage Mountain 007	AM 007	China	1 May 2013	91.4	L5
Alatage Mountain 008	AM 008	China	1 May 2013	19.4	L5
Alatage Mountain 010	AM 010	China	1 May 2013	8.1	L5
Alatage Mountain 011	AM 011	China	1 May 2013	7.2	L5
Alatage Mountain 012	AM 012	China	1 May 2013	2.6	L5
Alatage Mountain 015	AM 015	China	1 May 2013	83.7	L5
Alatage Mountain 016	AM 016	China	1 May 2013	315.9	L5
Alatage Mountain 017	AM 017	China	1 May 2013	129.2	L5
Alatage Mountain 018	AM 018	China	1 May 2013	23.4	L5
Alatage Mountain 019	AM 019	China	1 May 2013	42.7	L5
Alatage Mountain 021	AM 021	China	1 May 2013	37.8	L5
Alatage Mountain 022	AM 022	China	1 May 2013	77.7	L5
Alatage Mountain 023	AM 023	China	1 May 2013	26.8	L5
Alatage Mountain 024	AM 024	China	1 May 2013	239.7	L5
Alatage Mountain 025	AM 025	China	1 May 2013	9.3	L5

Alatage Mountain 026	AM 026	China	1 May 2013	33.3	L5
Alatage Mountain 027	AM 027	China	1 May 2013	17.7	L5
Alatage Mountain 028	AM 028	China	1 May 2013	17.7	L5
Alatage Mountain 029	AM 029	China	1 May 2013	44.7	L5
Alatage Mountain 031	AM 031	China	1 May 2013	38	L5
Alatage Mountain 032	AM 032	China	1 May 2013	23.5	L5
Alatage Mountain 033	AM 033	China	1 May 2013	23.1	L5
Alatage Mountain 034	AM 034	China	1 May 2013	101.6	L5
Alatage Mountain 035	AM 035	China	1 May 2013	19.9	L5
Alatage Mountain 036	AM 036	China	1 May 2013	24.8	L5
Alatage Mountain 038	AM 038	China	1 May 2013	103.2	L5
Alatage Mountain 039	AM 039	China	1 May 2013	67.6	L5
Alatage Mountain 040	AM 040	China	1 May 2013	97.2	L5
Alatage Mountain 041	AM 041	China	1 May 2013	340.5	L5
Altamira 001		Chile	2011 Jul 21	55	L6
Ardón		Spain	9 July 1931	5.48	L6
Asuka 09001	A 09001	Antarctica	2009	1.012	H4
Asuka 09002	A 09002	Antarctica	2009	1.709	H4
Asuka 09004	A 09004	Antarctica	2009	2.187	H5
Asuka 09005	A 09005	Antarctica	2009	1.383	H6
Asuka 09006	A 09006	Antarctica	2009	1.251	H6
Asuka 09007	A 09007	Antarctica	2009	11.760	H6
Asuka 09008	A 09008	Antarctica	2009	7.063	H6
Asuka 09009	A 09009	Antarctica	2009	5.237	H6
Asuka 09010	A 09010	Antarctica	2009	6.453	H6
Asuka 09011	A 09011	Antarctica	2009	2.545	H6
Asuka 09012	A 09012	Antarctica	2009	4.190	H6
Asuka 09013	A 09013	Antarctica	2009	2.893	H6
Asuka 09014	A 09014	Antarctica	2009	2.199	H6
Asuka 09015	A 09015	Antarctica	2009	3.450	H6
Asuka 09016	A 09016	Antarctica	2009	2.575	H6
Asuka 09017	A 09017	Antarctica	2009	2.458	H6
Asuka 09018	A 09018	Antarctica	2009	1.953	H6
Asuka 09019	A 09019	Antarctica	2009	2.139	L3
Asuka 09020	A 09020	Antarctica	2009	1.399	H6
Asuka 09021	A 09021	Antarctica	2009	1.437	H6
Asuka 09022	A 09022	Antarctica	2009	1.080	H6
Asuka 09023	A 09023	Antarctica	2009	1.692	H6
Asuka 09024	A 09024	Antarctica	2009	1.111	H6
Asuka 09025	A 09025	Antarctica	2009	1.414	H6
Asuka 09026	A 09026	Antarctica	2009	1.878	H6
Asuka 09027	A 09027	Antarctica	2009	1.008	H6
Asuka 09028	A 09028	Antarctica	2009	1.240	H6
Asuka 09029	A 09029	Antarctica	2009	1.425	H6

Asuka 09030	A 09030	Antarctica	2009	1.025	H6
Asuka 09031	A 09031	Antarctica	2009	0.892	H6
Asuka 09032	A 09032	Antarctica	2009	1.049	H6
Asuka 09033	A 09033	Antarctica	2009	1.021	H6
Asuka 09034	A 09034	Antarctica	2009	0.750	H6
Asuka 09035	A 09035	Antarctica	2009	0.545	H6
Asuka 09036	A 09036	Antarctica	2009	0.876	LL3
Asuka 09037	A 09037	Antarctica	2009	0.762	LL3
Asuka 09038	A 09038	Antarctica	2009	0.830	H6
Asuka 09039	A 09039	Antarctica	2009	0.795	H6
Asuka 09040	A 09040	Antarctica	2009	0.723	H6
Asuka 09041	A 09041	Antarctica	2009	0.640	H6
Asuka 09042	A 09042	Antarctica	2009	0.628	H6
Asuka 09043	A 09043	Antarctica	2009	0.650	H6
Asuka 09044	A 09044	Antarctica	2009	0.543	LL3
Asuka 09045	A 09045	Antarctica	2009	0.579	L3
Asuka 09046	A 09046	Antarctica	2009	0.445	H6
Asuka 09047	A 09047	Antarctica	2009	0.605	H6
Asuka 09048	A 09048	Antarctica	2009	0.570	H6
Asuka 09049	A 09049	Antarctica	2009	0.495	H6
Asuka 09050	A 09050	Antarctica	2009	0.762	H6
Asuka 09051	A 09051	Antarctica	2009	0.582	H6
Asuka 09052	A 09052	Antarctica	2009	0.578	H6
Asuka 09053	A 09053	Antarctica	2009	0.567	H6
Asuka 09054	A 09054	Antarctica	2009	0.382	LL3
Asuka 09055	A 09055	Antarctica	2009	0.453	H6
Asuka 09056	A 09056	Antarctica	2009	0.322	H6
Asuka 09057	A 09057	Antarctica	2009	0.648	H6
Asuka 09058	A 09058	Antarctica	2009	0.575	H6
Asuka 09059	A 09059	Antarctica	2009	0.417	H6
Asuka 09062	A 09062	Antarctica	2009	0.494	H6
Asuka 09067	A 09067	Antarctica	2009	0.323	H6
Asuka 09132	A 09132	Antarctica	2009	1.714	LL3
Asuka 09133	A 09133	Antarctica	2009	2.101	LL3
Asuka 09134	A 09134	Antarctica	2009	1.239	LL3
Asuka 09135	A 09135	Antarctica	2009	146.05	LL3
Asuka 09136	A 09136	Antarctica	2009	15.784	H6
Asuka 09137	A 09137	Antarctica	2009	4.588	LL3
Asuka 09138	A 09138	Antarctica	2009	3.973	LL3
Asuka 09139	A 09139	Antarctica	2009	3.296	LL3
Asuka 09140	A 09140	Antarctica	2009	2.995	LL3
Asuka 09141	A 09141	Antarctica	2009	2.595	LL3
Asuka 09142	A 09142	Antarctica	2009	2.734	LL3
Asuka 09143	A 09143	Antarctica	2009	2.109	LL3

Asuka 09144	A 09144	Antarctica	2009	1.707	LL3
Asuka 09145	A 09145	Antarctica	2009	1.578	LL3
Asuka 09146	A 09146	Antarctica	2009	1.502	LL3
Asuka 09147	A 09147	Antarctica	2009	1.621	LL3
Asuka 09148	A 09148	Antarctica	2009	1.068	LL3
Asuka 09150	A 09150	Antarctica	2009	1.038	LL3
Asuka 09151	A 09151	Antarctica	2009	1.164	LL3
Asuka 09152	A 09152	Antarctica	2009	0.953	LL3
Asuka 09153	A 09153	Antarctica	2009	0.873	LL3
Asuka 09154	A 09154	Antarctica	2009	1.000	LL3
Asuka 09155	A 09155	Antarctica	2009	0.698	LL3
Asuka 09156	A 09156	Antarctica	2009	0.752	H6
Asuka 09157	A 09157	Antarctica	2009	0.703	LL3
Asuka 09158	A 09158	Antarctica	2009	0.531	LL3
Asuka 09159	A 09159	Antarctica	2009	0.976	LL3
Asuka 09160	A 09160	Antarctica	2009	0.683	LL3
Asuka 09161	A 09161	Antarctica	2009	0.537	LL3
Asuka 09162	A 09162	Antarctica	2009	0.564	LL3
Asuka 09163	A 09163	Antarctica	2009	0.350	LL3
Asuka 09164	A 09164	Antarctica	2009	0.698	LL3
Asuka 09165	A 09165	Antarctica	2009	0.406	H6
Asuka 09166	A 09166	Antarctica	2009	0.423	LL3
Asuka 09167	A 09167	Antarctica	2009	0.413	LL3
Asuka 09168	A 09168	Antarctica	2009	0.538	LL3
Asuka 09169	A 09169	Antarctica	2009	0.348	LL3
Asuka 09170	A 09170	Antarctica	2009	0.339	LL3
Asuka 09175	A 09175	Antarctica	2009	1.403	H6
Asuka 09177	A 09177	Antarctica	2009	1.558	LL3
Asuka 09178	A 09178	Antarctica	2009	9.179	LL3
Asuka 09180	A 09180	Antarctica	2009	1.626	H6
Asuka 09181	A 09181	Antarctica	2009	1.187	H6
Asuka 09182	A 09182	Antarctica	2009	4.715	LL3
Asuka 09183	A 09183	Antarctica	2009	17.558	H5
Asuka 09188	A 09188	Antarctica	2009	0.311	H6
Asuka 09189	A 09189	Antarctica	2009	0.871	H6
Asuka 09190	A 09190	Antarctica	2009	1.465	LL3
Asuka 09193	A 09193	Antarctica	2009	4.198	H6
Asuka 09195	A 09195	Antarctica	2009	2.813	H5
Asuka 09196	A 09196	Antarctica	2009	2.757	L6
Asuka 09197	A 09197	Antarctica	2009	0.946	LL3-6
Asuka 09198	A 09198	Antarctica	2009	2.468	H5
Asuka 09199	A 09199	Antarctica	2009	2.941	L6
Asuka 09235	A 09235	Antarctica	2009	5.740	H5
Asuka 09239	A 09239	Antarctica	2009	5.640	L6

Asuka 09240	A 09240	Antarctica	2009	6.058	H4
Asuka 09241	A 09241	Antarctica	2009	5.858	H5
Asuka 09244	A 09244	Antarctica	2009	286.45	L6
Asuka 09245	A 09245	Antarctica	2009	10.230	H5
Asuka 09249	A 09249	Antarctica	2009	64.82	L6
Asuka 09255	A 09255	Antarctica	2009	15.471	H5
Asuka 09268	A 09268	Antarctica	2009	27.817	L6
Asuka 09269	A 09269	Antarctica	2009	7.037	L6
Asuka 09272	A 09272	Antarctica	2009	27.633	LL3
Asuka 09273	A 09273	Antarctica	2009	7.813	H5
Asuka 09274	A 09274	Antarctica	2009	6.673	H5
Asuka 09317	A 09317	Antarctica	2009	208.09	Ureilite
Asuka 09318	A 09318	Antarctica	2009	9.025	Ureilite
Asuka 09323	A 09323	Antarctica	2009	53.396	H5
Asuka 09328	A 09328	Antarctica	2009	52.274	L6
Asuka 09329	A 09329	Antarctica	2009	45.763	H6
Asuka 09343	A 09343	Antarctica	2009	8.331	L6
Asuka 09349	A 09349	Antarctica	2009	20.907	H5
Asuka 09350	A 09350	Antarctica	2009	15.852	H6
Asuka 09351	A 09351	Antarctica	2009	9.034	H6
Asuka 09352	A 09352	Antarctica	2009	10.811	H5
Asuka 09368	A 09368	Antarctica	2009	6.189	Ureilite
Asuka 09370	A 09370	Antarctica	2009	11.423	H6
Asuka 09371	A 09371	Antarctica	2009	10.814	L6
Asuka 09373	A 09373	Antarctica	2009	18.282	H5
Asuka 09374	A 09374	Antarctica	2009	18.182	H6
Asuka 09375	A 09375	Antarctica	2009	8.034	L6
Asuka 09379	A 09379	Antarctica	2009	6.262	L6
Asuka 09380	A 09380	Antarctica	2009	42.517	L6
Asuka 09382	A 09382	Antarctica	2009	6.840	H5
Asuka 09387	A 09387	Antarctica	2009	170.58	H4
Asuka 09388	A 09388	Antarctica	2009	12.989	H5
Asuka 09389	A 09389	Antarctica	2009	9.027	H5
Asuka 09408	A 09408	Antarctica	2009	22.765	H5
Asuka 09409	A 09409	Antarctica	2009	211.34	L6
Asuka 09412	A 09412	Antarctica	2009	7.084	H6
Asuka 09413	A 09413	Antarctica	2009	46.458	L5
Asuka 09414	A 09414	Antarctica	2009	53.761	L3
Asuka 09426	A 09426	Antarctica	2009	6.560	LL3
Asuka 09427	A 09427	Antarctica	2009	31.524	H4
Asuka 09428	A 09428	Antarctica	2009	13.540	H5
Asuka 09431	A 09431	Antarctica	2009	201.98	L6
Asuka 09432	A 09432	Antarctica	2009	11.960	L6
Asuka 09433	A 09433	Antarctica	2009	7.878	L6

Asuka 09436	A 09436	Antarctica	2009	289.13	H3
Asuka 09439	A 09439	Antarctica	2009	8.550	H6
Asuka 09441	A 09441	Antarctica	2009	7.727	L6
Asuka 09442	A 09442	Antarctica	2009	130.95	L6
Asuka 09443	A 09443	Antarctica	2009	34.261	L6
Asuka 09445	A 09445	Antarctica	2009	37.759	L6
Asuka 09446	A 09446	Antarctica	2009	13.790	L6
Asuka 09447	A 09447	Antarctica	2009	7.471	H4
Asuka 09448	A 09448	Antarctica	2009	12.242	H5
Asuka 09453	A 09453	Antarctica	2009	49.120	L6
Asuka 09455	A 09455	Antarctica	2009	4953.00	L6
Asuka 09456	A 09456	Antarctica	2009	57.129	L6
Asuka 09457	A 09457	Antarctica	2009	14.389	L6
Asuka 09468	A 09468	Antarctica	2009	176.28	L6
Asuka 09469	A 09469	Antarctica	2009	11.831	L6
Asuka 09473	A 09473	Antarctica	2009	6.770	H3
Asuka 09474	A 09474	Antarctica	2009	119.18	CM
Asuka 09481	A 09481	Antarctica	2009	9.483	H6
Asuka 09482	A 09482	Antarctica	2009	8.275	H5
Asuka 09488	A 09488	Antarctica	2009	170.46	L6
Asuka 09502	A 09502	Antarctica	2009	6.235	H5
Asuka 09507	A 09507	Antarctica	2009	13.762	H6
Asuka 09508	A 09508	Antarctica	2009	31.301	L6
Asuka 09515	A 09515	Antarctica	2009	738.00	L6
Asuka 09516	A 09516	Antarctica	2009	166.20	H6
Asuka 09523	A 09523	Antarctica	2009	67.95	H5
Asuka 09524	A 09524	Antarctica	2009	33.744	H5
Asuka 09528	A 09528	Antarctica	2009	33.511	H3
Asuka 09530	A 09530	Antarctica	2009	20.859	H4
Asuka 09531	A 09531	Antarctica	2009	6.376	H5
Asuka 09532	A 09532	Antarctica	2009	37.325	L3
Asuka 09533	A 09533	Antarctica	2009	55.419	L3
Asuka 09534	A 09534	Antarctica	2009	23.059	L3
Asuka 09537	A 09537	Antarctica	2009	104.42	H6
Asuka 09540	A 09540	Antarctica	2009	88.12	H5
Asuka 09542	A 09542	Antarctica	2009	8.787	H6
Asuka 09545	A 09545	Antarctica	2009	14.563	Mesosiderite
Asuka 09546	A 09546	Antarctica	2009	495.20	L6
Asuka 09547	A 09547	Antarctica	2009	47.413	L6
Asuka 09549	A 09549	Antarctica	2009	8.828	H5
Asuka 09550	A 09550	Antarctica	2009	10.422	L6
Asuka 09552	A 09552	Antarctica	2009	174.09	H5
Asuka 09565	A 09565	Antarctica	2009	6.175	H5
Asuka 09576	A 09576	Antarctica	2009	37.574	H5

Asuka 09578	A 09578	Antarctica	2009	60.50	L6
Asuka 09579	A 09579	Antarctica	2009	79.71	L6
Asuka 09580	A 09580	Antarctica	2009	50.691	L6
Asuka 09581	A 09581	Antarctica	2009	32.203	L6
Asuka 09582	A 09582	Antarctica	2009	11.581	L6
Asuka 09583	A 09583	Antarctica	2009	12.042	L6
Asuka 09584	A 09584	Antarctica	2009	12.795	L6
Asuka 09585	A 09585	Antarctica	2009	13.298	L6
Asuka 09586	A 09586	Antarctica	2009	11.443	L6
Asuka 09587	A 09587	Antarctica	2009	11.242	L6
Asuka 09588	A 09588	Antarctica	2009	7.243	L6
Asuka 09589	A 09589	Antarctica	2009	11.800	L6
Asuka 09590	A 09590	Antarctica	2009	7.882	L6
Asuka 09591	A 09591	Antarctica	2009	6.683	L6
Asuka 09592	A 09592	Antarctica	2009	7.223	L6
Asuka 09593	A 09593	Antarctica	2009	6.385	L6
Asuka 09594	A 09594	Antarctica	2009	7.412	L6
Asuka 09595	A 09595	Antarctica	2009	6.588	L6
Asuka 09608	A 09608	Antarctica	2009	83.05	H5
Asuka 09609	A 09609	Antarctica	2009	13.129	H5
Asuka 09610	A 09610	Antarctica	2009	6.196	H5
Asuka 09618	A 09618	Antarctica	2009	661.00	H5
Asuka 09619	A 09619	Antarctica	2009	8.015	H6
Asuka 09624	A 09624	Antarctica	2009	9.736	H4
Asuka 09627	A 09627	Antarctica	2009	40.293	L6
Asuka 09638	A 09638	Antarctica	2009	16.306	H5
Asuka 09639	A 09639	Antarctica	2009	7.323	H5
Asuka 09647	A 09647	Antarctica	2009	7.479	H6
Asuka 09648	A 09648	Antarctica	2009	17.001	H5
Asuka 09649	A 09649	Antarctica	2009	15.520	H5
Asuka 09650	A 09650	Antarctica	2009	10.917	H5
Asuka 09651	A 09651	Antarctica	2009	10.416	H5
Asuka 09652	A 09652	Antarctica	2009	6.158	H5
Asuka 10001	A 10001	Antarctica	2010	23.448	H5
Asuka 10002	A 10002	Antarctica	2010	1.784	L4
Asuka 10003	A 10003	Antarctica	2010	4.021	H6
Asuka 10004	A 10004	Antarctica	2010	120.82	LL6
Asuka 10006	A 10006	Antarctica	2010	2.470	H5
Asuka 10007	A 10007	Antarctica	2010	15.153	H6
Asuka 10008	A 10008	Antarctica	2010	15.384	L6
Asuka 10009	A 10009	Antarctica	2010	24.904	Ureilite
Asuka 10010	A 10010	Antarctica	2010	11.488	H5
Asuka 10013	A 10013	Antarctica	2010	9.624	L6
Asuka 10014	A 10014	Antarctica	2010	41.626	CM

Asuka 10017	A 10017	Antarctica	2010	13.880	LL4
Asuka 10019	A 10019	Antarctica	2010	4.142	H3-5
Asuka 10020	A 10020	Antarctica	2010	1.655	H6
Asuka 10021	A 10021	Antarctica	2010	9.382	H3
Asuka 10022	A 10022	Antarctica	2010	2.518	L6
Asuka 10023	A 10023	Antarctica	2010	3.531	LL5
Asuka 10024	A 10024	Antarctica	2010	11.339	L6
Asuka 10026	A 10026	Antarctica	2010	13.992	LL6
Asuka 10027	A 10027	Antarctica	2010	11.836	L5
Asuka 10030	A 10030	Antarctica	2010	9.943	H4
Asuka 10031	A 10031	Antarctica	2010	21.173	L4
Asuka 10032	A 10032	Antarctica	2010	6.309	H3
Asuka 10033	A 10033	Antarctica	2010	1.688	L3
Asuka 10034	A 10034	Antarctica	2010	1.684	L6
Asuka 10035	A 10035	Antarctica	2010	8.581	L6
Asuka 10037	A 10037	Antarctica	2010	6.127	L5
Asuka 10038	A 10038	Antarctica	2010	3.145	H5
Asuka 10039	A 10039	Antarctica	2010	7.722	LL6
Asuka 10041	A 10041	Antarctica	2010	3.422	H5
Asuka 10042	A 10042	Antarctica	2010	2.913	L3
Asuka 10043	A 10043	Antarctica	2010	9.326	H-melt breccia
Asuka 10044	A 10044	Antarctica	2010	60.70	L6
Asuka 10048	A 10048	Antarctica	2010	1.475	L5
Asuka 10049	A 10049	Antarctica	2010	19.895	H5
Asuka 10051	A 10051	Antarctica	2010	2.128	LL4-6
Asuka 10056	A 10056	Antarctica	2010	11.641	L5
Asuka 10057	A 10057	Antarctica	2010	5.595	L6
Asuka 10060	A 10060	Antarctica	2010	10.284	LL6
Asuka 10061	A 10061	Antarctica	2010	1.745	H6
Asuka 10068	A 10068	Antarctica	2010	3.177	H4
Asuka 10069	A 10069	Antarctica	2010	1.460	H4
Asuka 10070	A 10070	Antarctica	2010	18.612	L6
Asuka 10071	A 10071	Antarctica	2010	2.837	H3
Asuka 10073	A 10073	Antarctica	2010	1.130	H5
Asuka 10076	A 10076	Antarctica	2010	113.52	L6
Asuka 10077	A 10077	Antarctica	2010	115.60	Winonaite
Asuka 10078	A 10078	Antarctica	2010	7.980	H5
Asuka 10079	A 10079	Antarctica	2010	13.307	H4
Asuka 10080	A 10080	Antarctica	2010	15.857	H-melt breccia
Asuka 10081	A 10081	Antarctica	2010	8.051	H-melt breccia
Asuka 10083	A 10083	Antarctica	2010	25.448	L3
Asuka 10084	A 10084	Antarctica	2010	2.108	H5
Asuka 10085	A 10085	Antarctica	2010	1.141	L4
Asuka 10086	A 10086	Antarctica	2010	1.042	Eucrite

Asuka 10087	A 10087	Antarctica	2010	10.968	H3
Asuka 10090	A 10090	Antarctica	2010	18.702	H6
Asuka 10091	A 10091	Antarctica	2010	223.51	LL6
Asuka 10092	A 10092	Antarctica	2010	16.292	H6
Asuka 10093	A 10093	Antarctica	2010	2.927	L6
Asuka 10094	A 10094	Antarctica	2010	5.450	LL5
Asuka 10095	A 10095	Antarctica	2010	3.633	L6
Asuka 10097	A 10097	Antarctica	2010	235.19	L6
Asuka 10098	A 10098	Antarctica	2010	21.712	H5
Asuka 10103	A 10103	Antarctica	2010	44.494	L6
Asuka 10105	A 10105	Antarctica	2010	29.975	H5
Asuka 10107	A 10107	Antarctica	2010	1.174	LL6
Asuka 10108	A 10108	Antarctica	2010	24.537	H6
Asuka 10109	A 10109	Antarctica	2010	3.715	H5
Asuka 10110	A 10110	Antarctica	2010	1.068	H4
Asuka 10111	A 10111	Antarctica	2010	1.759	CM2
Asuka 10112	A 10112	Antarctica	2010	3.500	H4
Asuka 10113	A 10113	Antarctica	2010	34.220	H5
Asuka 10114	A 10114	Antarctica	2010	49.502	H5
Asuka 10115	A 10115	Antarctica	2010	1.590	H5
Asuka 10120	A 10120	Antarctica	2010	2.794	L6
Asuka 10121	A 10121	Antarctica	2010	9.174	H5
Asuka 10122	A 10122	Antarctica	2010	9.072	LL6
Asuka 10123	A 10123	Antarctica	2010	91.14	H4
Asuka 10124	A 10124	Antarctica	2010	2.878	L4
Asuka 10125	A 10125	Antarctica	2010	7.665	L5
Asuka 10126	A 10126	Antarctica	2010	2.191	E
Asuka 10127	A 10127	Antarctica	2010	3.080	H5
Asuka 10128	A 10128	Antarctica	2010	1.396	L6
Asuka 10132	A 10132	Antarctica	2010	24.150	H4
Asuka 10133	A 10133	Antarctica	2010	2.100	LL4-6
Asuka 10134	A 10134	Antarctica	2010	1.060	H5
Asuka 10135	A 10135	Antarctica	2010	6.694	LL6
Asuka 10136	A 10136	Antarctica	2010	6.311	LL6
Asuka 10137	A 10137	Antarctica	2010	1.500	L6
Asuka 10138	A 10138	Antarctica	2010	1.120	LL5
Asuka 10140	A 10140	Antarctica	2010	26.416	H4
Asuka 10141	A 10141	Antarctica	2010	1.021	H6
Asuka 10143	A 10143	Antarctica	2010	1.505	Mesosiderite
Asuka 10145	A 10145	Antarctica	2010	2.756	H5
Asuka 10147	A 10147	Antarctica	2010	81.21	H5
Asuka 10149	A 10149	Antarctica	2010	3.286	H5
Asuka 10151	A 10151	Antarctica	2010	11.152	LL3-6
Asuka 10153	A 10153	Antarctica	2010	2.758	H4

Asuka 10155	A 10155	Antarctica	2010	1.449	H5
Asuka 10156	A 10156	Antarctica	2010	5.643	LL3-6
Asuka 10157	A 10157	Antarctica	2010	21.260	LL3-6
Asuka 10158	A 10158	Antarctica	2010	3.397	LL5
Asuka 10161	A 10161	Antarctica	2010	2.420	L6
Asuka 10162	A 10162	Antarctica	2010	11.800	H4-5
Asuka 10163	A 10163	Antarctica	2010	4.953	L5
Asuka 10164	A 10164	Antarctica	2010	16.402	EH3
Asuka 10165	A 10165	Antarctica	2010	1.429	E4
Asuka 10166	A 10166	Antarctica	2010	2.732	L6
Asuka 10167	A 10167	Antarctica	2010	2.525	CM
Asuka 10168	A 10168	Antarctica	2010	1.937	L6
Asuka 10169	A 10169	Antarctica	2010	1.590	H5
Asuka 10170	A 10170	Antarctica	2010	5.957	H6
Asuka 10172	A 10172	Antarctica	2010	1.788	LL6
Asuka 10173	A 10173	Antarctica	2010	4.584	LL6
Asuka 10174	A 10174	Antarctica	2010	8.016	H6
Asuka 10175	A 10175	Antarctica	2010	10.406	H6
Asuka 10176	A 10176	Antarctica	2010	5.081	LL5
Asuka 10177	A 10177	Antarctica	2010	233.82	H5
Asuka 10178	A 10178	Antarctica	2010	200.29	H5
Asuka 10179	A 10179	Antarctica	2010	440.21	H5
Asuka 10180	A 10180	Antarctica	2010	69.65	H5
Asuka 10181	A 10181	Antarctica	2010	32.363	L6
Asuka 10182	A 10182	Antarctica	2010	540.01	H5
Asuka 10183	A 10183	Antarctica	2010	8.526	CV3
Asuka 10185	A 10185	Antarctica	2010	395.98	H5
Asuka 10186	A 10186	Antarctica	2010	9.506	H4
Asuka 10187	A 10187	Antarctica	2010	150.21	L5
Asuka 10188	A 10188	Antarctica	2010	160.13	H5
Asuka 10190	A 10190	Antarctica	2010	4.231	H5
Asuka 10193	A 10193	Antarctica	2010	9.882	H6
Asuka 10194	A 10194	Antarctica	2010	12.552	H5
Asuka 10195	A 10195	Antarctica	2010	7.723	H5
Asuka 10196	A 10196	Antarctica	2010	5.025	H5
Asuka 10198	A 10198	Antarctica	2010	70.72	CO3
Asuka 10199	A 10199	Antarctica	2010	31.315	H6
Asuka 10200	A 10200	Antarctica	2010	25.906	H5
Asuka 10201	A 10201	Antarctica	2010	336.58	H5
Asuka 10202	A 10202	Antarctica	2010	13.624	H6
Asuka 10203	A 10203	Antarctica	2010	24.331	H4
Asuka 10204	A 10204	Antarctica	2010	9.217	H6
Asuka 10205	A 10205	Antarctica	2010	20.273	L6
Asuka 10207	A 10207	Antarctica	2010	10.481	H5

Asuka 10210	A 10210	Antarctica	2010	10.527	H5
Asuka 10211	A 10211	Antarctica	2010	223.13	L6
Asuka 10212	A 10212	Antarctica	2010	5.370	E6
Asuka 10213	A 10213	Antarctica	2010	6.707	H5
Asuka 10215	A 10215	Antarctica	2010	158.79	L6
Asuka 10217	A 10217	Antarctica	2010	23.470	H5
Asuka 10218	A 10218	Antarctica	2010	7.150	H6
Asuka 10219	A 10219	Antarctica	2010	4.203	H5
Asuka 10220	A 10220	Antarctica	2010	12.173	L6
Asuka 10222	A 10222	Antarctica	2010	5.531	CK4
Asuka 10223	A 10223	Antarctica	2010	16.938	H5
Asuka 10224	A 10224	Antarctica	2010	108.52	L3
Asuka 10225	A 10225	Antarctica	2010	23.406	H5
Asuka 10227	A 10227	Antarctica	2010	31.601	H5
Asuka 10229	A 10229	Antarctica	2010	6.275	H5
Asuka 10230	A 10230	Antarctica	2010	127.50	H6
Asuka 12001	A 12001	Antarctica	2012	7.476	LL6
Asuka 12002	A 12002	Antarctica	2012	225.17	H5
Asuka 12006	A 12006	Antarctica	2012	37.222	H4
Asuka 12007	A 12007	Antarctica	2012	29.400	H5
Asuka 12008	A 12008	Antarctica	2012	81.95	LL6
Asuka 12009	A 12009	Antarctica	2012	353.33	L6
Asuka 12010	A 12010	Antarctica	2012	88.86	H5
Asuka 12011	A 12011	Antarctica	2012	113.31	LL4-6
Asuka 12015	A 12015	Antarctica	2012	105.18	Diogenite
Asuka 12017	A 12017	Antarctica	2012	14.182	H4-5
Asuka 12019	A 12019	Antarctica	2012	107.76	L6
Asuka 12022	A 12022	Antarctica	2012	36.747	L6
Asuka 12023	A 12023	Antarctica	2012	25.340	LL4-6
Asuka 12025	A 12025	Antarctica	2012	11.724	H5
Asuka 12028	A 12028	Antarctica	2012	2.712	L6
Asuka 12031	A 12031	Antarctica	2012	32.188	CM2
Asuka 12033	A 12033	Antarctica	2012	32.042	L5
Asuka 12034	A 12034	Antarctica	2012	8.447	H5
Asuka 12035	A 12035	Antarctica	2012	19.787	L6
Asuka 12039	A 12039	Antarctica	2012	102.63	H5
Asuka 12041	A 12041	Antarctica	2012	28.254	L4
Asuka 12045	A 12045	Antarctica	2012	38.014	L6
Asuka 12047	A 12047	Antarctica	2012	27.694	CK4
Asuka 12048	A 12048	Antarctica	2012	59.610	H4
Asuka 12049	A 12049	Antarctica	2012	12.034	L6
Asuka 12051	A 12051	Antarctica	2012	25.752	H4-6
Asuka 12052	A 12052	Antarctica	2012	27.445	L6
Asuka 12054	A 12054	Antarctica	2012	38.694	H4

Asuka 12055	A 12055	Antarctica	2012	9.928	LL3
Asuka 12056	A 12056	Antarctica	2012	120.04	L4
Asuka 12057	A 12057	Antarctica	2012	4.456	E-melt breccia
Asuka 12062	A 12062	Antarctica	2012	27.660	H5
Asuka 12063	A 12063	Antarctica	2012	3.958	L6
Asuka 12064	A 12064	Antarctica	2012	3.852	H5
Asuka 12065	A 12065	Antarctica	2012	3.644	LL5-6
Asuka 12066	A 12066	Antarctica	2012	13.543	LL4-6
Asuka 12067	A 12067	Antarctica	2012	2.211	H6
Asuka 12068	A 12068	Antarctica	2012	44.504	H5
Asuka 12069	A 12069	Antarctica	2012	17.030	H5
Asuka 12070	A 12070	Antarctica	2012	25.373	L5
Asuka 12389	A 12389	Antarctica	2012	18066.2	LL3-6
Blackhawk Mountain		United States	20 Oct 2012	20.16	H4
Buckhorn Lake		United States	2008 Feb 28	14.1	H4
Calama 001		Chile	3 June 2010	270	Ureilite
Catalina 085		Chile	2009 Dec	45	L6
Catalina 086		Chile	2012 Oct 25	261	L5
Catalina 087		Chile	2012 Oct 25	3011	H5
Catalina 088		Chile	2013 Apr 13	274	L6
Catalina 089		Chile	2013 Nov 6	5.9	H4
Catalina 090		Chile	2013 Nov 6	16	H4
Catalina 091		Chile	2013 Nov 7	12.1	H3
Catalina 092		Chile	2012 Feb 9	65	L3
Coyote Dry Lake 319	CyDL 319	United States	2006 Sep 17	3.40	H5
Coyote Dry Lake 338	CyDL 338	United States	2013 Dec 9	282.2	H6
Cruz Alta		Brazil	2008	48000	Iron, IIAB
Dar al Gani 1064	DaG 1064	Libya	21 Nov 2000	72.335	Ureilite-pmict
Dar el Kahal		Mali	P Oct 2013	85000	H5-6
Demsa		Nigeria	2006 Oct 31	5000	H6
Dhofar 1604	Dho 1604	Oman	10 Dec 2004	438	L5
Dhofar 1610	Dho 1610	Oman	11 Feb 2003	2552	H4
Dhofar 1620	Dho 1620	Oman	2009 Oct 6	240	CO3
Dhofar 1621	Dho 1621	Oman	2009 Oct 5	85	CO3
Dhofar 1756	Dho 1756	Oman	4 June 2000	559	H5
Dhofar 1768	Dho 1768	Oman	2011 Mar	49.7	Diogenite-pm
Dhofar 1785	Dho 1785	Oman	20 Jan 2012	140.555	H5
Dhofar 1786	Dho 1786	Oman	20 Jan 2012	43.083	H5
Dhofar 1787	Dho 1787	Oman	20 Jan 2012	56.967	L6
Dhofar 1788	Dho 1788	Oman	20 Jan 2012	72.608	H4/5
Dhofar 1789	Dho 1789	Oman	20 Jan 2012	208.943	H4
Dhofar 1790	Dho 1790	Oman	20 Jan 2012	45.773	H4/5
Dhofar 1791	Dho 1791	Oman	20 Jan 2012	40.409	H4/5
Dhofar 1792	Dho 1792	Oman	20 Jan 2012	44.949	H4/5

Dhofar 1793	Dho 1793	Oman	20 Jan 2012	47.869	H4/5
Dhofar 1794	Dho 1794	Oman	20 Jan 2012	4.686	L5
Dhofar 1795	Dho 1795	Oman	20 Jan 2012	51.746	H4/5
Dhofar 1796	Dho 1796	Oman	20 Jan 2012	69.535	H5-6
Dhofar 1797	Dho 1797	Oman	20 Jan 2012	334.008	H6
Dhofar 1798	Dho 1798	Oman	21 Jan 2012	580.243	H4-6
Dhofar 1799	Dho 1799	Oman	21 Jan 2012	2495.165	H5
Dhofar 1800	Dho 1800	Oman	21 Jan 2012	73.095	H4
Dhofar 1801	Dho 1801	Oman	21 Jan 2012	671	L4
Dhofar 1802	Dho 1802	Oman	21 Jan 2012	16.324	H4
Dhofar 1803	Dho 1803	Oman	21 Jan 2012	290.917	H4
Dhofar 1804	Dho 1804	Oman	21 Jan 2012	90.152	H4
Dhofar 1805	Dho 1805	Oman	22 Jan 2012	168.759	L6
Dhofar 1806	Dho 1806	Oman	22 Jan 2012	48.768	H4
Dhofar 1807	Dho 1807	Oman	22 Jan 2012	788.388	H4-6
Dhofar 1808	Dho 1808	Oman	22 Jan 2012	1657.201	L6
Dhofar 1809	Dho 1809	Oman	22 Jan 2012	69.604	H4/5
Dhofar 1810	Dho 1810	Oman	28 Jan 2012	168.209	H5
Dhofar 1811	Dho 1811	Oman	29 Jan 2012	23.455	L4
Dhofar 1812	Dho 1812	Oman	29 Jan 2012	13.627	L6
Dhofar 1813	Dho 1813	Oman	29 Jan 2012	17.927	L4-6
Dhofar 1814	Dho 1814	Oman	29 Jan 2012	2178.194	L6
Dhofar 1815	Dho 1815	Oman	29 Jan 2012	379.884	H4-6
Dhofar 1816	Dho 1816	Oman	30 Jan 2012	419.586	L6
Dhofar 1817	Dho 1817	Oman	Jan 2011	136.5	L6
Dhofar 1818	Dho 1818	Oman	Jan 2011	235	H6
Dhofar 1819	Dho 1819	Oman	Jan 2011	10064	LL5
Dhofar 1820	Dho 1820	Oman	Jan 2011	178.1	H5
Dhofar 1821	Dho 1821	Oman	Jan 2011	341.8	H5
Dhofar 1822	Dho 1822	Oman	Jan 2011	160.1	LL6
Dhofar 1823	Dho 1823	Oman	Jan 2011	78.6	H5
Dhofar 1824	Dho 1824	Oman	Jan 2011	41416	L6
Dhofar 1825	Dho 1825	Oman	15 Mar 2011	98.7	L3
Dhofar 1826	Dho 1826	Oman	2004	200	H6
Dhofar 1827	Dho 1827	Oman	2004	160	L4
Dhofar 1828	Dho 1828	Oman	2004	230	H5
Dhofar 1829	Dho 1829	Oman	Jan 2011	80.7	H5
Dhofar 1830	Dho 1830	Oman	Jan 2011	76.3	H6
Dhofar 1831	Dho 1831	Oman	Jan 2011	169	H5
Dhofar 1832	Dho 1832	Oman	Jan 2011	102	H4
Dhofar 1833	Dho 1833	Oman	Jan 2011	124.7	LL6
Dhofar 1834	Dho 1834	Oman	Jan 2011	357.9	L6
Dhofar 1835	Dho 1835	Oman	Jan 2011	404	H5
Dhofar 1836	Dho 1836	Oman	Jan 2011	707.4	L4

Dhofar 1837	Dho 1837	Oman	2001 Jan 12	909.7	L~4
Dhofar 1838	Dho 1838	Oman	2001 Jan 12	458.4	L~5
Dhofar 1839	Dho 1839	Oman	2001 Jan 13	956.7	LL~4
Dhofar 1840	Dho 1840	Oman	2001 Jan 15	834.7	H~5
Dhofar 1841	Dho 1841	Oman	2001 Jan 15	164.37	H~6
Dhofar 1843	Dho 1843	Oman	2001 Jan 15	241.2	H~5
Dhofar 1844	Dho 1844	Oman	2001 Jan 18	3642.8	H~6
Dhofar 1845	Dho 1845	Oman	2001 Jan 18	304.9	H~6
Dhofar 1846	Dho 1846	Oman	2001 Jan 18	233.5	H~6
Dhofar 1847	Dho 1847	Oman	2001 Jan 19	514.7	H~5
Dhofar 1848	Dho 1848	Oman	2001 Jan 19	183.03	H~6
Dhofar 1849	Dho 1849	Oman	2001 Jan 19	273.18	H~6
Dhofar 1850	Dho 1850	Oman	2001 Jan 22	155.6	H~6
Dhofar 1851	Dho 1851	Oman	2001 Jan 22	863.2	H~6
Dhofar 1852	Dho 1852	Oman	2001 Jan 22	383.1	H~6
Dhofar 1853	Dho 1853	Oman	2001 Jan 23	514.2	H~5
Dhofar 1855	Dho 1855	Oman	2001 Jan 24	1594	H~5
Dhofar 1857	Dho 1857	Oman	2001 Jan 26	494.27	H~5
Dhofar 1859	Dho 1859	Oman	2001 Jan 26	414.73	H~5
Dhofar 1861	Dho 1861	Oman	2001 Jan 28	201.37	H~5
Dhofar 1863	Dho 1863	Oman	2001 Jan 28	172.18	H~4
Dhofar 1864	Dho 1864	Oman	2001 Jan 28	278.79	H~5
Dhofar 1865	Dho 1865	Oman	2001 Jan 28	55.76	H~5
Dhofar 1867	Dho 1867	Oman	2003 Mar 2	3525	L~5
Dhofar 1870	Dho 1870	Oman	2003 Mar 4	7620.7	L~5
Dhofar 1871	Dho 1871	Oman	2003 Mar 4	415.8	H~6
Dhofar 1872	Dho 1872	Oman	2003 Mar 4	48.6	H~4
Dhofar 1873	Dho 1873	Oman	2003 Mar 4	221.1	L~4
Dhofar 1874	Dho 1874	Oman	2003 Mar 4	788.8	L~6
Dhofar 1875	Dho 1875	Oman	2003 Mar 5	375	H~5
Dhofar 1876	Dho 1876	Oman	2003 Mar 6	714.3	H~5
Dhofar 1878	Dho 1878	Oman	30 Nov 2004	24	H6
Dhofar 1879	Dho 1879	Oman	4 Dec 2004	62	H5
Dhofar 1880	Dho 1880	Oman	8 Dec 2004	190	H5
Dhofar 1881	Dho 1881	Oman	8 Dec 2004	206	L5
Dhofar 1882	Dho 1882	Oman	Jan 2011	221.1	H4
Dhofar 1883	Dho 1883	Oman	Jan 2011	167.3	H4
Dhofar 1884	Dho 1884	Oman	Jan 2011	127.9	H5
Dhofar 1885	Dho 1885	Oman	Jan 2011	76.3	L5
Dhofar 1886	Dho 1886	Oman	Jan 2011	252.2	L5
Dhofar 1887	Dho 1887	Oman	Jan 2011	830	L5
Dhofar 1888	Dho 1888	Oman	Jan 2011	212.3	L6
Dhofar 1889	Dho 1889	Oman	Jan 2011	419	H6
Dhofar 1890	Dho 1890	Oman	Jan 2011	509.6	H5

Dhofar 1891	Dho 1891	Oman	Jan 2011	205.5	H5
Dhofar 1892	Dho 1892	Oman	Jan 2011	1413.9	H5
Dhofar 1893	Dho 1893	Oman	Jan 2011	546.2	H5
Dhofar 1894	Dho 1894	Oman	Jan 2011	709.9	H5
Dhofar 1895	Dho 1895	Oman	Jan 2011	4838.8	H5
Dhofar 1896	Dho 1896	Oman	Jan 2011	116.3	H4
Dhofar 1897	Dho 1897	Oman	Jan 2011	474.5	L6
Dhofar 1964	Dho 1964	Oman	30 Nov 2004	124	H5
Dhofar 1965	Dho 1965	Oman	17 Dec 2004	352	H5
Dhofar 1966	Dho 1966	Oman	10 Dec 2004	164	H6
Dhofar 1967	Dho 1967	Oman	08 Feb 2003	1012	H5
Dhofar 1968	Dho 1968	Oman	01 Dec 2004	190	H5
Dhofar 1969	Dho 1969	Oman	January 2011	155.5	H4
Dhofar 1970	Dho 1970	Oman	January 2011	80.7	L5
Dhofar 1971	Dho 1971	Oman	January 2011	79.5	H5
Dhofar 1972	Dho 1972	Oman	January 2011	113.5	L5
Dhofar 1973	Dho 1973	Oman	January 2011	130.3	H5
Dhofar 1974	Dho 1974	Oman	January 2011	23.7	H5
Dhofar 1975	Dho 1975	Oman	2011 Jan	35.5	H6
Dhofar 1976	Dho 1976	Oman	January 2011	18.3	H5
Dhofar 1977	Dho 1977	Oman	January 2011	23.9	H4
Dhofar 1978	Dho 1978	Oman	January 2011	26.8	H5
Dhofar 1979	Dho 1979	Oman	January 2011	10.3	H5
Dhofar 1980	Dho 1980	Oman	2012 Dec	23.5	Lunar
Dhofar 1982	Dho 1982	Oman	January 2013	6000	L5
Dhofar 1983	Dho 1983	Oman	Jan 2011	56.3	Lunar (feldsp. breccia)
Dhofar 1984	Dho 1984	Oman	January 2011	32.1	Lunar (feldsp. breccia)
Diamond Valley 004	DV 004	United States	4 May 2011	28.7	H4
Diamond Valley 005	DV 005	United States	4 May 2011	52.3	H4
Diamond Valley 006	DV 006	United States	4 May 2011	13.2	L6
Dominion Range 10007	DOM 10007	Antarctica	2010	583.7	LL6
Dominion Range 10008	DOM 10008	Antarctica	2010	471.2	LL5
Dominion Range 10009	DOM 10009	Antarctica	2010	366	L5
Dominion Range 10010	DOM 10010	Antarctica	2010	640.8	L5
Dominion Range 10030	DOM 10030	Antarctica	2010	67.8	L5
Dominion Range 10031	DOM 10031	Antarctica	2010	80.4	L6
Dominion Range 10032	DOM 10032	Antarctica	2010	56.3	LL6
Dominion Range 10033	DOM 10033	Antarctica	2010	124.1	LL6
Dominion Range 10034	DOM 10034	Antarctica	2010	79.8	H6
Dominion Range 10035	DOM 10035	Antarctica	2010	87.8	LL6
Dominion Range 10036	DOM 10036	Antarctica	2010	81.3	LL6
Dominion Range 10037	DOM 10037	Antarctica	2010	48.5	LL6
Dominion Range 10038	DOM 10038	Antarctica	2010	79.3	LL6
Dominion Range 10039	DOM 10039	Antarctica	2010	95.2	L5

Dominion Range 10050	DOM 10050	Antarctica	2010	259.8	LL5
Dominion Range 10051	DOM 10051	Antarctica	2010	197	L5
Dominion Range 10052	DOM 10052	Antarctica	2010	147.7	L5
Dominion Range 10053	DOM 10053	Antarctica	2010	93.2	LL6
Dominion Range 10054	DOM 10054	Antarctica	2010	77.7	LL6
Dominion Range 10055	DOM 10055	Antarctica	2010	67.8	L5
Dominion Range 10056	DOM 10056	Antarctica	2010	43.2	L5
Dominion Range 10057	DOM 10057	Antarctica	2010	67	LL6
Dominion Range 10058	DOM 10058	Antarctica	2010	67.9	LL6
Dominion Range 10059	DOM 10059	Antarctica	2010	33.7	L6
Dominion Range 10060	DOM 10060	Antarctica	2010	42.3	LL6
Dominion Range 10061	DOM 10061	Antarctica	2010	40.6	LL6
Dominion Range 10062	DOM 10062	Antarctica	2010	21.4	LL6
Dominion Range 10063	DOM 10063	Antarctica	2010	20.5	LL6
Dominion Range 10064	DOM 10064	Antarctica	2010	32.8	L5
Dominion Range 10065	DOM 10065	Antarctica	2010	27	LL6
Dominion Range 10066	DOM 10066	Antarctica	2010	28	LL6
Dominion Range 10067	DOM 10067	Antarctica	2010	19.6	LL6
Dominion Range 10068	DOM 10068	Antarctica	2010	24	LL6
Dominion Range 10069	DOM 10069	Antarctica	2010	19.6	H5
Dominion Range 10070	DOM 10070	Antarctica	2010	12.6	LL6
Dominion Range 10071	DOM 10071	Antarctica	2010	14.2	H6
Dominion Range 10072	DOM 10072	Antarctica	2010	17.9	L6
Dominion Range 10073	DOM 10073	Antarctica	2010	8.9	LL6
Dominion Range 10074	DOM 10074	Antarctica	2010	14.4	L6
Dominion Range 10075	DOM 10075	Antarctica	2010	22	LL6
Dominion Range 10076	DOM 10076	Antarctica	2010	18.5	L6
Dominion Range 10077	DOM 10077	Antarctica	2010	8.6	CR2
Dominion Range 10078	DOM 10078	Antarctica	2010	14.1	L5
Dominion Range 10079	DOM 10079	Antarctica	2010	23.3	LL6
Dominion Range 10080	DOM 10080	Antarctica	2010	15.1	L5
Dominion Range 10081	DOM 10081	Antarctica	2010	36.3	LL6
Dominion Range 10082	DOM 10082	Antarctica	2010	34	LL6
Dominion Range 10083	DOM 10083	Antarctica	2010	28.3	LL6
Dominion Range 10084	DOM 10084	Antarctica	2010	17.2	LL5
Dominion Range 10085	DOM 10085	Antarctica	2010	18.2	CR2
Dominion Range 10086	DOM 10086	Antarctica	2010	23.6	L6
Dominion Range 10087	DOM 10087	Antarctica	2010	45.2	LL6
Dominion Range 10088	DOM 10088	Antarctica	2010	34	EL6
Dominion Range 10089	DOM 10089	Antarctica	2010	22	LL5
Dominion Range 10090	DOM 10090	Antarctica	2010	24.6	LL6
Dominion Range 10091	DOM 10091	Antarctica	2010	13.9	LL6
Dominion Range 10092	DOM 10092	Antarctica	2010	8.4	LL-imp melt
Dominion Range 10093	DOM 10093	Antarctica	2010	15.6	L5

Dominion Range 10094	DOM 10094	Antarctica	2010	9.8	LL6
Dominion Range 10095	DOM 10095	Antarctica	2010	26.5	L6
Dominion Range 10096	DOM 10096	Antarctica	2010	24.5	LL6
Dominion Range 10097	DOM 10097	Antarctica	2010	18.1	L5
Dominion Range 10098	DOM 10098	Antarctica	2010	24.3	LL6
Dominion Range 10099	DOM 10099	Antarctica	2010	12.4	LL6
Dominion Range 10101	DOM 10101	Antarctica	2010	241.8	CO3
Dominion Range 10106	DOM 10106	Antarctica	2010	36.8	L5
Dominion Range 10107	DOM 10107	Antarctica	2010	39.1	L5
Dominion Range 10108	DOM 10108	Antarctica	2010	32.3	LL6
Dominion Range 10109	DOM 10109	Antarctica	2010	52.7	LL6
Dominion Range 10110	DOM 10110	Antarctica	2010	44.5	LL6
Dominion Range 10111	DOM 10111	Antarctica	2010	15.8	LL6
Dominion Range 10112	DOM 10112	Antarctica	2010	41.5	LL6
Dominion Range 10113	DOM 10113	Antarctica	2010	18	H6
Dominion Range 10114	DOM 10114	Antarctica	2010	11	L-imp melt
Dominion Range 10115	DOM 10115	Antarctica	2010	22.4	LL6
Dominion Range 10116	DOM 10116	Antarctica	2010	59.5	LL6
Dominion Range 10117	DOM 10117	Antarctica	2010	39.9	LL6
Dominion Range 10118	DOM 10118	Antarctica	2010	33.9	LL6
Dominion Range 10119	DOM 10119	Antarctica	2010	21	L5
Dominion Range 10130	DOM 10130	Antarctica	2010	50.4	L5
Dominion Range 10131	DOM 10131	Antarctica	2010	72.3	L5
Dominion Range 10132	DOM 10132	Antarctica	2010	65	H4
Dominion Range 10133	DOM 10133	Antarctica	2010	45.9	LL6
Dominion Range 10134	DOM 10134	Antarctica	2010	90	LL6
Dominion Range 10135	DOM 10135	Antarctica	2010	77	LL6
Dominion Range 10136	DOM 10136	Antarctica	2010	110.9	LL6
Dominion Range 10137	DOM 10137	Antarctica	2010	126	LL6
Dominion Range 10138	DOM 10138	Antarctica	2010	95.3	LL6
Dominion Range 10139	DOM 10139	Antarctica	2010	58.8	LL6
Dominion Range 10140	DOM 10140	Antarctica	2010	223.8	LL5
Dominion Range 10141	DOM 10141	Antarctica	2010	177.5	LL5
Dominion Range 10142	DOM 10142	Antarctica	2010	253.8	LL6
Dominion Range 10143	DOM 10143	Antarctica	2010	124.6	LL6
Dominion Range 10144	DOM 10144	Antarctica	2010	80.7	LL6
Dominion Range 10145	DOM 10145	Antarctica	2010	71.4	LL6
Dominion Range 10146	DOM 10146	Antarctica	2010	42.4	LL6
Dominion Range 10147	DOM 10147	Antarctica	2010	42.3	H5
Dominion Range 10148	DOM 10148	Antarctica	2010	54.5	LL6
Dominion Range 10149	DOM 10149	Antarctica	2010	61	L5
Dominion Range 10150	DOM 10150	Antarctica	2010	23	LL6
Dominion Range 10151	DOM 10151	Antarctica	2010	31.9	LL6
Dominion Range 10152	DOM 10152	Antarctica	2010	34.3	LL6

Dominion Range 10153	DOM 10153	Antarctica	2010	35.6	LL6
Dominion Range 10154	DOM 10154	Antarctica	2010	27.3	LL5
Dominion Range 10155	DOM 10155	Antarctica	2010	53	LL5
Dominion Range 10156	DOM 10156	Antarctica	2010	36.2	LL6
Dominion Range 10157	DOM 10157	Antarctica	2010	23.9	LL5
Dominion Range 10158	DOM 10158	Antarctica	2010	12	H6
Dominion Range 10159	DOM 10159	Antarctica	2010	14.5	H6
Dominion Range 10160	DOM 10160	Antarctica	2010	5.9	L6
Dominion Range 10161	DOM 10161	Antarctica	2010	10.1	H5
Dominion Range 10162	DOM 10162	Antarctica	2010	14.7	LL6
Dominion Range 10163	DOM 10163	Antarctica	2010	10.4	LL6
Dominion Range 10164	DOM 10164	Antarctica	2010	11.3	L6
Dominion Range 10166	DOM 10166	Antarctica	2010	11.3	LL6
Dominion Range 10167	DOM 10167	Antarctica	2010	2.5	L6
Dominion Range 10168	DOM 10168	Antarctica	2010	14	LL6
Dominion Range 10169	DOM 10169	Antarctica	2010	15	LL6
Dominion Range 10180	DOM 10180	Antarctica	2010	19.6	L5
Dominion Range 10181	DOM 10181	Antarctica	2010	8.7	LL6
Dominion Range 10182	DOM 10182	Antarctica	2010	10	LL5
Dominion Range 10183	DOM 10183	Antarctica	2010	18.7	L6
Dominion Range 10184	DOM 10184	Antarctica	2010	30	LL6
Dominion Range 10185	DOM 10185	Antarctica	2010	21.1	LL6
Dominion Range 10186	DOM 10186	Antarctica	2010	34.1	H6
Dominion Range 10187	DOM 10187	Antarctica	2010	14.2	L6
Dominion Range 10188	DOM 10188	Antarctica	2010	21.6	H5
Dominion Range 10189	DOM 10189	Antarctica	2010	18.3	L6
Dominion Range 10190	DOM 10190	Antarctica	2010	90.4	LL6
Dominion Range 10191	DOM 10191	Antarctica	2010	46.2	LL6
Dominion Range 10192	DOM 10192	Antarctica	2010	65.7	LL6
Dominion Range 10193	DOM 10193	Antarctica	2010	65.4	LL5
Dominion Range 10194	DOM 10194	Antarctica	2010	73	LL6
Dominion Range 10195	DOM 10195	Antarctica	2010	98.8	L5
Dominion Range 10196	DOM 10196	Antarctica	2010	77.4	LL6
Dominion Range 10197	DOM 10197	Antarctica	2010	61.8	LL6
Dominion Range 10198	DOM 10198	Antarctica	2010	35.9	LL6
Dominion Range 10199	DOM 10199	Antarctica	2010	29.1	LL6
Dominion Range 10200	DOM 10200	Antarctica	2010	445.9	LL6
Dominion Range 10201	DOM 10201	Antarctica	2010	231	LL6
Dominion Range 10202	DOM 10202	Antarctica	2010	245.5	LL6
Dominion Range 10203	DOM 10203	Antarctica	2010	210.7	L5
Dominion Range 10204	DOM 10204	Antarctica	2010	136.1	H6
Dominion Range 10205	DOM 10205	Antarctica	2010	106.2	LL6
Dominion Range 10206	DOM 10206	Antarctica	2010	106.7	H6
Dominion Range 10207	DOM 10207	Antarctica	2010	133	LL6

Dominion Range 10208	DOM 10208	Antarctica	2010	133	L6
Dominion Range 10209	DOM 10209	Antarctica	2010	96	L5
Dominion Range 10220	DOM 10220	Antarctica	2010	78.9	LL6
Dominion Range 10221	DOM 10221	Antarctica	2010	52.2	LL6
Dominion Range 10222	DOM 10222	Antarctica	2010	46.8	LL6
Dominion Range 10223	DOM 10223	Antarctica	2010	49.8	LL6
Dominion Range 10224	DOM 10224	Antarctica	2010	49.6	LL6
Dominion Range 10225	DOM 10225	Antarctica	2010	60	LL6
Dominion Range 10226	DOM 10226	Antarctica	2010	32.7	LL6
Dominion Range 10227	DOM 10227	Antarctica	2010	44.4	LL6
Dominion Range 10228	DOM 10228	Antarctica	2010	59.3	L6
Dominion Range 10229	DOM 10229	Antarctica	2010	56.3	LL6
Dominion Range 10230	DOM 10230	Antarctica	2010	17.8	LL6
Dominion Range 10231	DOM 10231	Antarctica	2010	7.7	L6
Dominion Range 10232	DOM 10232	Antarctica	2010	10.5	L6
Dominion Range 10233	DOM 10233	Antarctica	2010	11.3	LL6
Dominion Range 10234	DOM 10234	Antarctica	2010	13.7	L6
Dominion Range 10235	DOM 10235	Antarctica	2010	9.1	L6
Dominion Range 10236	DOM 10236	Antarctica	2010	19.2	LL6
Dominion Range 10237	DOM 10237	Antarctica	2010	10.2	L6
Dominion Range 10238	DOM 10238	Antarctica	2010	9.2	LL6
Dominion Range 10239	DOM 10239	Antarctica	2010	18.8	LL6
Dominion Range 10240	DOM 10240	Antarctica	2010	110.5	LL6
Dominion Range 10241	DOM 10241	Antarctica	2010	102.5	LL6
Dominion Range 10242	DOM 10242	Antarctica	2010	72.7	LL6
Dominion Range 10243	DOM 10243	Antarctica	2010	52.4	LL6
Dominion Range 10244	DOM 10244	Antarctica	2010	103.2	LL6
Dominion Range 10245	DOM 10245	Antarctica	2010	46	LL6
Dominion Range 10246	DOM 10246	Antarctica	2010	79.4	LL6
Dominion Range 10247	DOM 10247	Antarctica	2010	43.8	L6
Dominion Range 10248	DOM 10248	Antarctica	2010	49.4	L6
Dominion Range 10249	DOM 10249	Antarctica	2010	64.1	LL6
Dominion Range 10257	DOM 10257	Antarctica	2010	11.7	CV3
Dominion Range 10260	DOM 10260	Antarctica	2010	34.8	LL5
Dominion Range 10261	DOM 10261	Antarctica	2010	36.3	LL6
Dominion Range 10262	DOM 10262	Antarctica	2010	31.9	L6
Dominion Range 10263	DOM 10263	Antarctica	2010	30.8	LL6
Dominion Range 10264	DOM 10264	Antarctica	2010	21.3	LL6
Dominion Range 10265	DOM 10265	Antarctica	2010	16.9	LL6
Dominion Range 10266	DOM 10266	Antarctica	2010	28.4	LL6
Dominion Range 10267	DOM 10267	Antarctica	2010	33.5	LL6
Dominion Range 10268	DOM 10268	Antarctica	2010	36.5	LL5
Dominion Range 10269	DOM 10269	Antarctica	2010	36.6	LL6
Dominion Range 10283	DOM 10283	Antarctica	2010	18.5	LL5

Dominion Range 10290	DOM 10290	Antarctica	2010	48.3	LL6
Dominion Range 10291	DOM 10291	Antarctica	2010	39.6	LL6
Dominion Range 10292	DOM 10292	Antarctica	2010	44.9	LL6
Dominion Range 10293	DOM 10293	Antarctica	2010	41.2	L6
Dominion Range 10294	DOM 10294	Antarctica	2010	45.4	LL6
Dominion Range 10295	DOM 10295	Antarctica	2010	42.2	L5
Dominion Range 10296	DOM 10296	Antarctica	2010	48.6	LL6
Dominion Range 10297	DOM 10297	Antarctica	2010	28.9	LL6
Dominion Range 10298	DOM 10298	Antarctica	2010	46.2	L6
Dominion Range 10300	DOM 10300	Antarctica	2010	409.6	LL6
Dominion Range 10301	DOM 10301	Antarctica	2010	274.2	LL6
Dominion Range 10302	DOM 10302	Antarctica	2010	227.1	L-imp melt
Dominion Range 10303	DOM 10303	Antarctica	2010	324.4	LL6
Dominion Range 10304	DOM 10304	Antarctica	2010	131.2	LL6
Dominion Range 10305	DOM 10305	Antarctica	2010	87.7	H6
Dominion Range 10306	DOM 10306	Antarctica	2010	98.4	LL6
Dominion Range 10307	DOM 10307	Antarctica	2010	170	L5
Dominion Range 10308	DOM 10308	Antarctica	2010	98.7	LL6
Dominion Range 10309	DOM 10309	Antarctica	2010	71.4	LL6
Dominion Range 10330	DOM 10330	Antarctica	2010	16.3	LL6
Dominion Range 10331	DOM 10331	Antarctica	2010	17.9	L6
Dominion Range 10332	DOM 10332	Antarctica	2010	19.7	LL6
Dominion Range 10333	DOM 10333	Antarctica	2010	10.3	L6
Dominion Range 10334	DOM 10334	Antarctica	2010	36.1	LL5
Dominion Range 10335	DOM 10335	Antarctica	2010	19.4	L6
Dominion Range 10336	DOM 10336	Antarctica	2010	37	LL6
Dominion Range 10337	DOM 10337	Antarctica	2010	41.4	L6
Dominion Range 10338	DOM 10338	Antarctica	2010	52.2	L5
Dominion Range 10339	DOM 10339	Antarctica	2010	40.3	LL6
Dominion Range 10340	DOM 10340	Antarctica	2010	92.1	L6
Dominion Range 10341	DOM 10341	Antarctica	2010	57.7	L5
Dominion Range 10342	DOM 10342	Antarctica	2010	110.3	LL5
Dominion Range 10343	DOM 10343	Antarctica	2010	61.3	L5
Dominion Range 10344	DOM 10344	Antarctica	2010	68.4	CR2
Dominion Range 10345	DOM 10345	Antarctica	2010	71.2	LL6
Dominion Range 10346	DOM 10346	Antarctica	2010	59.1	LL6
Dominion Range 10347	DOM 10347	Antarctica	2010	74.5	H6
Dominion Range 10348	DOM 10348	Antarctica	2010	87.3	L5
Dominion Range 10349	DOM 10349	Antarctica	2010	106.5	LL6
Dominion Range 10370	DOM 10370	Antarctica	2010	18.3	L6
Dominion Range 10371	DOM 10371	Antarctica	2010	24.6	L6
Dominion Range 10372	DOM 10372	Antarctica	2010	19.5	LL6
Dominion Range 10373	DOM 10373	Antarctica	2010	30.4	LL6
Dominion Range 10374	DOM 10374	Antarctica	2010	57.1	LL6

Dominion Range 10375	DOM 10375	Antarctica	2010	73.1	LL5
Dominion Range 10376	DOM 10376	Antarctica	2010	50.6	LL5
Dominion Range 10377	DOM 10377	Antarctica	2010	41.9	LL6
Dominion Range 10378	DOM 10378	Antarctica	2010	33.2	L6
Dominion Range 10379	DOM 10379	Antarctica	2010	91.5	LL6
Dominion Range 10380	DOM 10380	Antarctica	2010	19.4	LL6
Dominion Range 10381	DOM 10381	Antarctica	2010	31.9	LL6
Dominion Range 10382	DOM 10382	Antarctica	2010	23	LL6
Dominion Range 10383	DOM 10383	Antarctica	2010	29.2	L6
Dominion Range 10384	DOM 10384	Antarctica	2010	14	H6
Dominion Range 10385	DOM 10385	Antarctica	2010	22.4	LL6
Dominion Range 10386	DOM 10386	Antarctica	2010	16.9	LL6
Dominion Range 10387	DOM 10387	Antarctica	2010	13.9	L5
Dominion Range 10388	DOM 10388	Antarctica	2010	16.4	LL6
Dominion Range 10389	DOM 10389	Antarctica	2010	10.7	L6
Dominion Range 10390	DOM 10390	Antarctica	2010	99.8	LL6
Dominion Range 10391	DOM 10391	Antarctica	2010	139.7	LL6
Dominion Range 10392	DOM 10392	Antarctica	2010	179.5	L5
Dominion Range 10393	DOM 10393	Antarctica	2010	76	L6
Dominion Range 10394	DOM 10394	Antarctica	2010	73.6	LL6
Dominion Range 10395	DOM 10395	Antarctica	2010	53	LL6
Dominion Range 10396	DOM 10396	Antarctica	2010	73.2	LL6
Dominion Range 10397	DOM 10397	Antarctica	2010	59	L6
Dominion Range 10398	DOM 10398	Antarctica	2010	42.8	LL6
Dominion Range 10399	DOM 10399	Antarctica	2010	44.8	LL6
Dominion Range 10420	DOM 10420	Antarctica	2010	13.8	L6
Dominion Range 10421	DOM 10421	Antarctica	2010	18.8	L6
Dominion Range 10422	DOM 10422	Antarctica	2010	26.1	LL6
Dominion Range 10423	DOM 10423	Antarctica	2010	28.3	L5
Dominion Range 10424	DOM 10424	Antarctica	2010	22.6	LL6
Dominion Range 10425	DOM 10425	Antarctica	2010	41.5	LL6
Dominion Range 10426	DOM 10426	Antarctica	2010	57	LL6
Dominion Range 10427	DOM 10427	Antarctica	2010	39.9	L5
Dominion Range 10428	DOM 10428	Antarctica	2010	52.6	LL6
Dominion Range 10429	DOM 10429	Antarctica	2010	16.7	LL6
Dominion Range 10450	DOM 10450	Antarctica	2010	179.4	LL6
Dominion Range 10451	DOM 10451	Antarctica	2010	173.6	LL6
Dominion Range 10452	DOM 10452	Antarctica	2010	99.5	L5
Dominion Range 10453	DOM 10453	Antarctica	2010	75.1	LL6
Dominion Range 10454	DOM 10454	Antarctica	2010	196.4	L6
Dominion Range 10460	DOM 10460	Antarctica	2010	44.4	LL6
Dominion Range 10461	DOM 10461	Antarctica	2010	80.5	LL6
Dominion Range 10462	DOM 10462	Antarctica	2010	49.5	LL6
Dominion Range 10463	DOM 10463	Antarctica	2010	60.8	LL6

Dominion Range 10464	DOM 10464	Antarctica	2010	41.2	LL6
Dominion Range 10465	DOM 10465	Antarctica	2010	40.2	LL6
Dominion Range 10466	DOM 10466	Antarctica	2010	15.5	LL6
Dominion Range 10467	DOM 10467	Antarctica	2010	28.3	CR2
Dominion Range 10468	DOM 10468	Antarctica	2010	24.1	LL6
Dominion Range 10469	DOM 10469	Antarctica	2010	23.4	L5
Dominion Range 10470	DOM 10470	Antarctica	2010	22.7	LL6
Dominion Range 10471	DOM 10471	Antarctica	2010	22.7	LL6
Dominion Range 10472	DOM 10472	Antarctica	2010	37.8	L5
Dominion Range 10473	DOM 10473	Antarctica	2010	42.5	LL6
Dominion Range 10474	DOM 10474	Antarctica	2010	39	LL6
Dominion Range 10475	DOM 10475	Antarctica	2010	29.5	LL6
Dominion Range 10476	DOM 10476	Antarctica	2010	32.3	LL5
Dominion Range 10477	DOM 10477	Antarctica	2010	27	L6
Dominion Range 10478	DOM 10478	Antarctica	2010	37.9	LL6
Dominion Range 10479	DOM 10479	Antarctica	2010	20.7	LL6
Dominion Range 10490	DOM 10490	Antarctica	2010	115.9	LL3.2
Dominion Range 10491	DOM 10491	Antarctica	2010	96.7	LL6
Dominion Range 10492	DOM 10492	Antarctica	2010	126.3	L6
Dominion Range 10493	DOM 10493	Antarctica	2010	265.9	L5
Dominion Range 10494	DOM 10494	Antarctica	2010	164.4	LL6
Dominion Range 10520	DOM 10520	Antarctica	2010	51.8	LL6
Dominion Range 10521	DOM 10521	Antarctica	2010	69.8	LL5
Dominion Range 10522	DOM 10522	Antarctica	2010	44.3	LL6
Dominion Range 10523	DOM 10523	Antarctica	2010	42.4	LL6
Dominion Range 10524	DOM 10524	Antarctica	2010	34.4	L5
Dominion Range 10525	DOM 10525	Antarctica	2010	46.8	LL6
Dominion Range 10526	DOM 10526	Antarctica	2010	21.3	L5
Dominion Range 10527	DOM 10527	Antarctica	2010	39.7	L6
Dominion Range 10528	DOM 10528	Antarctica	2010	24.8	LL6
Dominion Range 10529	DOM 10529	Antarctica	2010	18.9	LL6
Dominion Range 10550	DOM 10550	Antarctica	2010	89.7	L5
Dominion Range 10551	DOM 10551	Antarctica	2010	70.4	LL6
Dominion Range 10552	DOM 10552	Antarctica	2010	47.1	LL6
Dominion Range 10553	DOM 10553	Antarctica	2010	57.9	LL6
Dominion Range 10554	DOM 10554	Antarctica	2010	83.6	LL6
Dominion Range 10555	DOM 10555	Antarctica	2010	62.5	LL6
Dominion Range 10556	DOM 10556	Antarctica	2010	119.9	L3.6
Dominion Range 10557	DOM 10557	Antarctica	2010	102	LL6
Dominion Range 10558	DOM 10558	Antarctica	2010	86.9	LL6
Dominion Range 10559	DOM 10559	Antarctica	2010	104.8	LL6
Dominion Range 10560	DOM 10560	Antarctica	2010	36.8	LL5
Dominion Range 10561	DOM 10561	Antarctica	2010	71.3	LL6
Dominion Range 10562	DOM 10562	Antarctica	2010	56.6	H6

Dominion Range 10563	DOM 10563	Antarctica	2010	66.5	LL6
Dominion Range 10564	DOM 10564	Antarctica	2010	80.5	LL6
Dominion Range 10565	DOM 10565	Antarctica	2010	43.6	L6
Dominion Range 10567	DOM 10567	Antarctica	2010	49.9	H6
Dominion Range 10568	DOM 10568	Antarctica	2010	50.1	LL6
Dominion Range 10569	DOM 10569	Antarctica	2010	44.8	LL6
Dominion Range 10570	DOM 10570	Antarctica	2010	15.4	L5
Dominion Range 10571	DOM 10571	Antarctica	2010	22.4	LL6
Dominion Range 10572	DOM 10572	Antarctica	2010	18.1	L6
Dominion Range 10573	DOM 10573	Antarctica	2010	17	L6
Dominion Range 10574	DOM 10574	Antarctica	2010	35.8	LL6
Dominion Range 10575	DOM 10575	Antarctica	2010	17.2	L5
Dominion Range 10576	DOM 10576	Antarctica	2010	24.9	LL6
Dominion Range 10577	DOM 10577	Antarctica	2010	41.3	LL6
Dominion Range 10578	DOM 10578	Antarctica	2010	31	LL6
Dominion Range 10579	DOM 10579	Antarctica	2010	34	L5
Dominion Range 10580	DOM 10580	Antarctica	2010	53.8	LL6
Dominion Range 10581	DOM 10581	Antarctica	2010	69.5	LL5
Dominion Range 10582	DOM 10582	Antarctica	2010	45.2	L6
Dominion Range 10583	DOM 10583	Antarctica	2010	57	LL6
Dominion Range 10584	DOM 10584	Antarctica	2010	83.1	LL6
Dominion Range 10585	DOM 10585	Antarctica	2010	82.3	LL6
Dominion Range 10586	DOM 10586	Antarctica	2010	75	LL6
Dominion Range 10587	DOM 10587	Antarctica	2010	55.1	LL6
Dominion Range 10588	DOM 10588	Antarctica	2010	53.7	LL6
Dominion Range 10589	DOM 10589	Antarctica	2010	38	L6
Dominion Range 10610	DOM 10610	Antarctica	2010	43	H6
Dominion Range 10611	DOM 10611	Antarctica	2010	50.2	L5
Dominion Range 10612	DOM 10612	Antarctica	2010	43.6	LL6
Dominion Range 10613	DOM 10613	Antarctica	2010	48.5	LL6
Dominion Range 10614	DOM 10614	Antarctica	2010	64.2	L5
Dominion Range 10615	DOM 10615	Antarctica	2010	66.1	L6
Dominion Range 10616	DOM 10616	Antarctica	2010	35.9	LL6
Dominion Range 10617	DOM 10617	Antarctica	2010	86.2	LL6
Dominion Range 10618	DOM 10618	Antarctica	2010	48.4	LL6
Dominion Range 10619	DOM 10619	Antarctica	2010	40.1	LL6
Dominion Range 10620	DOM 10620	Antarctica	2010	36.2	LL6
Dominion Range 10621	DOM 10621	Antarctica	2010	45.9	LL3.6
Dominion Range 10622	DOM 10622	Antarctica	2010	29.3	LL5
Dominion Range 10623	DOM 10623	Antarctica	2010	30	L5
Dominion Range 10624	DOM 10624	Antarctica	2010	40.6	LL5
Dominion Range 10625	DOM 10625	Antarctica	2010	28.8	LL6
Dominion Range 10626	DOM 10626	Antarctica	2010	20.8	LL5
Dominion Range 10627	DOM 10627	Antarctica	2010	31.8	LL6

Dominion Range 10628	DOM 10628	Antarctica	2010	41	LL6
Dominion Range 10629	DOM 10629	Antarctica	2010	38	LL6
Dominion Range 10640	DOM 10640	Antarctica	2010	35.5	LL6
Dominion Range 10641	DOM 10641	Antarctica	2010	36.6	LL6
Dominion Range 10642	DOM 10642	Antarctica	2010	27.1	LL6
Dominion Range 10643	DOM 10643	Antarctica	2010	36.3	LL6
Dominion Range 10644	DOM 10644	Antarctica	2010	20.7	LL5
Dominion Range 10645	DOM 10645	Antarctica	2010	26.2	L6
Dominion Range 10646	DOM 10646	Antarctica	2010	40.9	LL6
Dominion Range 10647	DOM 10647	Antarctica	2010	35	LL6
Dominion Range 10648	DOM 10648	Antarctica	2010	32.9	LL6
Dominion Range 10649	DOM 10649	Antarctica	2010	39.7	LL6
Dominion Range 10650	DOM 10650	Antarctica	2010	15.3	LL6
Dominion Range 10651	DOM 10651	Antarctica	2010	14	L5
Dominion Range 10652	DOM 10652	Antarctica	2010	28.3	LL6
Dominion Range 10653	DOM 10653	Antarctica	2010	29.9	LL6
Dominion Range 10654	DOM 10654	Antarctica	2010	35.1	LL6
Dominion Range 10655	DOM 10655	Antarctica	2010	52.3	LL6
Dominion Range 10656	DOM 10656	Antarctica	2010	52.2	LL6
Dominion Range 10657	DOM 10657	Antarctica	2010	69	LL6
Dominion Range 10658	DOM 10658	Antarctica	2010	24.9	LL5
Dominion Range 10659	DOM 10659	Antarctica	2010	34.1	LL6
Dominion Range 10661	DOM 10661	Antarctica	2010	9.7	L6
Dominion Range 10662	DOM 10662	Antarctica	2010	4.5	Ureilite
Dominion Range 10663	DOM 10663	Antarctica	2010	7	L6
Dominion Range 10664	DOM 10664	Antarctica	2010	14.9	LL6
Dominion Range 10665	DOM 10665	Antarctica	2010	9.2	L6
Dominion Range 10666	DOM 10666	Antarctica	2010	7.6	L6
Dominion Range 10667	DOM 10667	Antarctica	2010	10	LL6
Dominion Range 10668	DOM 10668	Antarctica	2010	2.8	L6
Dominion Range 10669	DOM 10669	Antarctica	2010	5.7	L6
Dominion Range 10670	DOM 10670	Antarctica	2010	26.9	LL6
Dominion Range 10671	DOM 10671	Antarctica	2010	15.8	LL6
Dominion Range 10672	DOM 10672	Antarctica	2010	15.7	LL6
Dominion Range 10673	DOM 10673	Antarctica	2010	28.2	LL6
Dominion Range 10674	DOM 10674	Antarctica	2010	22.6	LL6
Dominion Range 10675	DOM 10675	Antarctica	2010	25.1	LL5
Dominion Range 10676	DOM 10676	Antarctica	2010	18.7	LL6
Dominion Range 10677	DOM 10677	Antarctica	2010	36.9	LL6
Dominion Range 10678	DOM 10678	Antarctica	2010	32.6	L5
Dominion Range 10679	DOM 10679	Antarctica	2010	40.8	LL6
Dominion Range 10680	DOM 10680	Antarctica	2010	59.6	LL6
Dominion Range 10681	DOM 10681	Antarctica	2010	71.1	LL6
Dominion Range 10682	DOM 10682	Antarctica	2010	40.4	L6

Dominion Range 10683	DOM 10683	Antarctica	2010	50.7	LL6
Dominion Range 10684	DOM 10684	Antarctica	2010	57.8	LL6
Dominion Range 10685	DOM 10685	Antarctica	2010	57.4	LL6
Dominion Range 10686	DOM 10686	Antarctica	2010	181.6	L6
Dominion Range 10687	DOM 10687	Antarctica	2010	73.9	LL6
Dominion Range 10688	DOM 10688	Antarctica	2010	156.1	LL6
Dominion Range 10689	DOM 10689	Antarctica	2010	210.6	LL6
Dominion Range 10690	DOM 10690	Antarctica	2010	3.7	H6
Dominion Range 10691	DOM 10691	Antarctica	2010	5.2	LL6
Dominion Range 10692	DOM 10692	Antarctica	2010	3.8	L6
Dominion Range 10693	DOM 10693	Antarctica	2010	19.8	LL6
Dominion Range 10694	DOM 10694	Antarctica	2010	15.6	LL6
Dominion Range 10695	DOM 10695	Antarctica	2010	4.7	H6
Dominion Range 10696	DOM 10696	Antarctica	2010	22.1	H6
Dominion Range 10697	DOM 10697	Antarctica	2010	21.5	H6
Dominion Range 10698	DOM 10698	Antarctica	2010	17.8	LL6
Dominion Range 10699	DOM 10699	Antarctica	2010	11.6	LL6
Dominion Range 10700	DOM 10700	Antarctica	2010	41.2	LL6
Dominion Range 10701	DOM 10701	Antarctica	2010	69.1	LL5
Dominion Range 10702	DOM 10702	Antarctica	2010	54	LL6
Dominion Range 10703	DOM 10703	Antarctica	2010	66.5	LL6
Dominion Range 10704	DOM 10704	Antarctica	2010	65.4	LL6
Dominion Range 10705	DOM 10705	Antarctica	2010	80.4	LL6
Dominion Range 10706	DOM 10706	Antarctica	2010	47.7	LL6
Dominion Range 10707	DOM 10707	Antarctica	2010	36	L5
Dominion Range 10708	DOM 10708	Antarctica	2010	31.9	LL6
Dominion Range 10709	DOM 10709	Antarctica	2010	49.7	LL6
Dominion Range 10710	DOM 10710	Antarctica	2010	21.8	LL6
Dominion Range 10711	DOM 10711	Antarctica	2010	34.3	LL6
Dominion Range 10712	DOM 10712	Antarctica	2010	26.2	LL6
Dominion Range 10713	DOM 10713	Antarctica	2010	33.2	LL6
Dominion Range 10714	DOM 10714	Antarctica	2010	23.4	L6
Dominion Range 10715	DOM 10715	Antarctica	2010	29.4	LL6
Dominion Range 10716	DOM 10716	Antarctica	2010	27.8	LL6
Dominion Range 10717	DOM 10717	Antarctica	2010	42.1	L6
Dominion Range 10718	DOM 10718	Antarctica	2010	34.1	LL6
Dominion Range 10719	DOM 10719	Antarctica	2010	31.3	LL6
Dominion Range 10720	DOM 10720	Antarctica	2010	26	LL5
Dominion Range 10721	DOM 10721	Antarctica	2010	18.4	L6
Dominion Range 10722	DOM 10722	Antarctica	2010	23	H6
Dominion Range 10723	DOM 10723	Antarctica	2010	24.8	LL6
Dominion Range 10724	DOM 10724	Antarctica	2010	25	LL6
Dominion Range 10725	DOM 10725	Antarctica	2010	27.5	LL6
Dominion Range 10726	DOM 10726	Antarctica	2010	13.1	LL6

Dominion Range 10727	DOM 10727	Antarctica	2010	15.6	LL6
Dominion Range 10728	DOM 10728	Antarctica	2010	16.8	H6
Dominion Range 10729	DOM 10729	Antarctica	2010	33.1	LL6
Dominion Range 10730	DOM 10730	Antarctica	2010	147.7	LL6
Dominion Range 10731	DOM 10731	Antarctica	2010	100.9	LL6
Dominion Range 10732	DOM 10732	Antarctica	2010	170.6	LL6
Dominion Range 10733	DOM 10733	Antarctica	2010	282.2	LL6
Dominion Range 10734	DOM 10734	Antarctica	2010	152.2	L5
Dominion Range 10735	DOM 10735	Antarctica	2010	62.9	LL6
Dominion Range 10736	DOM 10736	Antarctica	2010	86.7	LL6
Dominion Range 10737	DOM 10737	Antarctica	2010	51.9	H6
Dominion Range 10738	DOM 10738	Antarctica	2010	41.6	LL6
Dominion Range 10739	DOM 10739	Antarctica	2010	46.4	LL6
Dominion Range 10740	DOM 10740	Antarctica	2010	23.4	L6
Dominion Range 10741	DOM 10741	Antarctica	2010	36	L6
Dominion Range 10742	DOM 10742	Antarctica	2010	21.9	L6
Dominion Range 10743	DOM 10743	Antarctica	2010	32.2	L6
Dominion Range 10744	DOM 10744	Antarctica	2010	22.1	LL6
Dominion Range 10745	DOM 10745	Antarctica	2010	32.4	LL6
Dominion Range 10746	DOM 10746	Antarctica	2010	41.5	LL5
Dominion Range 10747	DOM 10747	Antarctica	2010	23.8	LL6
Dominion Range 10748	DOM 10748	Antarctica	2010	20.5	LL6
Dominion Range 10749	DOM 10749	Antarctica	2010	22.3	LL6
Dominion Range 10750	DOM 10750	Antarctica	2010	12.3	L5
Dominion Range 10752	DOM 10752	Antarctica	2010	20.7	L6
Dominion Range 10753	DOM 10753	Antarctica	2010	8	L5
Dominion Range 10754	DOM 10754	Antarctica	2010	38	L5
Dominion Range 10755	DOM 10755	Antarctica	2010	37.6	LL5
Dominion Range 10756	DOM 10756	Antarctica	2010	36.4	LL5
Dominion Range 10757	DOM 10757	Antarctica	2010	11.4	L5
Dominion Range 10758	DOM 10758	Antarctica	2010	28.4	LL6
Dominion Range 10759	DOM 10759	Antarctica	2010	18.7	LL6
Dominion Range 10760	DOM 10760	Antarctica	2010	70.1	LL6
Dominion Range 10761	DOM 10761	Antarctica	2010	49.3	LL6
Dominion Range 10762	DOM 10762	Antarctica	2010	56.3	LL6
Dominion Range 10763	DOM 10763	Antarctica	2010	44.9	LL6
Dominion Range 10764	DOM 10764	Antarctica	2010	45.7	LL6
Dominion Range 10765	DOM 10765	Antarctica	2010	39.4	LL5
Dominion Range 10766	DOM 10766	Antarctica	2010	26.6	LL6
Dominion Range 10767	DOM 10767	Antarctica	2010	47.7	LL6
Dominion Range 10768	DOM 10768	Antarctica	2010	27.3	LL5
Dominion Range 10769	DOM 10769	Antarctica	2010	47.7	LL6
Dominion Range 10770	DOM 10770	Antarctica	2010	218	LL6
Dominion Range 10771	DOM 10771	Antarctica	2010	146.7	LL6

Dominion Range 10772	DOM 10772	Antarctica	2010	127.4	LL5
Dominion Range 10773	DOM 10773	Antarctica	2010	76.8	LL6
Dominion Range 10774	DOM 10774	Antarctica	2010	87.3	LL6
Dominion Range 10775	DOM 10775	Antarctica	2010	77.9	LL6
Dominion Range 10776	DOM 10776	Antarctica	2010	195.5	LL5
Dominion Range 10777	DOM 10777	Antarctica	2010	82.5	L6
Dominion Range 10778	DOM 10778	Antarctica	2010	29.9	LL6
Dominion Range 10779	DOM 10779	Antarctica	2010	29.7	LL6
Dominion Range 10780	DOM 10780	Antarctica	2010	57.4	LL6
Dominion Range 10781	DOM 10781	Antarctica	2010	50	LL5
Dominion Range 10782	DOM 10782	Antarctica	2010	59.4	LL6
Dominion Range 10783	DOM 10783	Antarctica	2010	101.3	LL6
Dominion Range 10784	DOM 10784	Antarctica	2010	72.9	L6
Dominion Range 10785	DOM 10785	Antarctica	2010	34.1	LL6
Dominion Range 10786	DOM 10786	Antarctica	2010	26	LL6
Dominion Range 10787	DOM 10787	Antarctica	2010	31	LL6
Dominion Range 10788	DOM 10788	Antarctica	2010	24.7	L5
Dominion Range 10789	DOM 10789	Antarctica	2010	23.1	LL6
Dominion Range 10790	DOM 10790	Antarctica	2010	23.1	LL6
Dominion Range 10791	DOM 10791	Antarctica	2010	42.7	LL6
Dominion Range 10792	DOM 10792	Antarctica	2010	38.3	LL6
Dominion Range 10793	DOM 10793	Antarctica	2010	37.1	LL6
Dominion Range 10794	DOM 10794	Antarctica	2010	18.8	LL6
Dominion Range 10795	DOM 10795	Antarctica	2010	14.2	L5
Dominion Range 10796	DOM 10796	Antarctica	2010	25.6	LL6
Dominion Range 10797	DOM 10797	Antarctica	2010	25.8	L6
Dominion Range 10798	DOM 10798	Antarctica	2010	36.1	LL6
Dominion Range 10799	DOM 10799	Antarctica	2010	25.9	LL6
Dominion Range 10800	DOM 10800	Antarctica	2010	125.3	LL5
Dominion Range 10802	DOM 10802	Antarctica	2010	203.7	LL5
Dominion Range 10803	DOM 10803	Antarctica	2010	75.5	LL6
Dominion Range 10804	DOM 10804	Antarctica	2010	87.6	LL6
Dominion Range 10805	DOM 10805	Antarctica	2010	66.7	LL6
Dominion Range 10806	DOM 10806	Antarctica	2010	65.5	LL5
Dominion Range 10807	DOM 10807	Antarctica	2010	72.9	L4
Dominion Range 10808	DOM 10808	Antarctica	2010	51.8	LL6
Dominion Range 10809	DOM 10809	Antarctica	2010	65.8	LL6
Dominion Range 10820	DOM 10820	Antarctica	2010	50.6	L6
Dominion Range 10821	DOM 10821	Antarctica	2010	41.5	LL6
Dominion Range 10822	DOM 10822	Antarctica	2010	40.6	LL6
Dominion Range 10823	DOM 10823	Antarctica	2010	40.1	L5
Dominion Range 10824	DOM 10824	Antarctica	2010	37.8	LL5
Dominion Range 10825	DOM 10825	Antarctica	2010	45.6	LL6
Dominion Range 10826	DOM 10826	Antarctica	2010	56.4	LL6

Dominion Range 10827	DOM 10827	Antarctica	2010	58.2	LL6
Dominion Range 10828	DOM 10828	Antarctica	2010	61.2	LL6
Dominion Range 10829	DOM 10829	Antarctica	2010	68.6	LL6
Dominion Range 10830	DOM 10830	Antarctica	2010	62.6	LL5
Dominion Range 10831	DOM 10831	Antarctica	2010	54.6	LL6
Dominion Range 10832	DOM 10832	Antarctica	2010	50.3	LL6
Dominion Range 10833	DOM 10833	Antarctica	2010	63.2	L5
Dominion Range 10834	DOM 10834	Antarctica	2010	75.4	LL6
Dominion Range 10835	DOM 10835	Antarctica	2010	39.7	LL6
Dominion Range 10836	DOM 10836	Antarctica	2010	30.7	LL6
Dominion Range 10840	DOM 10840	Antarctica	2010	118.6	LL6
Dominion Range 10841	DOM 10841	Antarctica	2010	90	LL6
Dominion Range 10842	DOM 10842	Antarctica	2010	48.4	L5
Dominion Range 10843	DOM 10843	Antarctica	2010	84	LL5
Dominion Range 10844	DOM 10844	Antarctica	2010	73.5	LL6
Dominion Range 10845	DOM 10845	Antarctica	2010	50.8	LL6
Dominion Range 10846	DOM 10846	Antarctica	2010	67.6	LL6
Dominion Range 10847	DOM 10847	Antarctica	2010	97.2	CO3
Dominion Range 10848	DOM 10848	Antarctica	2010	104.6	H-imp melt
Dominion Range 10849	DOM 10849	Antarctica	2010	240.5	H6
Dominion Range 10850	DOM 10850	Antarctica	2010	75.1	LL6
Dominion Range 10851	DOM 10851	Antarctica	2010	42.5	LL6
Dominion Range 10852	DOM 10852	Antarctica	2010	53.9	LL6
Dominion Range 10853	DOM 10853	Antarctica	2010	27.6	LL6
Dominion Range 10854	DOM 10854	Antarctica	2010	24.2	L6
Dominion Range 10855	DOM 10855	Antarctica	2010	23.1	LL5
Dominion Range 10856	DOM 10856	Antarctica	2010	35.5	LL6
Dominion Range 10857	DOM 10857	Antarctica	2010	20.2	LL6
Dominion Range 10858	DOM 10858	Antarctica	2010	22.1	LL6
Dominion Range 10859	DOM 10859	Antarctica	2010	17.7	LL6
Dominion Range 10860	DOM 10860	Antarctica	2010	34.7	LL6
Dominion Range 10861	DOM 10861	Antarctica	2010	25.9	LL6
Dominion Range 10862	DOM 10862	Antarctica	2010	19.1	LL6
Dominion Range 10863	DOM 10863	Antarctica	2010	36	L6
Dominion Range 10864	DOM 10864	Antarctica	2010	28.6	LL6
Dominion Range 10865	DOM 10865	Antarctica	2010	35.7	LL6
Dominion Range 10866	DOM 10866	Antarctica	2010	19.8	L6
Dominion Range 10867	DOM 10867	Antarctica	2010	19	LL6
Dominion Range 10868	DOM 10868	Antarctica	2010	32.9	L6
Dominion Range 10869	DOM 10869	Antarctica	2010	23.1	LL6
Dominion Range 10870	DOM 10870	Antarctica	2010	18.8	LL6
Dominion Range 10871	DOM 10871	Antarctica	2010	12.5	LL6
Dominion Range 10872	DOM 10872	Antarctica	2010	11.9	LL6
Dominion Range 10873	DOM 10873	Antarctica	2010	14.1	L5

Dominion Range 10874	DOM 10874	Antarctica	2010	33.7	LL6
Dominion Range 10875	DOM 10875	Antarctica	2010	20.8	LL6
Dominion Range 10876	DOM 10876	Antarctica	2010	16.9	LL6
Dominion Range 10877	DOM 10877	Antarctica	2010	24.4	L5
Dominion Range 10878	DOM 10878	Antarctica	2010	26.7	LL6
Dominion Range 10879	DOM 10879	Antarctica	2010	17.8	LL6
Dominion Range 10880	DOM 10880	Antarctica	2010	6.4	LL6
Dominion Range 10881	DOM 10881	Antarctica	2010	11.7	LL6
Dominion Range 10882	DOM 10882	Antarctica	2010	15.6	LL6
Dominion Range 10883	DOM 10883	Antarctica	2010	16.2	LL6
Dominion Range 10884	DOM 10884	Antarctica	2010	5.5	L6
Dominion Range 10885	DOM 10885	Antarctica	2010	10.9	LL6
Dominion Range 10886	DOM 10886	Antarctica	2010	6.2	L6
Dominion Range 10887	DOM 10887	Antarctica	2010	10	LL6
Dominion Range 10888	DOM 10888	Antarctica	2010	10.4	LL6
Dominion Range 10889	DOM 10889	Antarctica	2010	21.5	LL5
Dominion Range 10890	DOM 10890	Antarctica	2010	8.6	L6
Dominion Range 10891	DOM 10891	Antarctica	2010	12.3	H5
Dominion Range 10892	DOM 10892	Antarctica	2010	12.5	L6
Dominion Range 10893	DOM 10893	Antarctica	2010	15.2	L6
Dominion Range 10894	DOM 10894	Antarctica	2010	15.5	H6
Dominion Range 10895	DOM 10895	Antarctica	2010	13.1	H6
Dominion Range 10896	DOM 10896	Antarctica	2010	10.4	H6
Dominion Range 10897	DOM 10897	Antarctica	2010	15.1	LL6
Dominion Range 10898	DOM 10898	Antarctica	2010	10.4	L5
Dominion Range 10899	DOM 10899	Antarctica	2010	18.1	L6
Dominion Range 10901	DOM 10901	Antarctica	2010	19	LL5
El Médano 215		Chile	2011 Jun 22	14	L6
El Médano 216		Chile	2011 Jun 22	1323	CO3
El Médano 217		Chile	2011 Jun 30	76	L6
El Médano 218		Chile	2013 Nov 1	44.9	L6
El Médano 219		Chile	2013 Nov 9	55	L6
El Médano 220		Chile	2013 Nov 10	22.7	L6
El Médano 221		Chile	2013 Nov 11	14.3	L6
El Médano 222		Chile	2013 Nov 11	177	H4
El Médano 223		Chile	2013 Nov 3	30.3	H5
El Médano 224		Chile	2013 Nov 3	14.5	H5
El Médano 225		Chile	2013 Nov 4	14.1	L6
El Médano 226		Chile	2013 Nov 8	11.1	H5
El Médano 227		Chile	2013 Nov 8	79	LL6
El Médano 228		Chile	2013 Nov 9	13.4	L6
El Médano 229		Chile	2013 Nov 10	146	L6
El Médano 230		Chile	2013 Nov 11	37.1	L6
El Médano 231		Chile	2013 Nov 2	15.1	H4

El Médano 232		Chile	2013 Nov 8	37.6	L6
El Médano 233		Chile	2013 Nov 8	40	H5/6
El Médano 234		Chile	2013 Nov 9	36.3	H4
El Médano 235		Chile	2013 Nov 4	15.8	H6
El Médano 236		Chile	2013 Nov 4	106	H5
El Médano 237		Chile	2013 Nov 8	13.7	H5
El Médano 238		Chile	2013 Nov 9	46.3	H6
El Médano 239		Chile	2013 Nov 9	83.9	L6
El Médano 240		Chile	2013 Nov 9	13.1	H5
El Médano 241		Chile	2013 Nov 9	30.2	L6
El Médano 242		Chile	2013 Nov 10	147	H5
El Médano 243		Chile	2013 Nov 10	18.7	L6
El Médano 244		Chile	2013 Nov 11	39.8	H6
El Médano 245		Chile	2013 Nov 11	36.7	H5/6
El Médano 246		Chile	2013 Nov 3	54	H5/6
El Médano 247		Chile	2013 Nov 4	37.8	H5
El Médano 248		Chile	2013 Nov 9	129	H5
El Médano 249		Chile	2013 Nov 9	23.6	H5
El Médano 250		Chile	2013 Nov 9	65.8	H5
El Médano 251		Chile	2013 Nov 10	114	H5
El Médano 252		Chile	2013 Nov 10	143	H6
El Médano 253		Chile	2013 Nov 10	127	L6
El Médano 254		Chile	2013 Nov 10	35.3	L6
El Médano 255		Chile	2013 Nov 10	54.5	H5
El Médano 256		Chile	2013 Nov 8	13.7	H3
El Médano 257		Chile	2013 Nov 10	19.9	L3
El Médano 258		Chile	2013 Nov 3	209	L3
El Médano 259		Chile	2013 Nov 8	28.1	H3
El Médano 260		Chile	2013 Nov 10	17	L3.10
El Médano 261		Chile	2013 Nov 10	52	H3
El-Shaikh Fadl 006	ESF 006	Egypt	Apr 2010	52.15	H5
Eldorado Valley 001	EV 001	United States	4 Aug 2000	48.6	H5
Eldorado Valley 002	EV 002	United States	10 Dec 2010	12	H5
Faina		Brazil	2011	440	Iron, IAB complex
Gapyeong		Korea, Rep. of	1999 Nov	180000	Iron, IAB-sLL
Gila Mountains		United States	20 May 2012	3854	H4
Grove Mountains 090003	GRV 090003	Antarctica	2010 Jan 4	3.12	L4
Grove Mountains 090006	GRV 090006	Antarctica	2010 Jan 8	186.35	L6
Grove Mountains 090009	GRV 090009	Antarctica	2010 Jan 8	6.89	L6
Grove Mountains 090010	GRV 090010	Antarctica	2010 Jan 8	14.03	L5
Grove Mountains 090011	GRV 090011	Antarctica	2010 Jan 8	8.44	L4
Grove Mountains 090012	GRV 090012	Antarctica	2010 Jan 8	7.44	L5
Grove Mountains 090013	GRV 090013	Antarctica	2010 Jan 8	13.84	L4
Grove Mountains 090014	GRV 090014	Antarctica	2010 Jan 8	5.16	L6

Grove Mountains 090015	GRV 090015	Antarctica	2010 Jan 8	4.36	L6
Grove Mountains 090016	GRV 090016	Antarctica	2010 Jan 8	1.21	L6
Grove Mountains 090017	GRV 090017	Antarctica	2010 Jan 8	0.55	L6
Grove Mountains 090019	GRV 090019	Antarctica	2010 Jan 8	4.75	L5
Grove Mountains 090020	GRV 090020	Antarctica	2010 Jan 8	5.08	H5
Grove Mountains 090021	GRV 090021	Antarctica	2010 Jan 8	3.56	L5
Grove Mountains 090022	GRV 090022	Antarctica	2010 Jan 8	2.56	L6
Grove Mountains 090023	GRV 090023	Antarctica	2010 Jan 8	4.18	L5
Grove Mountains 090024	GRV 090024	Antarctica	2010 Jan 8	0.70	H4
Grove Mountains 090025	GRV 090025	Antarctica	2010 Jan 8	3.13	H4
Grove Mountains 090026	GRV 090026	Antarctica	2010 Jan 8	2.94	L6
Grove Mountains 090027	GRV 090027	Antarctica	2010 Jan 8	0.53	L5
Grove Mountains 090028	GRV 090028	Antarctica	2010 Jan 8	96.88	L6
Grove Mountains 090029	GRV 090029	Antarctica	2010 Jan 8	0.25	H4
Grove Mountains 090030	GRV 090030	Antarctica	2010 Jan 8	1.10	L5
Grove Mountains 090031	GRV 090031	Antarctica	2010 Jan 8	3.82	L6
Grove Mountains 090032	GRV 090032	Antarctica	2010 Jan 8	1.48	L5
Grove Mountains 090033	GRV 090033	Antarctica	2010 Jan 8	4.68	L5
Grove Mountains 090034	GRV 090034	Antarctica	2010 Jan 8	4.54	L5
Grove Mountains 090035	GRV 090035	Antarctica	2010 Jan 8	2.88	L5
Grove Mountains 090036	GRV 090036	Antarctica	2010 Jan 8	4.82	L6
Grove Mountains 090037	GRV 090037	Antarctica	2010 Jan 8	7.18	L5
Grove Mountains 090038	GRV 090038	Antarctica	2010 Jan 8	3.80	L5
Grove Mountains 090039	GRV 090039	Antarctica	2010 Jan 8	6.94	L6
Grove Mountains 090040	GRV 090040	Antarctica	2010 Jan 8	1.21	L5
Grove Mountains 090041	GRV 090041	Antarctica	2010 Jan 8	0.52	H6
Grove Mountains 090042	GRV 090042	Antarctica	2010 Jan 8	16.14	L4
Grove Mountains 090043	GRV 090043	Antarctica	2010 Jan 8	5.92	L6
Grove Mountains 090044	GRV 090044	Antarctica	2010 Jan 8	74.24	L6
Grove Mountains 090045	GRV 090045	Antarctica	2010 Jan 8	60.53	L6
Grove Mountains 090046	GRV 090046	Antarctica	2010 Jan 8	88.37	H5
Grove Mountains 090047	GRV 090047	Antarctica	2010 Jan 8	13.04	L4
Grove Mountains 090048	GRV 090048	Antarctica	2010 Jan 8	22.82	L5
Grove Mountains 090049	GRV 090049	Antarctica	2010 Jan 8	19.57	L5
Grove Mountains 090050	GRV 090050	Antarctica	2010 Jan 8	8.63	L5
Grove Mountains 090051	GRV 090051	Antarctica	2010 Jan 8	13.81	L5
Grove Mountains 090052	GRV 090052	Antarctica	2010 Jan 8	71.33	L4
Grove Mountains 090053	GRV 090053	Antarctica	2010 Jan 8	12.48	L6
Grove Mountains 090054	GRV 090054	Antarctica	2010 Jan 8	9.79	L5
Grove Mountains 090055	GRV 090055	Antarctica	2010 Jan 8	6.30	L6
Grove Mountains 090056	GRV 090056	Antarctica	2010 Jan 8	4.05	L5
Grove Mountains 090057	GRV 090057	Antarctica	2010 Jan 8	4.89	L6
Grove Mountains 090058	GRV 090058	Antarctica	2010 Jan 8	14.18	L5
Grove Mountains 090059	GRV 090059	Antarctica	2010 Jan 8	28.01	L5

Grove Mountains 090060	GRV 090060	Antarctica	2010 Jan 8	23.74	L5
Grove Mountains 090061	GRV 090061	Antarctica	2010 Jan 8	31.12	L5
Grove Mountains 090062	GRV 090062	Antarctica	2010 Jan 8	17.14	L5
Grove Mountains 090063	GRV 090063	Antarctica	2010 Jan 8	21.37	L6
Grove Mountains 090064	GRV 090064	Antarctica	2010 Jan 8	22.29	L5
Grove Mountains 090065	GRV 090065	Antarctica	2010 Jan 8	16.10	L4
Grove Mountains 090066	GRV 090066	Antarctica	2010 Jan 8	9.62	H4
Grove Mountains 090067	GRV 090067	Antarctica	2010 Jan 8	13.14	L5
Grove Mountains 090068	GRV 090068	Antarctica	2010 Jan 8	6.58	L6
Grove Mountains 090069	GRV 090069	Antarctica	2010 Jan 8	5.35	L5
Grove Mountains 090070	GRV 090070	Antarctica	2010 Jan 8	18.01	L6
Grove Mountains 090071	GRV 090071	Antarctica	2010 Jan 8	5.07	L5
Grove Mountains 090072	GRV 090072	Antarctica	2010 Jan 8	6.97	L5
Grove Mountains 090073	GRV 090073	Antarctica	2010 Jan 8	5.65	L6
Grove Mountains 090074	GRV 090074	Antarctica	2010 Jan 8	3.01	L6
Grove Mountains 090075	GRV 090075	Antarctica	2010 Jan 8	4.21	L5
Grove Mountains 090076	GRV 090076	Antarctica	2010 Jan 8	1.85	L5
Grove Mountains 090077	GRV 090077	Antarctica	2010 Jan 8	45.20	L5
Grove Mountains 090079	GRV 090079	Antarctica	2010 Jan 8	30.07	L6
Grove Mountains 090080	GRV 090080	Antarctica	2010 Jan 8	35.06	L5
Grove Mountains 090081	GRV 090081	Antarctica	2010 Jan 8	13.35	L6
Grove Mountains 090082	GRV 090082	Antarctica	2010 Jan 8	40.74	L5
Grove Mountains 090083	GRV 090083	Antarctica	2010 Jan 8	25.30	L6
Grove Mountains 090084	GRV 090084	Antarctica	2010 Jan 8	11.19	L5
Grove Mountains 090085	GRV 090085	Antarctica	2010 Jan 8	8.94	L6
Grove Mountains 090086	GRV 090086	Antarctica	2010 Jan 8	7.14	H4
Grove Mountains 090087	GRV 090087	Antarctica	2010 Jan 8	3.13	L5
Grove Mountains 090088	GRV 090088	Antarctica	2010 Jan 8	2.08	L5
Grove Mountains 090089	GRV 090089	Antarctica	2010 Jan 8	2.91	L5
Grove Mountains 090090	GRV 090090	Antarctica	2010 Jan 8	2.16	L5
Grove Mountains 090091	GRV 090091	Antarctica	2010 Jan 8	14.58	L5
Grove Mountains 090092	GRV 090092	Antarctica	2010 Jan 8	2.61	L5
Grove Mountains 090093	GRV 090093	Antarctica	2010 Jan 8	2.54	L5
Grove Mountains 090094	GRV 090094	Antarctica	2010 Jan 8	1.77	L4
Grove Mountains 090095	GRV 090095	Antarctica	2010 Jan 8	1.47	L5
Grove Mountains 090096	GRV 090096	Antarctica	2010 Jan 8	0.44	L6
Grove Mountains 090097	GRV 090097	Antarctica	2010 Jan 8	0.81	L6
Grove Mountains 13001	GRV 13001	Antarctica	6 Feb 2014	1299.10	Eucrite
Grove Mountains 13002	GRV 13002	Antarctica	2014 Jan 16	5.9	L5
Grove Mountains 13003	GRV 13003	Antarctica	2014 Jan 16	7.11	L5
Grove Mountains 13004	GRV 13004	Antarctica	2014 Jan 16	5.8	L5
Grove Mountains 13005	GRV 13005	Antarctica	2014 Jan 16	7.98	H5
Grove Mountains 13006	GRV 13006	Antarctica	2014 Jan 16	5.8	H5
Grove Mountains 13007	GRV 13007	Antarctica	2014 Jan 17	35.88	L5

Grove Mountains 13008	GRV 13008	Antarctica	2014 Jan 17	24.86	L3
Grove Mountains 13009	GRV 13009	Antarctica	2014 Jan 17	10.76	L6
Grove Mountains 13010	GRV 13010	Antarctica	2014 Jan 17	12.2	L5
Grove Mountains 13011	GRV 13011	Antarctica	2014 Jan 17	9.11	L5
Grove Mountains 13012	GRV 13012	Antarctica	2014 Jan 17	7.88	L5
Grove Mountains 13013	GRV 13013	Antarctica	2014 Jan 17	7.44	L5
Grove Mountains 13014	GRV 13014	Antarctica	2014 Jan 17	5.88	L5
Grove Mountains 13015	GRV 13015	Antarctica	2014 Jan 17	6.15	L5
Grove Mountains 13016	GRV 13016	Antarctica	2014 Jan 17	6.46	L5
Grove Mountains 13017	GRV 13017	Antarctica	2014 Jan 17	5.71	L5
Grove Mountains 13018	GRV 13018	Antarctica	2014 Jan 24	19.83	L5
Grove Mountains 13019	GRV 13019	Antarctica	2014 Jan 24	17.2	L4
Grove Mountains 13020	GRV 13020	Antarctica	2014 Jan 24	10.45	L4
Grove Mountains 13021	GRV 13021	Antarctica	2014 Jan 24	6.13	L5
Grove Mountains 13022	GRV 13022	Antarctica	2014 Jan 24	5.38	L6
Grove Mountains 13023	GRV 13023	Antarctica	2014 Jan 23	8.8	H4
Grove Mountains 13024	GRV 13024	Antarctica	2014 Jan 31	27.66	L5
Grove Mountains 13025	GRV 13025	Antarctica	2014 Jan 31	20.77	L4
Grove Mountains 13026	GRV 13026	Antarctica	2014 Jan 31	20.79	L4
Grove Mountains 13027	GRV 13027	Antarctica	2014 Jan 31	18.81	L5
Grove Mountains 13028	GRV 13028	Antarctica	2014 Jan 31	7.89	L4
Grove Mountains 13029	GRV 13029	Antarctica	2014 Jan 31	9.17	L5
Grove Mountains 13030	GRV 13030	Antarctica	2014 Jan 31	6.09	L5
Grove Mountains 13031	GRV 13031	Antarctica	2014 Jan 31	5.25	L5
Grove Mountains 13032	GRV 13032	Antarctica	2014 Jan 24	0.18	H4
Grove Mountains 13033	GRV 13033	Antarctica	2014 Feb 4	15.04	L3
Grove Mountains 13034	GRV 13034	Antarctica	2014 Feb 4	11.23	L5
Grove Mountains 13035	GRV 13035	Antarctica	2014 Feb 6	166.16	H4
Grove Mountains 13036	GRV 13036	Antarctica	2014 Feb 6	11.72	L6
Grove Mountains 13037	GRV 13037	Antarctica	2014 Feb 6	5.61	L5
Grove Mountains 13038	GRV 13038	Antarctica	2014 Jan 16	4.68	L5
Grove Mountains 13039	GRV 13039	Antarctica	2014 Jan 17	4.57	L5
Grove Mountains 13040	GRV 13040	Antarctica	2014 Jan 17	4.1	L5
Grove Mountains 13041	GRV 13041	Antarctica	2014 Jan 17	4.16	L6
Grove Mountains 13042	GRV 13042	Antarctica	2014 Jan 24	3.81	L5
Grove Mountains 13043	GRV 13043	Antarctica	2014 Jan 24	3.78	L6
Grove Mountains 13044	GRV 13044	Antarctica	2014 Jan 24	3.61	L5
Grove Mountains 13045	GRV 13045	Antarctica	2014 Jan 24	3.64	L5
Grove Mountains 13046	GRV 13046	Antarctica	2014 Jan 24	3.02	L5
Grove Mountains 13047	GRV 13047	Antarctica	2014 Jan 24	3.26	L6
Grove Mountains 13048	GRV 13048	Antarctica	2014 Jan 31	4.16	L5
Grove Mountains 13049	GRV 13049	Antarctica	2014 Jan 31	3.84	L6
Grove Mountains 13050	GRV 13050	Antarctica	2014 Jan 31	3.5	L5
Grove Mountains 13051	GRV 13051	Antarctica	5 Feb 2014	3.47	CM2

Grove Mountains 13052	GRV 13052	Antarctica	2014 Feb 5	4.68	H4
Grove Mountains 13053	GRV 13053	Antarctica	2014 Jan 24	4.78	L4
Grove Mountains 13054	GRV 13054	Antarctica	2014 Jan 16	2.87	H5
Grove Mountains 13055	GRV 13055	Antarctica	2014 Jan 17	2.88	L5
Grove Mountains 13056	GRV 13056	Antarctica	2014 Jan 17	2.16	L6
Grove Mountains 13057	GRV 13057	Antarctica	2014 Jan 17	2.91	L5
Grove Mountains 13058	GRV 13058	Antarctica	2014 Jan 17	2.15	H4
Grove Mountains 13059	GRV 13059	Antarctica	2014 Jan 17	2.09	L5
Grove Mountains 13060	GRV 13060	Antarctica	2014 Jan 17	2.25	L5
Grove Mountains 13061	GRV 13061	Antarctica	2014 Jan 24	2.08	H5
Grove Mountains 13062	GRV 13062	Antarctica	2014 Jan 24	2.44	L4
Grove Mountains 13063	GRV 13063	Antarctica	2014 Jan 24	2.73	L6
Grove Mountains 13064	GRV 13064	Antarctica	2014 Jan 24	2.09	L6
Grove Mountains 13065	GRV 13065	Antarctica	2014 Jan 23	2.77	L4
Grove Mountains 13066	GRV 13066	Antarctica	2014 Jan 31	2.89	H5
Grove Mountains 13067	GRV 13067	Antarctica	2014 Jan 31	2.03	H6
Grove Mountains 13068	GRV 13068	Antarctica	2014 Jan 31	2.24	L6
Grove Mountains 13069	GRV 13069	Antarctica	2014 Jan 17	2.03	L6
Grove Mountains 13070	GRV 13070	Antarctica	2014 Jan 17	2	H4
Grove Mountains 13071	GRV 13071	Antarctica	2014 Jan 16	1.52	LL6
Grove Mountains 13072	GRV 13072	Antarctica	2014 Jan 17	1.88	L5
Grove Mountains 13073	GRV 13073	Antarctica	2014 Jan 17	1.96	L5
Grove Mountains 13074	GRV 13074	Antarctica	2014 Jan 17	1.76	L6
Grove Mountains 13075	GRV 13075	Antarctica	2014 Jan 17	1.7	L5
Grove Mountains 13076	GRV 13076	Antarctica	2014 Jan 17	1.74	H4
Grove Mountains 13077	GRV 13077	Antarctica	2014 Jan 24	1.66	L5
Grove Mountains 13078	GRV 13078	Antarctica	2014 Jan 24	1.5	H4
Grove Mountains 13079	GRV 13079	Antarctica	2014 Jan 24	1.58	L6
Grove Mountains 13080	GRV 13080	Antarctica	2014 Jan 24	1.57	L6
Grove Mountains 13081	GRV 13081	Antarctica	2014 Jan 24	1.72	L5
Grove Mountains 13082	GRV 13082	Antarctica	2014 Jan 31	1.55	L6
Grove Mountains 13083	GRV 13083	Antarctica	2014 Jan 31	1.77	H4
Grove Mountains 13084	GRV 13084	Antarctica	2014 Jan 15	0.71	L5
Grove Mountains 13085	GRV 13085	Antarctica	2014 Jan 15	1.22	L5
Grove Mountains 13086	GRV 13086	Antarctica	2014 Jan 16	1.24	L5
Grove Mountains 13087	GRV 13087	Antarctica	2014 Jan 17	1.48	L5
Grove Mountains 13088	GRV 13088	Antarctica	2014 Jan 17	1.35	L5
Grove Mountains 13089	GRV 13089	Antarctica	2014 Jan 17	1.26	L5
Grove Mountains 13090	GRV 13090	Antarctica	2014 Jan 17	1.17	L6
Grove Mountains 13091	GRV 13091	Antarctica	2014 Jan 17	1.11	L5
Grove Mountains 13092	GRV 13092	Antarctica	2014 Jan 17	1.06	H5
Grove Mountains 13093	GRV 13093	Antarctica	2014 Jan 17	1.1	L6
Grove Mountains 13094	GRV 13094	Antarctica	2014 Jan 17	0.96	L6
Grove Mountains 13095	GRV 13095	Antarctica	2014 Jan 24	0.96	L5

Grove Mountains 13096	GRV 13096	Antarctica	2014 Jan 24	1.03	H6
Grove Mountains 13097	GRV 13097	Antarctica	2014 Jan 31	1.12	L5
Grove Mountains 13098	GRV 13098	Antarctica	2014 Feb 6	1.45	L4
Grove Mountains 13099	GRV 13099	Antarctica	2014 Jan 15	0.5	L4
Grove Mountains 13100	GRV 13100	Antarctica	16 Jan 2014	0.68	EH4
Grove Mountains 13101	GRV 13101	Antarctica	2014 Jan 17	0.69	H5
Grove Mountains 13102	GRV 13102	Antarctica	2014 Jan 17	0.59	H6
Grove Mountains 13103	GRV 13103	Antarctica	2014 Jan 24	0.72	H6
Grove Mountains 13104	GRV 13104	Antarctica	2014 Feb 5	1.21	L5
Grove Mountains 13105	GRV 13105	Antarctica	2014 Jan 17	0.83	L5
Grove Mountains 13106	GRV 13106	Antarctica	2014 Jan 17	0.66	L5
Grove Mountains 13107	GRV 13107	Antarctica	2014 Jan 24	1	L4
Grove Mountains 13108	GRV 13108	Antarctica	2014 Jan 24	0.8	L6
Grove Mountains 13109	GRV 13109	Antarctica	2014 Jan 17	1.38	H4
Grove Mountains 13110	GRV 13110	Antarctica	2014 Jan 17	0.96	H4
Grove Mountains 13111	GRV 13111	Antarctica	2014 Jan 24	0.69	H5
Grove Mountains 13112	GRV 13112	Antarctica	2014 Jan 24	0.56	L6
Grove Mountains 13113	GRV 13113	Antarctica	2014 Jan 31	0.92	H4
Grove Mountains 13114	GRV 13114	Antarctica	2014 Jan 15	0.47	L5
Grove Mountains 13115	GRV 13115	Antarctica	2014 Jan 24	1.35	L5
Grove Mountains 13116	GRV 13116	Antarctica	2014 Jan 24	0.59	H5
Grove Mountains 13117	GRV 13117	Antarctica	2014 Jan 24	0.34	H4
Grove Mountains 13118	GRV 13118	Antarctica	2014 Jan 31	0.48	H4
Grove Mountains 13119	GRV 13119	Antarctica	2014 Jan 31	0.37	L5
Grove Mountains 13120	GRV 13120	Antarctica	2014 Jan 31	0.38	H4
Grove Mountains 13121	GRV 13121	Antarctica	2014 Feb 6	0.37	L5
Grove Mountains 13122	GRV 13122	Antarctica	2014 Jan 17	0.46	L5
Grove Mountains 13123	GRV 13123	Antarctica	2014 Jan 17	0.49	L5
Grove Mountains 13124	GRV 13124	Antarctica	2014 Jan 15	0.22	H6
Grove Mountains 13125	GRV 13125	Antarctica	2014 Jan 15	0.27	H4
Grove Mountains 13126	GRV 13126	Antarctica	2014 Jan 17	0.57	L5
Grove Mountains 13127	GRV 13127	Antarctica	2014 Jan 17	0.42	L6
Grove Mountains 13128	GRV 13128	Antarctica	2014 Jan 17	0.4	L6
Grove Mountains 13129	GRV 13129	Antarctica	2014 Jan 17	0.4	L6
Grove Mountains 13130	GRV 13130	Antarctica	2014 Jan 17	0.25	L6
Grove Mountains 13131	GRV 13131	Antarctica	2014 Jan 17	0.34	L5
Grove Mountains 13132	GRV 13132	Antarctica	2014 Jan 24	0.26	H4
Grove Mountains 13133	GRV 13133	Antarctica	2014 Jan 31	0.51	H6
Grove Mountains 13134	GRV 13134	Antarctica	2014 Jan 15	0.28	L5
Grove Mountains 13135	GRV 13135	Antarctica	2014 Jan 15	0.19	L5
Grove Mountains 13136	GRV 13136	Antarctica	2014 Jan 15	0.2	L-melt rock
Grove Mountains 13137	GRV 13137	Antarctica	2014 Jan 17	0.81	L6
Grove Mountains 13138	GRV 13138	Antarctica	2014 Jan 17	0.5	H4
Grove Mountains 13139	GRV 13139	Antarctica	2014 Jan 17	0.31	L6

Grove Mountains 13140	GRV 13140	Antarctica	2014 Jan 17	0.19	L5
Grove Mountains 13141	GRV 13141	Antarctica	2014 Jan 24	0.47	H5
Grove Mountains 13142	GRV 13142	Antarctica	2014 Jan 24	0.13	H6
Grove Mountains 13143	GRV 13143	Antarctica	2014 Jan 24	0.15	H4
Grove Mountains 13144	GRV 13144	Antarctica	2014 Jan 15	0.13	L5
Grove Mountains 13145	GRV 13145	Antarctica	2014 Jan 15	1.68	H4
Grove Mountains 13146	GRV 13146	Antarctica	2014 Jan 16	0.63	L6
Grove Mountains 13147	GRV 13147	Antarctica	2014 Jan 17	0.56	L5
Grove Mountains 13148	GRV 13148	Antarctica	2014 Jan 23	0.72	H5
Grove Mountains 13149	GRV 13149	Antarctica	2014 Jan 17	0.62	L6
Hami 001		China	2013	364	H5
Hami 002		China	2013	163	L6
Hami 003		China	4 May 2013	152	H5
Hami 004		China	4 May 2013	99	L5
Hami 005		China	6 May 2013	411	H5
Jezersko		Slovenia	13 Sept 1992	1380	H4
Jiddat al Harasis 819	JaH 819	Oman	11 Jan 2012	372.116	H4-an
Jiddat al Harasis 820	JaH 820	Oman	17 Jan 2012	826	L5
Jiddat al Harasis 821	JaH 821	Oman	17 Jan 2012	441.325	H6
Jiddat al Harasis 822	JaH 822	Oman	17 Jan 2012	11.56	L5
Jiddat al Harasis 823	JaH 823	Oman	18 Jan 2012	124.296	H5
Jiddat al Harasis 824	JaH 824	Oman	18 Jan 2012	53.624	H4
Jiddat al Harasis 825	JaH 825	Oman	18 Jan 2012	288.845	L5-6
Jiddat al Harasis 826	JaH 826	Oman	18 Jan 2012	4098	L6
Jiddat al Harasis 827	JaH 827	Oman	18 Jan 2012	921	L6
Jiddat al Harasis 828	JaH 828	Oman	19 Jan 2012	531.095	H4
Jiddat al Harasis 829	JaH 829	Oman	19 Jan 2012	67.925	H4
Jiddat al Harasis 831	JaH 831	Oman	Jan 2011	275.7	L6
Jiddat al Harasis 832	JaH 832	Oman	2001 Feb 2	758.7	L~5
Jiddat al Harasis 833	JaH 833	Oman	2001 Feb 2	5332.4	LL~6
Jiddat al Harasis 834	JaH 834	Oman	2003 Feb 27	1246.2	L~6
Jiddat al Harasis 835	JaH 835	Oman	2003 Feb 28	247.2	H~5
Jiddat al Harasis 836	JaH 836	Oman	2003 Feb 28	13.9	H~5
Jiddat al Harasis 837	JaH 837	Oman	2003 Feb 28	233.3	L~4
Jiddat al Harasis 839	JaH 839	Oman	2003 Feb 28	66.5	H~5
Jiddat al Harasis 840	JaH 840	Oman	2003 Mar 1	258.7	H~4
Jiddat al Harasis 841	JaH 841	Oman	2003 Mar 1	142.4	L~6
Jiddat al Harasis 842	JaH 842	Oman	2003 Mar 1	437	L~6
Jiddat al Harasis 845	JaH 845	Oman	2004	119.1	Mesosiderite-C2
Jiddat al Harasis 847	JaH 847	Oman	Jan 2011	171.8	H5
Jiddat al Harasis 848	JaH 848	Oman	Jan 2011	369.1	L5
Jiddat al Harasis 868	JaH 868	Oman	P 2009 Jan 25	18.2	Diogenite
Jiddat al Harasis 869	JaH 869	Oman	2011 Nov 26	300	Mesosiderite
Jiddat al Harasis 870	JaH 870	Oman	2009 Jan 26	121.3	H6

Jiddat al Harasis 871	JaH 871	Oman	2009 Jan 26	246	H5
Jiddat al Harasis 872	JaH 872	Oman	2009 Jan 26	8.7	H5
Jiddat al Harasis 873	JaH 873	Oman	January 2011	53	H6
Jiddat al Harasis 875	JaH 875	Oman	Jan 2013	120	H4
Jiddat al Harasis 876	JaH 876	Oman	Jan 2013	1500	L6
Jiddat al Harasis 877	JaH 877	Oman	January 2013	700	H5
Jinju		South Korea	2014 Mar 9	34000	H5
Kerman 001		Iran	2013 Dec 8	17000	H5
Kerman 002		Iran	2012 Oct 23	211	L6
Khawr al Fazra 001	KaF 001	Saudi Arabia	12 Feb 2013	38.56	H4
Khawr al Fazra 002	KaF 002	Saudi Arabia	12 Feb 2013	133.717	H6
Khawr al Fazra 003	KaF 003	Saudi Arabia	13 Feb 2013	33.005	L6
Khawr al Fazra 004	KaF 004	Saudi Arabia	13 Feb 2013	1.995	H4
Khawr al Fazra 005	KaF 005	Saudi Arabia	13 Feb 2013	43.65	CV3
Khawr al Fazra 006	KaF 006	Saudi Arabia	15 Feb 2013	58.99	CK6
Khawr al Fazra 007	KaF 007	Saudi Arabia	15 Feb 2013	3.184	H5
Khawr al Fazra 008	KaF 008	Saudi Arabia	15 Feb 2013	1.153	CO3
Khawr al Fazra 009	KaF 009	Saudi Arabia	15 Feb 2013	2.664	H4
Khawr al Fazra 010	KaF 010	Saudi Arabia	15 Feb 2013	4.319	H5
Khawr al Fazra 011	KaF 011	Saudi Arabia	15 Feb 2013	0.59	E5
Khawr al Fazra 012	KaF 012	Saudi Arabia	15 Feb 2013	35.957	L6
Khawr al Fazra 013	KaF 013	Saudi Arabia	15 Feb 2013	124.152	L6
Khawr al Fazra 014	KaF 014	Saudi Arabia	15 Feb 2013	236.167	LL6
Khawr al Fazra 015	KaF 015	Saudi Arabia	15 Feb 2013	1.676	L4
Khawr al Fazra 016	KaF 016	Saudi Arabia	15 Feb 2013	1.707	E5
Khawr al Fazra 017	KaF 017	Saudi Arabia	15 Feb 2013	1.709	Relict ureilite
Khawr al Fazra 018	KaF 018	Saudi Arabia	15 Feb 2013	0.855	Ureilite
Khawr al Fazra 019	KaF 019	Saudi Arabia	15 Feb 2013	3.347	L4
Khawr al Fazra 020	KaF 020	Saudi Arabia	15 Feb 2013	1.293	H5
Khawr al Fazra 021	KaF 021	Saudi Arabia	15 Feb 2013	0.728	Eucrite
Križevci		Croatia	4 Feb 2011	291	H6
Ksar Mehiri 001	KM 001	Tunisia	2013 Jun 28	96.8	H6
Ksar Mehiri 002	KM 002	Tunisia	2012 Oct 24	93.3	H6
Ksar Mehiri 003	KM 003	Tunisia	2013 Jan 16	30.8	L6
Ksar Tarcine 002	KT 002	Tunisia	Oct 2012	8.2	H5
Ksar Tarcine 003	KT 003	Tunisia	Oct 2012	10.2	H5
Ksar Tarcine 004	KT 004	Tunisia	Oct 2012	10.3	H6
Ksar Tarcine 005	KT 005	Tunisia	Oct 2012	2.9	H5
Kumtag 013		China	2012 Aug 20	100	L5
Kumtag 014		China	5 May 2013	693	L3
Kuresoi		Kenya	27 February 2014	555	L6
Lake Los Angeles		United States	2013 Nov 30	444.5	H6
Lake Los Angeles (b)		United States	2014 Jan 5	177.3	L6

LaPaz Icefield 10120	LAP 10120	Antarctica	2010	1.3	L6
LaPaz Icefield 10121	LAP 10121	Antarctica	2010	3	L6
LaPaz Icefield 10122	LAP 10122	Antarctica	2010	2.2	LL6
LaPaz Icefield 10123	LAP 10123	Antarctica	2010	1	L6
LaPaz Icefield 10124	LAP 10124	Antarctica	2010	3.2	L6
LaPaz Icefield 10125	LAP 10125	Antarctica	2010	4.5	L6
LaPaz Icefield 10126	LAP 10126	Antarctica	2010	2.3	LL5
LaPaz Icefield 10127	LAP 10127	Antarctica	2010	6.4	LL6
LaPaz Icefield 10128	LAP 10128	Antarctica	2010	3.1	L5
LaPaz Icefield 10129	LAP 10129	Antarctica	2010	11.2	LL5
Last Stand Lake 007	LSL 007	United States	11 Nov 2011	35.3	H4
Last Stand Lake 008	LSL 008	United States	2011 Oct 22	19.88	H5
Last Stand Lake 009	LSL 009	United States	2011 Oct 23	6.56	H5
Last Stand Lake 010	LSL 010	United States	2012 Jan 04	7.40	H4
Lenghu 001		China	2013 Apr 23	8000	H4
Lenghu 002		China	2013 Jul 27	15000	L5
Limón Verde 001		Chile	2012 Sep 7	2717	L4
Limón Verde 002		Chile	2012 Dec 09	2741	L6-melt breccia
Limón Verde 003		Chile	2012 Sep 7	2634	H3-6
Los Vientos 051	LoV 051	Chile	2010 Sep 30	66	C3-ung
Los Vientos 058	LoV 058	Chile	2011 Jul 1	129	L6
Los Vientos 059	LoV 059	Chile	2012 Jan 25	1521	L4
Los Vientos 060	LoV 060	Chile	2011 Jul 3	718	L6
Los Vientos 061	LoV 061	Chile	2012 Jun 24	5841	L6
Los Vientos 062	LoV 062	Chile	2012 Oct 25	1610	H5
Los Vientos 063	LoV 063	Chile	2013 Nov 5	26.7	L6
Los Vientos 064	LoV 064	Chile	2013 Nov 5	24.2	L6
Los Vientos 065	LoV 065	Chile	2013 Nov 6	21.7	L6
Los Vientos 066	LoV 066	Chile	2013 Nov 9	41.4	H5
Los Vientos 067	LoV 067	Chile	2013 Nov 5	41	L6
Los Vientos 068	LoV 068	Chile	2012 July	2250	H5
Los Vientos 069	LoV 069	Chile	2010 Jan 21	89	L6
Los Vientos 070	LoV 070	Chile	2011 Apr 13	1280	L6
Los Vientos 071	LoV 071	Chile	2013 Nov 7	10.6	H3
Los Vientos 072	LoV 072	Chile	2012 Oct 25	220	L3
Los Vientos 073	LoV 073	Chile	2009 Dec	16.5	H3
Lut 001		Iran	Nov 2011	1030	H5
Lut 002		Iran	2013 Feb 8	568	H4
Lut 003		Iran	2013 Mar 21	504.5	L3
Lut 004		Iran	2013 Mar 21	504.6	H3
Lut 005		Iran	2013 Feb 8	93	LL3
Lut 006		Iran	2013 Feb 8	86.6	LL3
Lut 007		Iran	2013 Feb 8	54.7	LL3
Lut 008		Iran	2012 Nov 24	215	H4

Machtenstein		Germany	1956	1422	H5
Machuca 001		Chile	2013 Apr 14	775	L/LL3
Marsa Alam		Egypt	21 Jan 2012	69	H5
Metameur 005		Tunisia	Oct 2012	184	LL3
Miller Range 11007	MIL 11007	Antarctica	2011	97.5	LL5
Miller Range 11008	MIL 11008	Antarctica	2011	102	L6
Miller Range 11009	MIL 11009	Antarctica	2011	111	L6
Miller Range 11010	MIL 11010	Antarctica	2011	4.9	LL5
Miller Range 11011	MIL 11011	Antarctica	2011	4.9	LL5
Miller Range 11012	MIL 11012	Antarctica	2011	2.6	H6
Miller Range 11013	MIL 11013	Antarctica	2011	5.2	LL6
Miller Range 11014	MIL 11014	Antarctica	2011	3.8	EL5
Miller Range 11015	MIL 11015	Antarctica	2011	2.5	LL5
Miller Range 11016	MIL 11016	Antarctica	2011	6.2	LL5
Miller Range 11017	MIL 11017	Antarctica	2011	9.8	H5
Miller Range 11018	MIL 11018	Antarctica	2011	9.6	L6
Miller Range 11019	MIL 11019	Antarctica	2011	0.2	CO3
Miller Range 11020	MIL 11020	Antarctica	2011	21	L6
Miller Range 11021	MIL 11021	Antarctica	2011	52.9	LL6
Miller Range 11023	MIL 11023	Antarctica	2011	19	L6
Miller Range 11024	MIL 11024	Antarctica	2011	24.6	L6
Miller Range 11026	MIL 11026	Antarctica	2011	6.8	LL5
Miller Range 11027	MIL 11027	Antarctica	2011	22	LL5
Miller Range 11028	MIL 11028	Antarctica	2011	46	LL5
Miller Range 11029	MIL 11029	Antarctica	2011	32.4	L5
Miller Range 11030	MIL 11030	Antarctica	2011	11.7	LL6
Miller Range 11031	MIL 11031	Antarctica	2011	3.6	H6
Miller Range 11032	MIL 11032	Antarctica	2011	11.9	L6
Miller Range 11033	MIL 11033	Antarctica	2011	9	LL3.2
Miller Range 11034	MIL 11034	Antarctica	2011	12.4	LL6
Miller Range 11035	MIL 11035	Antarctica	2011	6.1	LL5
Miller Range 11036	MIL 11036	Antarctica	2011	12.4	LL5
Miller Range 11037	MIL 11037	Antarctica	2011	7.1	L6
Miller Range 11038	MIL 11038	Antarctica	2011	4.8	H5
Miller Range 11039	MIL 11039	Antarctica	2011	2.8	H5
Miller Range 11042	MIL 11042	Antarctica	2011	503.1	H6
Miller Range 11043	MIL 11043	Antarctica	2011	164.1	LL5
Miller Range 11044	MIL 11044	Antarctica	2011	245.1	L5
Miller Range 11045	MIL 11045	Antarctica	2011	135.6	LL6
Miller Range 11046	MIL 11046	Antarctica	2011	422.8	L5
Miller Range 11047	MIL 11047	Antarctica	2011	309.7	LL6
Miller Range 11048	MIL 11048	Antarctica	2011	99.5	L5
Miller Range 11049	MIL 11049	Antarctica	2011	83	LL5
Miller Range 11050	MIL 11050	Antarctica	2011	53.2	CO3

Miller Range 11051	MIL 11051	Antarctica	2011	62.3	CO3
Miller Range 11052	MIL 11052	Antarctica	2011	38.1	L6
Miller Range 11053	MIL 11053	Antarctica	2011	31.5	L6
Miller Range 11054	MIL 11054	Antarctica	2011	21.8	L5
Miller Range 11055	MIL 11055	Antarctica	2011	37	CO3
Miller Range 11056	MIL 11056	Antarctica	2011	11.2	LL6
Miller Range 11057	MIL 11057	Antarctica	2011	26.7	CO3
Miller Range 11058	MIL 11058	Antarctica	2011	24.1	L5
Miller Range 11059	MIL 11059	Antarctica	2011	25.3	LL6
Miller Range 11060	MIL 11060	Antarctica	2011	14.3	LL6
Miller Range 11061	MIL 11061	Antarctica	2011	10.6	CO3
Miller Range 11062	MIL 11062	Antarctica	2011	4.8	LL5
Miller Range 11063	MIL 11063	Antarctica	2011	6.5	CO3
Miller Range 11064	MIL 11064	Antarctica	2011	10.7	LL5
Miller Range 11065	MIL 11065	Antarctica	2011	6.9	LL5
Miller Range 11066	MIL 11066	Antarctica	2011	12.5	L5
Miller Range 11067	MIL 11067	Antarctica	2011	12.5	L6
Miller Range 11069	MIL 11069	Antarctica	2011	3	CO3
Miller Range 11070	MIL 11070	Antarctica	2011	2	LL6
Miller Range 11071	MIL 11071	Antarctica	2011	3.1	L5
Miller Range 11072	MIL 11072	Antarctica	2011	6.5	L6
Miller Range 11073	MIL 11073	Antarctica	2011	3.3	EH3
Miller Range 11074	MIL 11074	Antarctica	2011	3.4	L6
Miller Range 11075	MIL 11075	Antarctica	2011	3	L5
Miller Range 11076	MIL 11076	Antarctica	2011	3	L6
Miller Range 11077	MIL 11077	Antarctica	2011	10.6	LL6
Miller Range 11078	MIL 11078	Antarctica	2011	15.9	L6
Miller Range 11079	MIL 11079	Antarctica	2011	17.5	LL5
Miller Range 11080	MIL 11080	Antarctica	2011	19.7	L5
Miller Range 11081	MIL 11081	Antarctica	2011	24.9	L6
Miller Range 11082	MIL 11082	Antarctica	2011	19.6	L5
Miller Range 11083	MIL 11083	Antarctica	2011	34.3	L5
Miller Range 11084	MIL 11084	Antarctica	2011	32.7	L6
Miller Range 11085	MIL 11085	Antarctica	2011	21.6	L5
Miller Range 11086	MIL 11086	Antarctica	2011	52.6	H6
Miller Range 11087	MIL 11087	Antarctica	2011	52.5	L6
Miller Range 11088	MIL 11088	Antarctica	2011	100.7	LL6
Miller Range 11089	MIL 11089	Antarctica	2011	140	LL6
Miller Range 11102	MIL 11102	Antarctica	2011	6.7	L6
Miller Range 11103	MIL 11103	Antarctica	2011	5.6	H6
Miller Range 11104	MIL 11104	Antarctica	2011	14	L5
Miller Range 11105	MIL 11105	Antarctica	2011	9.2	L5
Miller Range 11106	MIL 11106	Antarctica	2011	6.4	L6
Miller Range 11107	MIL 11107	Antarctica	2011	0.7	LL6

Miller Range 11108	MIL 11108	Antarctica	2011	0.2	LL6
Miller Range 11110	MIL 11110	Antarctica	2011	178.7	CO3
Miller Range 11112	MIL 11112	Antarctica	2011	151.7	H6
Miller Range 11113	MIL 11113	Antarctica	2011	152.4	LL6
Miller Range 11114	MIL 11114	Antarctica	2011	124.5	L5
Miller Range 11115	MIL 11115	Antarctica	2011	129.8	L5
Miller Range 11116	MIL 11116	Antarctica	2011	119.4	CO3
Miller Range 11117	MIL 11117	Antarctica	2011	79	L5
Miller Range 11118	MIL 11118	Antarctica	2011	39.5	CO3
Miller Range 11119	MIL 11119	Antarctica	2011	29.9	CO3
Miller Range 11120	MIL 11120	Antarctica	2011	27	CO3
Miller Range 11121	MIL 11121	Antarctica	2011	26.9	CO3
Miller Range 11122	MIL 11122	Antarctica	2011	21.2	L6
Miller Range 11124	MIL 11124	Antarctica	2011	34.7	CO3
Miller Range 11125	MIL 11125	Antarctica	2011	50.5	L6
Miller Range 11126	MIL 11126	Antarctica	2011	33.3	L5
Miller Range 11127	MIL 11127	Antarctica	2011	36.2	L5
Miller Range 11128	MIL 11128	Antarctica	2011	29.4	L6
Miller Range 11129	MIL 11129	Antarctica	2011	17.3	L5
Miller Range 11140	MIL 11140	Antarctica	2011	14.9	CO3
Miller Range 11142	MIL 11142	Antarctica	2011	10.1	L5
Miller Range 11143	MIL 11143	Antarctica	2011	11.3	L5
Miller Range 11145	MIL 11145	Antarctica	2011	5.3	LL5
Miller Range 11146	MIL 11146	Antarctica	2011	8.4	LL5
Miller Range 11147	MIL 11147	Antarctica	2011	11.9	CO3
Miller Range 11148	MIL 11148	Antarctica	2011	6.9	L5
Miller Range 11149	MIL 11149	Antarctica	2011	5.5	L6
Miller Range 11150	MIL 11150	Antarctica	2011	1.9	CO3
Miller Range 11151	MIL 11151	Antarctica	2011	0.3	LL6
Miller Range 11152	MIL 11152	Antarctica	2011	0.9	CO3
Miller Range 11153	MIL 11153	Antarctica	2011	2.5	L5
Miller Range 11154	MIL 11154	Antarctica	2011	4.6	CO3
Miller Range 11155	MIL 11155	Antarctica	2011	0.6	L5
Miller Range 11156	MIL 11156	Antarctica	2011	1.8	H5
Miller Range 11157	MIL 11157	Antarctica	2011	1.6	CO3
Miller Range 11158	MIL 11158	Antarctica	2011	9.3	L6
Miller Range 11159	MIL 11159	Antarctica	2011	4.2	L6
Miller Range 11160	MIL 11160	Antarctica	2011	31.8	L6
Miller Range 11161	MIL 11161	Antarctica	2011	62.3	LL5
Miller Range 11162	MIL 11162	Antarctica	2011	25	H6
Miller Range 11163	MIL 11163	Antarctica	2011	36.7	LL6
Miller Range 11164	MIL 11164	Antarctica	2011	78.9	LL6
Miller Range 11165	MIL 11165	Antarctica	2011	85.8	L6
Miller Range 11166	MIL 11166	Antarctica	2011	35.6	L6

Miller Range 11167	MIL 11167	Antarctica	2011	27.4	L6
Miller Range 11168	MIL 11168	Antarctica	2011	24.7	L6
Miller Range 11169	MIL 11169	Antarctica	2011	25.6	H5
Miller Range 11170	MIL 11170	Antarctica	2011	25.7	L6
Miller Range 11171	MIL 11171	Antarctica	2011	23.4	L6
Miller Range 11172	MIL 11172	Antarctica	2011	24.3	L6
Miller Range 11173	MIL 11173	Antarctica	2011	69.9	L6
Miller Range 11174	MIL 11174	Antarctica	2011	13.4	L6
Miller Range 11175	MIL 11175	Antarctica	2011	15.3	L6
Miller Range 11176	MIL 11176	Antarctica	2011	27.8	L6
Miller Range 11177	MIL 11177	Antarctica	2011	14.9	L6
Miller Range 11179	MIL 11179	Antarctica	2011	9.2	LL6
Miller Range 11210	MIL 11210	Antarctica	2011	394.3	L6
Miller Range 11211	MIL 11211	Antarctica	2011	373.9	L5
Miller Range 11212	MIL 11212	Antarctica	2011	188	L6
Miller Range 11214	MIL 11214	Antarctica	2011	93.8	L5
Miller Range 11215	MIL 11215	Antarctica	2011	111	H5
Miller Range 11216	MIL 11216	Antarctica	2011	137.6	L6
Miller Range 11217	MIL 11217	Antarctica	2011	82	L6
Miller Range 11218	MIL 11218	Antarctica	2011	74.2	L5
Miller Range 11219	MIL 11219	Antarctica	2011	85.9	L6
Miller Range 11220	MIL 11220	Antarctica	2011	13.6	LL6
Miller Range 11221	MIL 11221	Antarctica	2011	12.1	L6
Miller Range 11222	MIL 11222	Antarctica	2011	16.1	L6
Miller Range 11223	MIL 11223	Antarctica	2011	18.4	H5
Miller Range 11224	MIL 11224	Antarctica	2011	13.1	L5
Miller Range 11225	MIL 11225	Antarctica	2011	3	L5
Miller Range 11226	MIL 11226	Antarctica	2011	10.3	LL5
Miller Range 11227	MIL 11227	Antarctica	2011	6.1	LL6
Miller Range 11228	MIL 11228	Antarctica	2011	4.5	LL5
Miller Range 11229	MIL 11229	Antarctica	2011	19.6	LL5
Miller Range 11230	MIL 11230	Antarctica	2011	6.4	LL6
Miller Range 11231	MIL 11231	Antarctica	2011	3.7	CR2
Miller Range 11233	MIL 11233	Antarctica	2011	33.4	L5
Miller Range 11234	MIL 11234	Antarctica	2011	24.6	LL5
Miller Range 11235	MIL 11235	Antarctica	2011	40.1	H5
Miller Range 11236	MIL 11236	Antarctica	2011	55.3	LL5
Miller Range 11237	MIL 11237	Antarctica	2011	12.9	CO3
Miller Range 11238	MIL 11238	Antarctica	2011	24	L5
Miller Range 11239	MIL 11239	Antarctica	2011	29.7	LL5
Miller Range 11250	MIL 11250	Antarctica	2011	22	H6
Miller Range 11251	MIL 11251	Antarctica	2011	25.1	H6
Miller Range 11252	MIL 11252	Antarctica	2011	26.7	CO3
Miller Range 11253	MIL 11253	Antarctica	2011	14.9	H6

Miller Range 11254	MIL 11254	Antarctica	2011	14	L6
Miller Range 11256	MIL 11256	Antarctica	2011	26.4	L5
Miller Range 11257	MIL 11257	Antarctica	2011	28.4	LL6
Miller Range 11258	MIL 11258	Antarctica	2011	30	L6
Miller Range 11259	MIL 11259	Antarctica	2011	20.8	L6
Miller Range 11260	MIL 11260	Antarctica	2011	34.9	LL6
Miller Range 11261	MIL 11261	Antarctica	2011	30.8	CO3
Miller Range 11262	MIL 11262	Antarctica	2011	46.4	L6
Miller Range 11263	MIL 11263	Antarctica	2011	25	LL5
Miller Range 11264	MIL 11264	Antarctica	2011	26.4	LL6
Miller Range 11265	MIL 11265	Antarctica	2011	38.9	L5
Miller Range 11266	MIL 11266	Antarctica	2011	34	L6
Miller Range 11267	MIL 11267	Antarctica	2011	38.5	LL5
Miller Range 11268	MIL 11268	Antarctica	2011	20.2	LL5
Miller Range 11269	MIL 11269	Antarctica	2011	18.6	L6
Miller Range 11270	MIL 11270	Antarctica	2011	7.8	L6
Miller Range 11272	MIL 11272	Antarctica	2011	3.1	CM1/2
Miller Range 11274	MIL 11274	Antarctica	2011	12.3	H6
Miller Range 11275	MIL 11275	Antarctica	2011	17.1	LL6
Miller Range 11276	MIL 11276	Antarctica	2011	6.2	LL6
Miller Range 11277	MIL 11277	Antarctica	2011	20.5	L5
Miller Range 11278	MIL 11278	Antarctica	2011	10.8	LL5
Miller Range 11279	MIL 11279	Antarctica	2011	10.6	L5
Miller Range 11280	MIL 11280	Antarctica	2011	2.2	L5
Miller Range 11281	MIL 11281	Antarctica	2011	3.1	L5
Miller Range 11282	MIL 11282	Antarctica	2011	0.7	L6
Miller Range 11284	MIL 11284	Antarctica	2011	1.7	L6
Miller Range 11286	MIL 11286	Antarctica	2011	3.9	LL6
Miller Range 11287	MIL 11287	Antarctica	2011	7.7	LL5
Miller Range 11288	MIL 11288	Antarctica	2011	4.6	L6
Miller Range 11289	MIL 11289	Antarctica	2011	34.6	LL6
Miller Range 11290	MIL 11290	Antarctica	2011	327.1	Eucrite
Miller Range 11293	MIL 11293	Antarctica	2011	49.5	CO3
Miller Range 11295	MIL 11295	Antarctica	2011	147.7	LL6
Miller Range 11297	MIL 11297	Antarctica	2011	390.9	LL6
Miller Range 11298	MIL 11298	Antarctica	2011	623.1	LL5
Mount DeWitt 12007	DEW 12007	Antarctica	2013 Jan 3	94.2	Lunar
Northeast Africa 004	NEA 004	Libya	P 2004	2005	L6
Northeast Africa 005	NEA 005	Algeria	2000 Dec 12	95	L5
Northwest Africa 590	NWA 590	(Northwest Africa)	P 2000	280	H5
Northwest Africa 596	NWA 596	(Northwest Africa)	P 2000	136	H5
Northwest Africa 601	NWA 601	(Northwest Africa)	P 2000	210	LL6
Northwest Africa 618	NWA 618	(Northwest Africa)	P 2000	126.1	H3-5
Northwest Africa 649	NWA 649	(Northwest Africa)	P 2000	1690	L6

Northwest Africa 692	NWA 692	(Northwest Africa)	P 2000	478	H5
Northwest Africa 697	NWA 697	(Northwest Africa)	P 2000	686	H6
Northwest Africa 699	NWA 699	(Northwest Africa)	P 2000	858	H5
Northwest Africa 1158	NWA 1158	(Northwest Africa)	P 1999	180	L6
Northwest Africa 1163	NWA 1163	(Northwest Africa)	P 1999	280	L6
Northwest Africa 1165	NWA 1165	(Northwest Africa)	P 2001	240	H-melt breccia
Northwest Africa 2553	NWA 2553	(Northwest Africa)	P April 2002	1502	L5/6
Northwest Africa 2554	NWA 2554	(Northwest Africa)	P April 2002	1320	L4-6
Northwest Africa 2555	NWA 2555	(Northwest Africa)	P 2004	36	L4-6
Northwest Africa 2556	NWA 2556	(Northwest Africa)	P 2004	14	L6
Northwest Africa 3083	NWA 3083	(Northwest Africa)	P 2003	59	ureilite
Northwest Africa 3344	NWA 3344	(Northwest Africa)	P 2003	47	L4-6
Northwest Africa 5341	NWA 5341	(Northwest Africa)	P 2007	49.1	H3
Northwest Africa 5343	NWA 5343	(Northwest Africa)	P 2007	578	CK3
Northwest Africa 5582	NWA 5582	(Northwest Africa)	P 2008	411	Eucrite
Northwest Africa 5585	NWA 5585	(Northwest Africa)	P 2008	204	CO3
Northwest Africa 5586	NWA 5586	(Northwest Africa)	P 2008	131	Eucrite
Northwest Africa 5587	NWA 5587	(Northwest Africa)	P 2008	80.4	Ureilite
Northwest Africa 5588	NWA 5588	(Northwest Africa)	P 2008	318	Ureilite
Northwest Africa 5653	NWA 5653	(Northwest Africa)	P 2003	340	L5
Northwest Africa 5654	NWA 5654	(Northwest Africa)	P 2003	338	H4
Northwest Africa 5657	NWA 5657	(Northwest Africa)	P 2004	400	L6
Northwest Africa 5658	NWA 5658	(Northwest Africa)	P 2004	175	L6
Northwest Africa 5659	NWA 5659	(Northwest Africa)	P 2004	205	L6
Northwest Africa 5660	NWA 5660	(Northwest Africa)	P 2005	50	L6
Northwest Africa 5661	NWA 5661	(Northwest Africa)	P 2005	40	L6
Northwest Africa 5662	NWA 5662	(Northwest Africa)	P 2005	80	L4
Northwest Africa 5663	NWA 5663	(Northwest Africa)	P 2007	260	H4
Northwest Africa 5664	NWA 5664	(Northwest Africa)	P 2007	180	H4
Northwest Africa 5665	NWA 5665	(Northwest Africa)	P 2007	125	L5
Northwest Africa 5666	NWA 5666	(Northwest Africa)	P 2007	60	LL5
Northwest Africa 5943	NWA 5943	Morocco	August 2009	228.9	CV3
Northwest Africa 5945	NWA 5945	Algeria	August 2009	375.2	H/L3
Northwest Africa 6218	NWA 6218	Morocco	Apr 2010	22.96	R5
Northwest Africa 6220	NWA 6220	Morocco	Apr 2010	197.43	R5
Northwest Africa 6296	NWA 6296	(Northwest Africa)	P 2009	117.75	EL5 melt breccia
Northwest Africa 6314	NWA 6314	(Northwest Africa)	P 2010	1084	LL7
Northwest Africa 6362	NWA 6362	Morocco	P Oct 2004	170	H3
Northwest Africa 6432	NWA 6432	(Northwest Africa)	P 2009 Feb	793	L5
Northwest Africa 6434	NWA 6434	(Northwest Africa)	P 2009	423	H6-an
Northwest Africa 6468	NWA 6468	(Northwest Africa)	P 2010-10	1112	R4
Northwest Africa 6469	NWA 6469	(Northwest Africa)	P 2010 Aug	806	Lodranite
Northwest Africa 6699	NWA 6699	(Northwest Africa)	P 2011 Jan	17.4	L-melt rock
Northwest Africa 6718	NWA 6718	(Northwest Africa)	P 2011 Feb	1864	R4

Northwest Africa 6742	NWA 6742	(Northwest Africa)	P 2008 Jun 22	149	LL3.7
Northwest Africa 6877	NWA 6877	(Northwest Africa)	P 2011 Apr	38000	H5
Northwest Africa 6934	NWA 6934	(Northwest Africa)	P 2005 Aug 31	271	H5
Northwest Africa 6935	NWA 6935	(Northwest Africa)	P 2011 Jun 17	554	LL5
Northwest Africa 6936	NWA 6936	(Northwest Africa)	P 2011 Jun 17	75	LL5
Northwest Africa 6937	NWA 6937	(Northwest Africa)	P 2011 Jun 17	172	LL5
Northwest Africa 6938	NWA 6938	(Northwest Africa)	P 2011 Jun 17	116	H5
Northwest Africa 6939	NWA 6939	(Northwest Africa)	P 2011 Jun 17	39	Ureilite
Northwest Africa 6940	NWA 6940	(Northwest Africa)	P 2011 Jun 17	12800	L5
Northwest Africa 6941	NWA 6941	(Northwest Africa)	P 2011 Jun 17	266	H5
Northwest Africa 6942	NWA 6942	(Northwest Africa)	P 2011 Jun 22	179	H5
Northwest Africa 7030	NWA 7030	(Northwest Africa)	P 2011 Oct	224	LL7
Northwest Africa 7300	NWA 7300	(Northwest Africa)	2009	20.2	Eucrite
Northwest Africa 7302	NWA 7302	Morocco	2009	2129	CK5
Northwest Africa 7344	NWA 7344	(Northwest Africa)	P June 2011	119	CV3
Northwest Africa 7398	NWA 7398	(Northwest Africa)	P 2012 Jun	118.3	Diogenite-pm
Northwest Africa 7470	NWA 7470	(Northwest Africa)	P 2009 Sep	107	Eucrite-mmict
Northwest Africa 7541	NWA 7541	(Northwest Africa)	P 2010	844	L3-6
Northwest Africa 7634	NWA 7634	(Northwest Africa)	P 2012 Nov	866	CO3
Northwest Africa 7639	NWA 7639	(Northwest Africa)	P 2008	294.1	Diogenite
Northwest Africa 7642	NWA 7642	(Northwest Africa)	P 2012 Dec	180.3	Eucrite-mmict
Northwest Africa 7643	NWA 7643	(Northwest Africa)	P 2012 Dec	740	Eucrite
Northwest Africa 7644	NWA 7644	(Northwest Africa)	P 2012 Dec	1337	Eucrite-unbr
Northwest Africa 7645	NWA 7645	(Northwest Africa)	P 2012 Dec	43.1	Eucrite-pmict
Northwest Africa 7647	NWA 7647	(Northwest Africa)	P 2012 Dec	23.3	Eucrite-pmict
Northwest Africa 7660	NWA 7660	Morocco	P Oct 2011	23	LL-melt rock
Northwest Africa 7665	NWA 7665	(Northwest Africa)	P 2012 Dec	28	Diogenite-pm
Northwest Africa 7669	NWA 7669	(Northwest Africa)	P 2012 Dec	176	LL3
Northwest Africa 7670	NWA 7670	(Northwest Africa)	P 2012 Dec	18.9	CM2
Northwest Africa 7672	NWA 7672	(Northwest Africa)	P 2013 Feb	35	Diogenite
Northwest Africa 7673	NWA 7673	(Northwest Africa)	P 2012 Dec	189	L3
Northwest Africa 7676	NWA 7676	(Northwest Africa)	P 2012 Feb	1050	LL3
Northwest Africa 7718	NWA 7718	(Northwest Africa)	P 2012 Dec	50.9	CV3
Northwest Africa 7719	NWA 7719	(Northwest Africa)	P 2012 Dec	53	CV3
Northwest Africa 7725	NWA 7725	(Northwest Africa)	P 2012 Dec	123	L3
Northwest Africa 7726	NWA 7726	(Northwest Africa)	P 2012 Dec	248	L3
Northwest Africa 7727	NWA 7727	(Northwest Africa)	P 2012 Dec	150	L3
Northwest Africa 7811	NWA 7811	(Northwest Africa)	P 2011	95	Eucrite-pmict
Northwest Africa 7813	NWA 7813	(Northwest Africa)	P 2013 Jan	510	L3
Northwest Africa 7814	NWA 7814	(Northwest Africa)	P 2013 Feb	916	LL3
Northwest Africa 7819	NWA 7819	(Northwest Africa)	P 2013 Feb	21	CO3
Northwest Africa 7823	NWA 7823	(Northwest Africa)	P 2013 Feb	228	L3
Northwest Africa 7829	NWA 7829	(Northwest Africa)	P 2013 Mar	155	R3
Northwest Africa 7831	NWA 7831	Western Sahara	2013 Mar	>20000	Diogenite

Northwest Africa 7833	NWA 7833	(Northwest Africa)	P 2012 Jan	1320	L3
Northwest Africa 7835	NWA 7835	(Northwest Africa)	P 2013 Nov	56	Achondrite-ung
Northwest Africa 7836	NWA 7836	(Northwest Africa)	2011 Jun	240	Eucrite
Northwest Africa 7890	NWA 7890	(Northwest Africa)	P 2013 Feb	5.1	Martian (shergottite)
Northwest Africa 7911	NWA 7911	(Northwest Africa)	P 2002	97.6	L4
Northwest Africa 7949	NWA 7949	(Northwest Africa)	P 2013 May	136	CO3
Northwest Africa 7969	NWA 7969	(Northwest Africa)	P 2004	16.22	L5
Northwest Africa 7970	NWA 7970	(Northwest Africa)	P 2004	264.94	L5
Northwest Africa 7984	NWA 7984	(Northwest Africa)	P 23 Jun 2012	1178	L6
Northwest Africa 7985	NWA 7985	(Northwest Africa)	P 28-June-2009	560	LL3-5
Northwest Africa 7988	NWA 7988	(Northwest Africa)	P 2013 Jul	116	LL6
Northwest Africa 7989	NWA 7989	(Northwest Africa)	P 2013 Jul	510	Eucrite-pmict
Northwest Africa 8011	NWA 8011	(Northwest Africa)	P 2013 Jan	160	LL-melt rock
Northwest Africa 8015	NWA 8015	(Northwest Africa)	P 2012 Jun	1513	L5-melt breccia
Northwest Africa 8026	NWA 8026	(Northwest Africa)	P 2003	1954	CV3
Northwest Africa 8027	NWA 8027	(Northwest Africa)	P 2003	4.58	Howardite
Northwest Africa 8033	NWA 8033	(Northwest Africa)	P 2012	114	L4
Northwest Africa 8036	NWA 8036	(Northwest Africa)	P 2013 Aug	1612	Eucrite-pmict
Northwest Africa 8041	NWA 8041	(Northwest Africa)	P 2013 Feb	862	LL3-5
Northwest Africa 8046	NWA 8046	(Northwest Africa)	P 2012 Dec	47.3	Lunar (feldsp. breccia)
Northwest Africa 8048	NWA 8048	(Northwest Africa)	P 2013 Aug	141	Eucrite
Northwest Africa 8049	NWA 8049	(Northwest Africa)	P 2013 Aug	368	Ureilite
Northwest Africa 8052	NWA 8052	(Northwest Africa)	P 2013 Apr	102	Ureilite
Northwest Africa 8055	NWA 8055	(Northwest Africa)	P 2013 Sep	98	Lunar (feldsp. breccia)
Northwest Africa 8056	NWA 8056	(Northwest Africa)	P 2013 Aug	1560	Eucrite
Northwest Africa 8057	NWA 8057	(Northwest Africa)	P 2013 Sep	100.8	Diogenite
Northwest Africa 8058	NWA 8058	(Northwest Africa)	P 2013 Jul	31.4	L3
Northwest Africa 8118	NWA 8118	(Northwest Africa)	P 2013 Sep	955	Lodranite
Northwest Africa 8119	NWA 8119	(Northwest Africa)	P 2013 Feb	344	Diogenite
Northwest Africa 8120	NWA 8120	(Northwest Africa)	P 2013 Feb	1840	Eucrite
Northwest Africa 8121	NWA 8121	(Northwest Africa)	P 2013 Feb	583	L3
Northwest Africa 8122	NWA 8122	(Northwest Africa)	P 2013 Feb	128.5	L3
Northwest Africa 8127	NWA 8127	(Northwest Africa)	P 2012 Mar	529	Lunar (gabbro)
Northwest Africa 8129	NWA 8129	(Northwest Africa)	P 2013 Sep	610	H4
Northwest Africa 8132	NWA 8132	(Northwest Africa)	P 2013 Oct	79	Ureilite
Northwest Africa 8133	NWA 8133	(Northwest Africa)	P 2013 Oct	317	L3
Northwest Africa 8135	NWA 8135	(Northwest Africa)	P 2013 Apr	47.8	CO3
Northwest Africa 8136	NWA 8136	(Northwest Africa)	P 2013 Apr	16.5	Ureilite
Northwest Africa 8137	NWA 8137	(Northwest Africa)	P 2013 Apr	55.2	Ureilite
Northwest Africa 8138	NWA 8138	(Northwest Africa)	P 2013 Apr	67.8	H6
Northwest Africa 8169	NWA 8169	(Northwest Africa)	P Feb 2011	1645	L6
Northwest Africa 8170	NWA 8170	Morocco	P 2013	89.2	Eucrite-pmict
Northwest Africa 8171	NWA 8171	(Northwest Africa)	P June 2013	81.88	Martian (basaltic breccia)

Northwest Africa 8172	NWA 8172	(Northwest Africa)	P 2013 Sep	334	Ureilite
Northwest Africa 8173	NWA 8173	(Northwest Africa)	P 2013 Oct	67.2	Enst achon
Northwest Africa 8174	NWA 8174	(Northwest Africa)	P 2013 Oct	150	Eucrite-pmict
Northwest Africa 8175	NWA 8175	(Northwest Africa)	P 2013 Dec	62	CK4
Northwest Africa 8176	NWA 8176	(Northwest Africa)	P 2004 Dec	380	Eucrite-pmict
Northwest Africa 8177	NWA 8177	(Northwest Africa)	P 2008 Apr	3925	Eucrite-mmict
Northwest Africa 8178	NWA 8178	(Northwest Africa)	P 2013 Dec	397	Diogenite
Northwest Africa 8179	NWA 8179	(Northwest Africa)	P 2013 Dec	245	Ureilite
Northwest Africa 8180	NWA 8180	(Northwest Africa)	P 2013 Nov	235	Eucrite
Northwest Africa 8181	NWA 8181	Morocco	P 2013 Jun	18.2	Lunar (feldsp. breccia)
Northwest Africa 8182	NWA 8182	(Northwest Africa)	P 2013	15.6	Lunar (feldsp. breccia)
Northwest Africa 8183	NWA 8183	(Northwest Africa)	P 2013	307	LL(L)3.2
Northwest Africa 8184	NWA 8184	(Northwest Africa)	P 2013	4300	L3.7
Northwest Africa 8185	NWA 8185	(Northwest Africa)	P 2009	793	L5
Northwest Africa 8186	NWA 8186	(Northwest Africa)	P 2013	5.9	Achondrite-ung
Northwest Africa 8187	NWA 8187	Western Sahara	2013	682	Eucrite-mmict
Northwest Africa 8188	NWA 8188	(Northwest Africa)	P 2013	123.7	Howardite
Northwest Africa 8189	NWA 8189	(Northwest Africa)	P 2012	557	L5/6
Northwest Africa 8190	NWA 8190	(Northwest Africa)	P 2007	660	CK3
Northwest Africa 8191	NWA 8191	(Northwest Africa)	P 2013	1100	L3
Northwest Africa 8192	NWA 8192	(Northwest Africa)	P 2013	164	L5/6
Northwest Africa 8193	NWA 8193	(Northwest Africa)	P 2010	1016	LL6
Northwest Africa 8196	NWA 8196	(Northwest Africa)	P 04/2013	290	Eucrite
Northwest Africa 8197	NWA 8197	(Northwest Africa)	P 04/2013	57	Eucrite
Northwest Africa 8200	NWA 8200	(Northwest Africa)	P Dec. 2012	260	L6
Northwest Africa 8201	NWA 8201	(Northwest Africa)	P Oct. 2011	66	L6
Northwest Africa 8202	NWA 8202	(Northwest Africa)	P Oct. 2011	59	LL5
Northwest Africa 8204	NWA 8204	(Northwest Africa)	P 2013	130	L3
Northwest Africa 8205	NWA 8205	(Northwest Africa)	P 2013	140	Ureilite
Northwest Africa 8206	NWA 8206	(Northwest Africa)	P 2008	14500	H5
Northwest Africa 8207	NWA 8207	(Northwest Africa)	P 2008	18000	L6
Northwest Africa 8208	NWA 8208	(Northwest Africa)	P 2012	120	CV3
Northwest Africa 8209	NWA 8209	(Northwest Africa)	P 2012	420	LL6
Northwest Africa 8210	NWA 8210	(Northwest Africa)	P 2002	410	LL3
Northwest Africa 8212	NWA 8212	(Northwest Africa)	P 2013	500	H-melt rock
Northwest Africa 8213	NWA 8213	(Northwest Africa)	P 2013	410	H6
Northwest Africa 8214	NWA 8214	(Northwest Africa)	P 2013	380	CK5
Northwest Africa 8216	NWA 8216	(Northwest Africa)	P 2013 Dec	176	Lodranite
Northwest Africa 8219	NWA 8219	(Northwest Africa)	P 2013 Dec	86	Ureilite
Northwest Africa 8222	NWA 8222	(Northwest Africa)	P 2013 Dec	208.6	Lunar (feldsp. breccia)
Northwest Africa 8224	NWA 8224	(Northwest Africa)	P 2013 Dec	22	Eucrite-pmict
Northwest Africa 8226	NWA 8226	(Northwest Africa)	P 2013 Dec	220	Ureilite
Northwest Africa 8229	NWA 8229	(Northwest Africa)	P 2013 Dec	406	Ureilite
Northwest Africa 8231	NWA 8231	(Northwest Africa)	P Oct. 2005	356	H4-6

Northwest Africa 8232	NWA 8232	(Northwest Africa)	P Oct. 2005	73	LL5
Northwest Africa 8233	NWA 8233	(Northwest Africa)	P Nov 2013	916	H6
Northwest Africa 8234	NWA 8234	(Northwest Africa)	P Nov 2013	905	Mesosiderite-C2
Northwest Africa 8235	NWA 8235	(Northwest Africa)	P 2013	140	Eucrite-mmict
Northwest Africa 8238	NWA 8238	(Northwest Africa)	P 2013	1050	LL6
Northwest Africa 8239	NWA 8239	(Northwest Africa)	P 2012	50	LL7
Northwest Africa 8240	NWA 8240	(Northwest Africa)	P Sept 2013	55.1	EL6
Northwest Africa 8241	NWA 8241	(Northwest Africa)	P Sept 2013	355	L5
Northwest Africa 8242	NWA 8242	(Northwest Africa)	P Oct 2013	27.8	CK3
Northwest Africa 8243	NWA 8243	(Northwest Africa)	P Oct 2013	5942	L3
Northwest Africa 8244	NWA 8244	(Northwest Africa)	P Dec 2013	283	L3
Northwest Africa 8245	NWA 8245	(Northwest Africa)	P Dec 2013	2122	LL6
Northwest Africa 8246	NWA 8246	(Northwest Africa)	P Jul 2012	41	LL6
Northwest Africa 8247	NWA 8247	(Northwest Africa)	P Dec 2012	202	LL6
Northwest Africa 8248	NWA 8248	(Northwest Africa)	P Dec 2012	14.8	L3
Northwest Africa 8249	NWA 8249	(Northwest Africa)	P Dec 2012	605	L6
Northwest Africa 8250	NWA 8250	(Northwest Africa)	P Oct 2013	755	L6
Northwest Africa 8251	NWA 8251	(Northwest Africa)	P 2013 Dec	853	Lodranite
Northwest Africa 8254	NWA 8254	(Northwest Africa)	P 2013	105	Eucrite-br
Northwest Africa 8261	NWA 8261	(Northwest Africa)	P 2014 Jan	559	Eucrite-pmict
Northwest Africa 8264	NWA 8264	(Northwest Africa)	P 2014 Jan	57.9	Eucrite
Northwest Africa 8265	NWA 8265	(Northwest Africa)	P 2014 Jan	227	Diogenite
Northwest Africa 8266	NWA 8266	(Northwest Africa)	P 2014 Jan	235	Eucrite-mmict
Northwest Africa 8268	NWA 8268	(Northwest Africa)	P 2013 May 12	3.23	Achondrite-ung
Northwest Africa 8269	NWA 8269	(Northwest Africa)	P 2013 Aug	636.9	H7
Northwest Africa 8270	NWA 8270	(Northwest Africa)	P 2013 May	1069	H4
Northwest Africa 8271	NWA 8271	(Northwest Africa)	P 2013 Aug	145	L5
Northwest Africa 8272	NWA 8272	Morocco	P Nov 2013	291.9	L6
Northwest Africa 8273	NWA 8273	Morocco	P Dec 2013	270	LL5
Northwest Africa 8274	NWA 8274	Morocco	P 2012 Sep 15	371	L6
Northwest Africa 8275	NWA 8275	Morocco	P 2012 Aug 19	374	LL7
Northwest Africa 8276	NWA 8276	(Northwest Africa)	P 2013	789	L3.00
Northwest Africa 8277	NWA 8277	(Northwest Africa)	P 2013	773	Lunar meteorite
Northwest Africa 8278	NWA 8278	(Northwest Africa)	P 2011	34	H4
Northwest Africa 8279	NWA 8279	(Northwest Africa)	P 2011	33	L4
Northwest Africa 8280	NWA 8280	(Northwest Africa)	P 2011	36	H4
Northwest Africa 8281	NWA 8281	(Northwest Africa)	P 2011	132	H5
Northwest Africa 8283	NWA 8283	(Northwest Africa)	P 2011	55	H5
Northwest Africa 8284	NWA 8284	(Northwest Africa)	P 2011	60	L5
Northwest Africa 8287	NWA 8287	(Northwest Africa)	P 2013	220.9	Acapulcoite
Northwest Africa 8288	NWA 8288	(Northwest Africa)	P 2013	123.25	CV3
Northwest Africa 8289	NWA 8289	(Northwest Africa)	P 2013	333.37	CV3
Northwest Africa 8290	NWA 8290	(Northwest Africa)	P 2013	167.75	CO3.1
Northwest Africa 8291	NWA 8291	(Northwest Africa)	P 2013	295.7	Mesosiderite

Northwest Africa 8292	NWA 8292	(Northwest Africa)	P 2013	360.71	L5
Northwest Africa 8293	NWA 8293	(Northwest Africa)	P 2013	188.98	L5
Northwest Africa 8294	NWA 8294	(Northwest Africa)	P 2013	1206	H6
Northwest Africa 8295	NWA 8295	(Northwest Africa)	P 2013	133.39	H4
Northwest Africa 8296	NWA 8296	(Northwest Africa)	P 2013	159.97	L5
Northwest Africa 8297	NWA 8297	(Northwest Africa)	P 2013	1650	H6
Northwest Africa 8298	NWA 8298	(Northwest Africa)	P 2013	206.9	L5
Northwest Africa 8299	NWA 8299	(Northwest Africa)	P Oct 2000	0.5	L5
Northwest Africa 8300	NWA 8300	Morocco	P June 2013	48.9	CM2
Northwest Africa 8301	NWA 8301	Morocco	P June 2013	6.733	CM2
Northwest Africa 8302	NWA 8302	(Northwest Africa)	P 2010	22400	Iron, IIAB
Northwest Africa 8304	NWA 8304	(Northwest Africa)	P 2013 Nov	433	Lodranite
Northwest Africa 8306	NWA 8306	(Northwest Africa)	P 2014 Feb	1389	Lunar (feldsp. breccia)
Northwest Africa 8307	NWA 8307	(Northwest Africa)	P 2012 Oct	417.5	Ureilite
Northwest Africa 8308	NWA 8308	(Northwest Africa)	P 2012 Aug	604.5	Howardite
Northwest Africa 8309	NWA 8309	(Northwest Africa)	P 2012 Jun	424	Eucrite
Northwest Africa 8311	NWA 8311	(Northwest Africa)	P 2012 Mar	926	Ureilite
Northwest Africa 8313	NWA 8313	(Northwest Africa)	P 2014 Jan	26.6	Diogenite
Northwest Africa 8316	NWA 8316	(Northwest Africa)	P 2014 Jan	353	Diogenite
Northwest Africa 8317	NWA 8317	(Northwest Africa)	P 2014 Jan	383	Eucrite-br
Northwest Africa 8318	NWA 8318	(Northwest Africa)	P 2014 Feb	71	Eucrite-mmict
Northwest Africa 8321	NWA 8321	(Northwest Africa)	P Dec 2013	317	Diogenite
Northwest Africa 8322	NWA 8322	(Northwest Africa)	P Dec 2013	563	LL6
Northwest Africa 8323	NWA 8323	(Northwest Africa)	P Dec 2013	251	CV3
Northwest Africa 8324	NWA 8324	(Northwest Africa)	P Dec 2013	1100	LL6
Northwest Africa 8325	NWA 8325	(Northwest Africa)	P Dec 2013	784	L6
Northwest Africa 8326	NWA 8326	(Northwest Africa)	P Dec 2013	205	Diogenite
Northwest Africa 8327	NWA 8327	(Northwest Africa)	P Dec 2006	140	LL5
Northwest Africa 8328	NWA 8328	(Northwest Africa)	P Oct 2013	1592	H6
Northwest Africa 8330	NWA 8330	Morocco	P Jan 2014	676	LL3
Northwest Africa 8331	NWA 8331	Morocco	P 2002	43	CV3
Northwest Africa 8332	NWA 8332	(Northwest Africa)	P 2012	73.377	L5
Northwest Africa 8336	NWA 8336	(Northwest Africa)	P 2014 Feb	2130	Eucrite-mmict
Northwest Africa 8337	NWA 8337	(Northwest Africa)	P 2012	750	Iron, IAB-ung
Northwest Africa 8338	NWA 8338	(Northwest Africa)	P 2013	1870	Eucrite-melt breccia
Northwest Africa 8339	NWA 8339	(Northwest Africa)	P 2013	111.4	Eucrite-cm
Northwest Africa 8340	NWA 8340	(Northwest Africa)	P 2010 Oct	1500	CV3
Northwest Africa 8341	NWA 8341	(Northwest Africa)	P 2012	280	EL6
Northwest Africa 8342	NWA 8342	(Northwest Africa)	P 2013	167	CO3.1
Northwest Africa 8343	NWA 8343	(Northwest Africa)	P 2013	700.92	Howardite
Northwest Africa 8344	NWA 8344	(Northwest Africa)	P 2013	1495.7	Eucrite-mmict
Northwest Africa 8345	NWA 8345	(Northwest Africa)	P 2013	986.14	CO3.2
Northwest Africa 8346	NWA 8346	Morocco	P June 2010	334	Iron, IAB-sLL
Northwest Africa 8347	NWA 8347	Morocco	P June 2010	96	Iron, IAB-sLL

Northwest Africa 8348	NWA 8348	Morocco	P June 2010	518	Iron, IAB-sHL
Northwest Africa 8354	NWA 8354	(Northwest Africa)	P 2013	57	Diogenite-pm
Northwest Africa 8362	NWA 8362	(Northwest Africa)	P 2013 Dec	548	Howardite
Northwest Africa 8365	NWA 8365	(Northwest Africa)	P 2014 Mar	319	Eucrite-mmict
Northwest Africa 8367	NWA 8367	(Northwest Africa)	P 2013 Dec	109	Diogenite
Northwest Africa 8368	NWA 8368	(Northwest Africa)	P 2014 Feb	1994	Mesosiderite
Northwest Africa 8369	NWA 8369	Morocco	P 2012	228	H5
Northwest Africa 8370	NWA 8370	Morocco	2011	15250	Iron, IIIAB
Northwest Africa 8371	NWA 8371	Morocco	2012	7828	L~6
Northwest Africa 8372	NWA 8372	(Northwest Africa)	P 2013	230	Eucrite
Northwest Africa 8373	NWA 8373	(Northwest Africa)	P Sept 2013	891	H6
Northwest Africa 8374	NWA 8374	(Northwest Africa)	P Nov 2013	388.8	H6
Northwest Africa 8375	NWA 8375	(Northwest Africa)	P Nov 2013	626.2	L5
Northwest Africa 8376	NWA 8376	(Northwest Africa)	P Jun 2013	200.6	CV3
Northwest Africa 8377	NWA 8377	(Northwest Africa)	P Oct 2013	421	CV3
Northwest Africa 8378	NWA 8378	(Northwest Africa)	P Oct 2013	182.8	Ureilite
Northwest Africa 8379	NWA 8379	(Northwest Africa)	P Feb 2013	279	Diogenite
Northwest Africa 8380	NWA 8380	(Northwest Africa)	P 2014 Mar 26	109.9	CK5
Northwest Africa 8381	NWA 8381	(Northwest Africa)	P 2014 Mar 31	131	L6
Northwest Africa 8382	NWA 8382	(Northwest Africa)	P 2014 Mar 26	145	LL6
Northwest Africa 8383	NWA 8383	(Northwest Africa)	P 2013	24.9	Eucrite-cm
Northwest Africa 8384	NWA 8384	(Northwest Africa)	2011 Aug	1080	LL3
Northwest Africa 8385	NWA 8385	Morocco	P March 2014	122.5	CK5
Northwest Africa 8386	NWA 8386	(Northwest Africa)	P 2014	1002	Howardite
Northwest Africa 8387	NWA 8387	(Northwest Africa)	P 2014	1149.5	LL3
Northwest Africa 8388	NWA 8388	Western Sahara	2014	97.1	H6
Northwest Africa 8389	NWA 8389	Western Sahara	2014	1961	L6
Northwest Africa 8390	NWA 8390	Western Sahara	2014	48.4	H6
Northwest Africa 8391	NWA 8391	Western Sahara	2014	286.1	H6
Northwest Africa 8392	NWA 8392	Western Sahara	2014	29.9	H5
Northwest Africa 8393	NWA 8393	Western Sahara	2014	30.5	H6
Northwest Africa 8394	NWA 8394	Western Sahara	2014	19	H5
Northwest Africa 8395	NWA 8395	Western Sahara	2014	595.3	Eucrite
Northwest Africa 8396	NWA 8396	Western Sahara	2014	147.4	Aubrite
Northwest Africa 8397	NWA 8397	Western Sahara	2014	23.1	CV3
Northwest Africa 8398	NWA 8398	Western Sahara	2014	9.4	CO3.2
Northwest Africa 8399	NWA 8399	Western Sahara	2014	18.5	Ureilite
Northwest Africa 8400	NWA 8400	Western Sahara	2014	1026	H7
Northwest Africa 8401	NWA 8401	(Northwest Africa)	P 2014	71	Howardite
Northwest Africa 8402	NWA 8402	(Northwest Africa)	P 2014	23850	Mesosiderite-A3
Northwest Africa 8403	NWA 8403	(Northwest Africa)	P 2014	11770	EL6
Northwest Africa 8404	NWA 8404	(Northwest Africa)	P 2014	28	Diogenite-olivine
Northwest Africa 8407	NWA 8407	(Northwest Africa)	P 2013 Jun	445	Ureilite
Northwest Africa 8410	NWA 8410	(Northwest Africa)	P 2013 Jun	146.4	Lodranite

Northwest Africa 8411	NWA 8411	(Northwest Africa)	P 2013 Jun	982	Howardite
Northwest Africa 8412	NWA 8412	(Northwest Africa)	P 2014 Mar	200000	L5
Northwest Africa 8413	NWA 8413	(Northwest Africa)	P 2011 Mar	155000	H6
Northwest Africa 8415	NWA 8415	(Northwest Africa)	P 2013 Jun	160000	L5
Northwest Africa 8416	NWA 8416	(Northwest Africa)	P 2014 Mar	730	Ureilite
Northwest Africa 8417	NWA 8417	(Northwest Africa)	P 2014 Apr	221.5	LL7
Northwest Africa 8422	NWA 8422	(Northwest Africa)	P 2014 Mar	422	Lodranite
Northwest Africa 8425	NWA 8425	(Northwest Africa)	P 2014 Mar	83	LL6
Northwest Africa 8426	NWA 8426	(Northwest Africa)	P 2014 Mar	581	Eucrite-mmict
Northwest Africa 8430	NWA 8430	(Northwest Africa)	P 2011	611	L5
Northwest Africa 8431	NWA 8431	Western Sahara	06/2013	2000.7	Eucrite-pmict
Northwest Africa 8432	NWA 8432	(Northwest Africa)	P 2012	305	LL7
Northwest Africa 8433	NWA 8433	(Northwest Africa)	P 2002	598	LL7
Northwest Africa 8434	NWA 8434	(Northwest Africa)	P 2013	71	H5
Northwest Africa 8435	NWA 8435	(Northwest Africa)	P 2010	40	LL5/6
Northwest Africa 8436	NWA 8436	(Northwest Africa)	P 2013 Jun	54	Eucrite-mmict
Northwest Africa 8437	NWA 8437	(Northwest Africa)	P 2013 Feb	22	Howardite
Northwest Africa 8438	NWA 8438	(Northwest Africa)	P 2013 Jun	16	Howardite
Northwest Africa 8439	NWA 8439	(Northwest Africa)	P 2013 Feb	26	Eucrite-mmict
Northwest Africa 8440	NWA 8440	(Northwest Africa)	P 2014	146.2	Howardite
Northwest Africa 8441	NWA 8441	(Northwest Africa)	P June 2012	130	Iron, IAB-sLM-an
Northwest Africa 8442	NWA 8442	(Northwest Africa)	P June 2012	2231	Iron, IIIAB
Northwest Africa 8443	NWA 8443	Morocco	P Feb 2013	164.2	Iron, IAB Complex
Northwest Africa 8444	NWA 8444	Western Sahara	P Apr 2013	10866	Iron, IIIAB
Northwest Africa 8445	NWA 8445	(Northwest Africa)	P 2014	42.48	CV3
Northwest Africa 8446	NWA 8446	(Northwest Africa)	P 2014	9.95	Diogenite
Northwest Africa 8447	NWA 8447	(Northwest Africa)	P 2014	36.16	CK6
Northwest Africa 8448	NWA 8448	(Northwest Africa)	P 2014 Jan	830	L6
Northwest Africa 8449	NWA 8449	(Northwest Africa)	P 2014 Jan	20.15	L4
Northwest Africa 8450	NWA 8450	(Northwest Africa)	P 2014 Jan	214.41	H5
Northwest Africa 8451	NWA 8451	(Northwest Africa)	P 2014 Jan	88.19	H5
Northwest Africa 8452	NWA 8452	(Northwest Africa)	P 2014 Jan	130.21	H4
Northwest Africa 8453	NWA 8453	(Northwest Africa)	P 2014 Jan	725	H4
Northwest Africa 8455	NWA 8455	(Northwest Africa)	P 2014	2814	Lunar
Northwest Africa 8456	NWA 8456	(Northwest Africa)	P 2014	707	Lodranite
Northwest Africa 8457	NWA 8457	(Northwest Africa)	P 2014	54.6	LL3.2
Northwest Africa 8458	NWA 8458	(Northwest Africa)	P 2013	3530	H5
Northwest Africa 8459	NWA 8459	(Northwest Africa)	P 2013	2650	EL6
Northwest Africa 8460	NWA 8460	(Northwest Africa)	P 2013	155	EL6
Northwest Africa 8461	NWA 8461	(Northwest Africa)	P 2013	388	H4
Northwest Africa 8462	NWA 8462	(Northwest Africa)	P 2013	34	L4
Northwest Africa 8463	NWA 8463	(Northwest Africa)	P 2013	215	H4
Northwest Africa 8464	NWA 8464	(Northwest Africa)	P 2013	365	H4
Northwest Africa 8465	NWA 8465	(Northwest Africa)	P 2013	76	H5

Northwest Africa 8466	NWA 8466	(Northwest Africa)	P 2013	34	L4
Northwest Africa 8467	NWA 8467	(Northwest Africa)	P 2013	165	EL6
Northwest Africa 8468	NWA 8468	(Northwest Africa)	P 2013	204	EL6
Northwest Africa 8469	NWA 8469	(Northwest Africa)	P 2013	137	EL6
Northwest Africa 8470	NWA 8470	(Northwest Africa)	P 2013	281	H6
Northwest Africa 8471	NWA 8471	Morocco	P 2014 Mar	314.0	CV3
Northwest Africa 8472	NWA 8472	Morocco	P May 2014	390.8	LL3
Northwest Africa 8473	NWA 8473	(Northwest Africa)	P 2013 Jun	218	Eucrite-mmict
Northwest Africa 8474	NWA 8474	(Northwest Africa)	P 2013 Jun	24	Eucrite
Northwest Africa 8475	NWA 8475	(Northwest Africa)	P 2013 Feb	34	Eucrite-cm
Northwest Africa 8476	NWA 8476	Morocco	P 2013 Jun 4	1570	diogenite
Northwest Africa 8477	NWA 8477	Morocco	2013 Mar	793	L5
Northwest Africa 8478	NWA 8478	(Northwest Africa)	P 2013 Jun 05	64.6	CV3
Northwest Africa 8479	NWA 8479	(Northwest Africa)	P 2013 Jun 06	155.8	Eucrite-unbr
Northwest Africa 8481	NWA 8481	(Northwest Africa)	P 2013 June 7	181.1	CV3
Northwest Africa 8482	NWA 8482	(Northwest Africa)	P 2013 June 7	23.2	Eucrite-pmict
Northwest Africa 8483	NWA 8483	(Northwest Africa)	P 2013 Apr 30	61.5	CV3
Northwest Africa 8484	NWA 8484	(Northwest Africa)	P 2014	83.1	LL3
Northwest Africa 8485	NWA 8485	(Northwest Africa)	P 2002	340	LL4
Northwest Africa 8486	NWA 8486	Morocco	P 2014 June	43.81	Achondrite-ung
Northwest Africa 8487	NWA 8487	(Northwest Africa)	P 2008	550.1	LL3
Northwest Africa 8488	NWA 8488	(Northwest Africa)	P 2001	155	L-melt breccia
Northwest Africa 8489	NWA 8489	(Northwest Africa)	P 2013	10	CO3
Northwest Africa 8490	NWA 8490	(Northwest Africa)	P 2014	21	Eucrite
Northwest Africa 8491	NWA 8491	(Northwest Africa)	P 2014	151	H3
Northwest Africa 8492	NWA 8492	(Northwest Africa)	P 2014	82	CO3
Northwest Africa 8493	NWA 8493	(Northwest Africa)	P 2001	80	H3
Northwest Africa 8494	NWA 8494	(Northwest Africa)	P 2001	110	L6
Northwest Africa 8495	NWA 8495	(Northwest Africa)	P 2001	170	L6
Northwest Africa 8496	NWA 8496	(Northwest Africa)	P 2001	250	L6
Northwest Africa 8497	NWA 8497	(Northwest Africa)	P 2001	58	L3
Northwest Africa 8498	NWA 8498	(Northwest Africa)	P 2001	460	L4
Northwest Africa 8499	NWA 8499	(Northwest Africa)	P 2000	15	Eucrite
Northwest Africa 8500	NWA 8500	(Northwest Africa)	P 2001	30	CK6
Northwest Africa 8501	NWA 8501	(Northwest Africa)	P 2001	29	CK5
Northwest Africa 8502	NWA 8502	(Northwest Africa)	P 2013	48	Diogenite
Northwest Africa 8503	NWA 8503	(Northwest Africa)	P 2013	45	Ureilite
Northwest Africa 8504	NWA 8504	(Northwest Africa)	P 2013	140	CK6
Northwest Africa 8505	NWA 8505	(Northwest Africa)	P 2014	1330	Mesosiderite
Northwest Africa 8506	NWA 8506	(Northwest Africa)	P March 2014	192	LL4
Northwest Africa 8507	NWA 8507	(Northwest Africa)	P March 2014	184	H6
Northwest Africa 8508	NWA 8508	(Northwest Africa)	P 2014	3000	H6
Northwest Africa 8509	NWA 8509	(Northwest Africa)	P March 2014	272	Eucrite
Northwest Africa 8510	NWA 8510	(Northwest Africa)	P 2007	8	Eucrite

Northwest Africa 8511	NWA 8511	(Northwest Africa)	P 2014	1660	L6-melt breccia
Northwest Africa 8512	NWA 8512	(Northwest Africa)	P 2014	185	H4
Northwest Africa 8513	NWA 8513	(Northwest Africa)	P 2014	71	EH6-melt breccia
Northwest Africa 8514	NWA 8514	(Northwest Africa)	P 2014	85	H5
Northwest Africa 8515	NWA 8515	(Northwest Africa)	P 2014	134	H3
Northwest Africa 8516	NWA 8516	(Northwest Africa)	P 2014	75	L6
Northwest Africa 8517	NWA 8517	(Northwest Africa)	P 2014	410	H5
Northwest Africa 8518	NWA 8518	(Northwest Africa)	P 2014	188	L6-melt breccia
Northwest Africa 8519	NWA 8519	(Northwest Africa)	P 2014	73	H6-melt breccia
Northwest Africa 8520	NWA 8520	(Northwest Africa)	P 2014	21.5	CO3
Northwest Africa 8521	NWA 8521	(Northwest Africa)	P 2014	111.6	LL5
Northwest Africa 8522	NWA 8522	(Northwest Africa)	P 2014	328.1	L6-melt breccia
Northwest Africa 8523	NWA 8523	(Northwest Africa)	P 2014	41.1	eucrite
Northwest Africa 8524	NWA 8524	(Northwest Africa)	P 2014	3500	LL4-6
Northwest Africa 8525	NWA 8525	(Northwest Africa)	P 2014	6500	H5
Northwest Africa 8526	NWA 8526	(Northwest Africa)	P 2014	2100	H5
Northwest Africa 8527	NWA 8527	(Northwest Africa)	P 2014	430	L3
Northwest Africa 8528	NWA 8528	(Northwest Africa)	P 2014	520	H6
Northwest Africa 8529	NWA 8529	(Northwest Africa)	P 2014	9000	H6
Northwest Africa 8530	NWA 8530	(Northwest Africa)	P 2014	165	H4
Northwest Africa 8531	NWA 8531	(Northwest Africa)	P 2014	115	H6
Northwest Africa 8532	NWA 8532	(Northwest Africa)	P 2014	95	H5
Northwest Africa 8533	NWA 8533	(Northwest Africa)	P 2014	200	LL5
Northwest Africa 8534	NWA 8534	(Northwest Africa)	P 2014 Jun 12	60	CM1/2
Northwest Africa 8535	NWA 8535	(Northwest Africa)	P 2014 Mar 6	149	Angrite
Northwest Africa 8536	NWA 8536	(Northwest Africa)	P April 2005	54.4	H5
Northwest Africa 8537	NWA 8537	Mali	P 2014 Feb	131.1	LL5/6
Northwest Africa 8538	NWA 8538	(Northwest Africa)	P 2014	994.8	LL6-melt breccia
Northwest Africa 8540	NWA 8540	(Northwest Africa)	P 2013	324.5	LL4
Northwest Africa 8541	NWA 8541	(Northwest Africa)	P 2013	191.2	L6
Northwest Africa 8542	NWA 8542	(Northwest Africa)	P 2013	367.9	LL6
Northwest Africa 8543	NWA 8543	(Northwest Africa)	P 2013	148.9	LL4
Northwest Africa 8544	NWA 8544	(Northwest Africa)	P 2013	1574.2	L6
Northwest Africa 8545	NWA 8545	(Northwest Africa)	P 2013	57.8	Achondrite-ung
Northwest Africa 8546	NWA 8546	(Northwest Africa)	P 2013	77.7	Diogenite
Northwest Africa 8547	NWA 8547	(Northwest Africa)	P 2013	103.8	Ureilite
Northwest Africa 8548	NWA 8548	(Northwest Africa)	P 2013	244.81	Achondrite-prim
Northwest Africa 8549	NWA 8549	(Northwest Africa)	P 2013	35.16	Eucrite-unbr
Northwest Africa 8550	NWA 8550	(Northwest Africa)	P 2013	148.6	Eucrite-mmict
Northwest Africa 8551	NWA 8551	(Northwest Africa)	P 2013	135.6	Ureilite
Northwest Africa 8552	NWA 8552	(Northwest Africa)	P 2013	256.4	EL6
Northwest Africa 8553	NWA 8553	(Northwest Africa)	P 2013	78.2	EL6
Northwest Africa 8554	NWA 8554	(Northwest Africa)	P 2013	54.38	Eucrite-mmict
Northwest Africa 8555	NWA 8555	(Northwest Africa)	P 2013	2923.78	Eucrite-mmict

Northwest Africa 8556	NWA 8556	(Northwest Africa)	P 2013	109.97	Eucrite
Northwest Africa 8557	NWA 8557	(Northwest Africa)	P 2013	81.59	Eucrite-mmict
Northwest Africa 8558	NWA 8558	(Northwest Africa)	P 2013	4336	Eucrite-mmict
Northwest Africa 8559	NWA 8559	(Northwest Africa)	P 2013	1758.8	Howardite
Northwest Africa 8560	NWA 8560	(Northwest Africa)	P 2013	139.7	H5-melt breccia
Northwest Africa 8561	NWA 8561	(Northwest Africa)	P 2013	403.74	Mesosiderite-A1
Northwest Africa 8562	NWA 8562	(Northwest Africa)	P 2014	510	Eucrite-unbr
Northwest Africa 8563	NWA 8563	Mauritania	P August 2014	9125	Eucrite-mmict
Northwest Africa 8564	NWA 8564	(Northwest Africa)	2013	1335	Eucrite-cm
Northwest Africa 8565	NWA 8565	(Northwest Africa)	2007	48000	L3
Northwest Africa 8566	NWA 8566	(Northwest Africa)	2013	3708	H5
Northwest Africa 8567	NWA 8567	(Northwest Africa)	2013	6600	L5
Northwest Africa 8568	NWA 8568	(Northwest Africa)	P 2014	3200	Iron, IVA
Northwest Africa 8569	NWA 8569	Morocco	P May 2014	442.90	LL6
Northwest Africa 8570	NWA 8570	Morocco	P May 2014	438.92	LL6
Northwest Africa 8571	NWA 8571	Morocco	P May 2014	376.12	H4
Northwest Africa 8572	NWA 8572	Morocco	P May 2014	494.77	L6
Northwest Africa 8573	NWA 8573	Morocco	P May 2014	596.38	LL5
Northwest Africa 8574	NWA 8574	Morocco	P May 2014	198.42	H4
Northwest Africa 8575	NWA 8575	Morocco	P May 2014	394.18	L/LL3
Northwest Africa 8576	NWA 8576	Morocco	P May 2014	59.45	LL3.00
Northwest Africa 8577	NWA 8577	Morocco	P May 2014	238.55	CV3-ox
Northwest Africa 8578	NWA 8578	(Northwest Africa)	P 2014	853	L6
Northwest Africa 8586	NWA 8586	Mauritania	P 2014 Feb	704.5	Lunar (feldsp. breccia)
Northwest Africa 8587	NWA 8587	(Northwest Africa)	P 2009	1264	L6
Northwest Africa 8588	NWA 8588	(Northwest Africa)	P 2013 Jul	1635	Eucrite
Northwest Africa 8589	NWA 8589	(Northwest Africa)	P 2014 Jan	60	CV3
Northwest Africa 8590	NWA 8590	(Northwest Africa)	P 2014 Jan	126.4	LL6
Northwest Africa 8591	NWA 8591	(Northwest Africa)	P 2014 Jan	89.8	Eucrite-mmict
Northwest Africa 8592	NWA 8592	(Northwest Africa)	P 2014 Jan	290	Diogenite-pm
Northwest Africa 8593	NWA 8593	(Northwest Africa)	P 2014 Jan	54.2	LL6
Northwest Africa 8594	NWA 8594	(Northwest Africa)	P 2014 Jan	138	Eucrite-mmict
Northwest Africa 8595	NWA 8595	(Northwest Africa)	P 2014 Jan	79.4	Howardite
Northwest Africa 8596	NWA 8596	(Northwest Africa)	P 2014 Jan	96.3	LL6
Northwest Africa 8597	NWA 8597	(Northwest Africa)	P 2014 Jan	207.7	CK6
Northwest Africa 8598	NWA 8598	(Northwest Africa)	P 2014 Jan	1313	L6
Northwest Africa 8599	NWA 8599	(Northwest Africa)	P 2014 Jun	36.5	Lunar
Northwest Africa 8600	NWA 8600	(Northwest Africa)	P 2014 Jan	124	LL5
Northwest Africa 8601	NWA 8601	(Northwest Africa)	P 2014 Jan	1371	L5
Northwest Africa 8602	NWA 8602	(Northwest Africa)	P 2014 Jan	711	LL4
Northwest Africa 8603	NWA 8603	(Northwest Africa)	P 2014 Jan	28.15	Ureilite
Northwest Africa 8604	NWA 8604	(Northwest Africa)	P 2013	603.7	Eucrite-pmict
Northwest Africa 8605	NWA 8605	(Northwest Africa)	P 2004	400	CV3
Northwest Africa 8606	NWA 8606	(Northwest Africa)	P 2014	475	Eucrite-mmict

Northwest Africa 8607	NWA 8607	(Northwest Africa)	P 2014	261	Lunar
Northwest Africa 8608	NWA 8608	(Northwest Africa)	P 2003 Feb 8	72.2	H6
Northwest Africa 8609	NWA 8609	(Northwest Africa)	P 2014	45	Lunar (feldsp. breccia)
Northwest Africa 8610	NWA 8610	(Northwest Africa)	P 2014	305	Eucrite
Northwest Africa 8611	NWA 8611	(Northwest Africa)	P 23 June 2012	32.7	Eucrite
Northwest Africa 8612	NWA 8612	(Northwest Africa)	P 13 Sept 2013	1280	L6
Northwest Africa 8613	NWA 8613	(Northwest Africa)	P 2013 Sep 13	316	CV3
Northwest Africa 8614	NWA 8614	(Northwest Africa)	P 2002 Feb	24	Winonaite
Northwest Africa 8615	NWA 8615	(Northwest Africa)	P April 1, 2014	109	Howardite
Northwest Africa 8616	NWA 8616	(Northwest Africa)	P February 2013	150	CV3
Northwest Africa 8617	NWA 8617	(Northwest Africa)	P 2014	327.3	Howardite
Northwest Africa 8618	NWA 8618	Morocco	P 2014	25.2	CM2
Northwest Africa 8619	NWA 8619	Morocco	P 2014	23.3	CM2
Northwest Africa 8620	NWA 8620	Morocco	P 2013	10.3	Eucrite
Northwest Africa 8621	NWA 8621	Morocco	P 2014	22	CK5
Northwest Africa 8622	NWA 8622	Morocco	P 2013	104	Ureilite
Northwest Africa 8623	NWA 8623	Morocco	P 2012	236	LL6-melt breccia
Northwest Africa 8624	NWA 8624	Morocco	P 2014	91	R5
Northwest Africa 8625	NWA 8625	(Northwest Africa)	P 2014 May 8	384	Mesosiderite-A
Northwest Africa 8626	NWA 8626	(Northwest Africa)	P 2014 May 6	151	Eucrite-an
Northwest Africa 8627	NWA 8627	(Northwest Africa)	P 2014 May 5	5.8	Eucrite-br
Northwest Africa 8628	NWA 8628	(Northwest Africa)	P 2014 May 17	202	L4
Northwest Africa 8629	NWA 8629	(Northwest Africa)	P 2014 May 6	239	H3
Northwest Africa 8630	NWA 8630	(Northwest Africa)	P 2012	34	LL7
Northwest Africa 8631	NWA 8631	(Northwest Africa)	P 2012	37	CO3.0
Northwest Africa 8632	NWA 8632	Morocco	P 2014 Jun	23.8	Lunar (basalt)
Northwest Africa 8633	NWA 8633	(Northwest Africa)	P 2014 Apr	207	Diogenite
Northwest Africa 8634	NWA 8634	(Northwest Africa)	P 2009 Apr	40000	L5
Northwest Africa 8635	NWA 8635	(Northwest Africa)	P 2014 Aug	200	Ureilite
Northwest Africa 8636	NWA 8636	(Northwest Africa)	P 2014 Aug	100000	L5
Northwest Africa 8637	NWA 8637	(Northwest Africa)	P 2014 May	4.2	Martian (shergottite)
Northwest Africa 8638	NWA 8638	(Northwest Africa)	P 2014 Apr	2130	Ureilite
Northwest Africa 8639	NWA 8639	(Northwest Africa)	P 2012 Jan	81818	LL6
Northwest Africa 8640	NWA 8640	(Northwest Africa)	P 2005 Jan	4210	Eucrite-pmict
Northwest Africa 8641	NWA 8641	(Northwest Africa)	P 2014 May	5895	Lunar (feldsp. breccia)
Northwest Africa 8642	NWA 8642	(Northwest Africa)	P 2002 Feb	52	L6
Northwest Africa 8643	NWA 8643	(Northwest Africa)	P 2002 Feb	8	L6
Northwest Africa 8644	NWA 8644	(Northwest Africa)	P 2002 Feb	51	L6
Northwest Africa 8645	NWA 8645	(Northwest Africa)	P 2014 Mar 7	47	L5
Northwest Africa 8648	NWA 8648	(Northwest Africa)	P 2012	287	H5
Northwest Africa 8649	NWA 8649	(Northwest Africa)	P 2014	1680	LL3.05
Northwest Africa 8650	NWA 8650	(Northwest Africa)	P 2013	441.1	LL6
Northwest Africa 8651	NWA 8651	Mauritania	April 2014	598	Lunar, gran. troct. brec.
Northwest Africa 8652	NWA 8652	Morocco	April 2013	880	Acapulcoite

Northwest Africa 8653	NWA 8653	Mauritania	P Sept 2014	214	Martian (shergottite)
Northwest Africa 8654	NWA 8654	(Northwest Africa)	P 2014 May	412	LL6
Northwest Africa 8656	NWA 8656	(Northwest Africa)	P 2014 Jan	1655.8	Martian (shergottite)
Northwest Africa 8657	NWA 8657	(Northwest Africa)	P 2014 Sep	233.6	Martian (shergottite)
Northwest Africa 8668	NWA 8668	(Northwest Africa)	P 2014 Jun	166.3	Lunar (feldsp. breccia)
Northwest Africa 8669	NWA 8669	(Northwest Africa)	P 2014 May	85	Ureilite
Northwest Africa 8670	NWA 8670	(Northwest Africa)	P 2014 May	53	CK6
Northwest Africa 8672	NWA 8672	(Northwest Africa)	P 2014 May	109	CK5
Northwest Africa 8673	NWA 8673	(Northwest Africa)	P 2014 Aug	263	Lunar (feldsp. breccia)
Northwest Africa 8674	NWA 8674	(Northwest Africa)	P 2012	12	Martian (bas.breccia)
Northwest Africa 8675	NWA 8675	(Northwest Africa)	P 2014 May	146	Eucrite-mmict
Northwest Africa 8677	NWA 8677	(Northwest Africa)	P 2014 May	4155	Eucrite
Northwest Africa 8678	NWA 8678	(Northwest Africa)	P 2014 May	279	Ureilite
Northwest Africa 8679	NWA 8679	(Northwest Africa)	P 2014 Sep	285	Martian (shergottite)
Northwest Africa 8682	NWA 8682	(Northwest Africa)	P 2014 Aug	82	Lunar (feldsp. breccia)
Northwest Africa 8683	NWA 8683	(Northwest Africa)	P 2012	14000	L5
Northwest Africa 8684	NWA 8684	(Northwest Africa)	P 2014	1500	L6
Northwest Africa 8685	NWA 8685	(Northwest Africa)	P 2014	340	Acapulcoite
Northwest Africa 8686	NWA 8686	(Northwest Africa)	P 2014	376	Martian (shergottite)
Northwest Africa 8687	NWA 8687	(Northwest Africa)	P 2014	562.5	Lunar (troctolite)
Northwest Africa 8688	NWA 8688	(Northwest Africa)	P 2014	440	H6
Northwest Africa 8689	NWA 8689	(Northwest Africa)	P 2014 June 21	106	L3
Northwest Africa 8690	NWA 8690	Morocco	P 2014 Apr 22	227	Eucrite-cm
Northwest Africa 8692	NWA 8692	(Northwest Africa)	P 2013	361.2	LL6
Northwest Africa 8693	NWA 8693	(Northwest Africa)	P Feb 2010	833.1	LL3.6/3.7
Northwest Africa 8695	NWA 8695	(Northwest Africa)	P 14 June 2012	135	LL4-6
Northwest Africa 8696	NWA 8696	(Northwest Africa)	P 2013	302	H6
Northwest Africa 8697	NWA 8697	(Northwest Africa)	P 2013	269	H4
Northwest Africa 8698	NWA 8698	(Northwest Africa)	P 2013	332	L5
Northwest Africa 8700	NWA 8700	(Northwest Africa)	P 2013	439	H5
Northwest Africa 8701	NWA 8701	Mali	P 2014 Sep	72	Lunar (feldsp. breccia)
Northwest Africa 8703	NWA 8703	(Northwest Africa)	P 2014 Jul	461	Diogenite
Northwest Africa 8704	NWA 8704	(Northwest Africa)	P 2014 Oct	503	Eucrite
Northwest Africa 8705	NWA 8705	(Northwest Africa)	P 2014 Oct	6.2	Martian (shergottite)
Northwest Africa 8706	NWA 8706	Morocco	P Oct. 2012	103	Acapulcoite
Northwest Africa 8708	NWA 8708	(Northwest Africa)	P 2005 Oct 1	1060	L6
Nova 013		United States?	2006	28	Ureilite
Nova 014		Oman?	14 Aug 2001	1202	L4
Novato		United States	18 Oct 2012	314	L6
Oued Awlitis 001	OA 001	Western Sahara	2014 Jan 15	432.5	Lunar
Paposo 017		Chile	2010	351.7	CR2
Paposo 018		Chile	2011 Jul 2	680	L5
Qatar 002		Qatar	2011 Oct	702	L5
Qatar 003		Qatar	2010 May 08	86.7	H5

Qatar 004		Qatar	2010 Sept 13	330	H5
Qulumat al Harsha 001	QaH 001	Saudi Arabia	14 Feb 2013	2.388	H5
Qulumat al Harsha 002	QaH 002	Saudi Arabia	14 Feb 2013	5.501	L5
Qulumat al Harsha 003	QaH 003	Saudi Arabia	14 Feb 2013	3.85	Eucrite
Ramlat as Sahmah 448	RaS 448	Oman	12 Jan 2012	52.266	L6
Ramlat as Sahmah 449	RaS 449	Oman	12 Jan 2012	115.505	L5
Ramlat as Sahmah 450	RaS 450	Oman	12 Jan 2012	914.141	H4
Ramlat as Sahmah 451	RaS 451	Oman	12 Jan 2012	54.824	H4
Ramlat as Sahmah 452	RaS 452	Oman	13 Jan 2012	403.769	H5
Ramlat as Sahmah 453	RaS 453	Oman	13 Jan 2012	437.375	L5
Ramlat as Sahmah 454	RaS 454	Oman	13 Jan 2012	1247.032	L5
Ramlat as Sahmah 455	RaS 455	Oman	13 Jan 2012	835	H5
Ramlat as Sahmah 456	RaS 456	Oman	14 Jan 2012	48.169	L5
Ramlat as Sahmah 457	RaS 457	Oman	14 Jan 2012	268.629	H5
Ramlat as Sahmah 458	RaS 458	Oman	15 Jan 2012	2901.078	H4
Ramlat as Sahmah 459	RaS 459	Oman	15 Jan 2012	30781.268	L6
Ramlat as Sahmah 460	RaS 460	Oman	16 Jan 2012	818.658	L6
Ramlat as Sahmah 461	RaS 461	Oman	16 Jan 2012	2166.211	H5
Ramlat as Sahmah 462	RaS 462	Oman	16 Jan 2012	603.448	L6
Ramlat as Sahmah 463	RaS 463	Oman	16 Jan 2012	179.382	L6
Ramlat as Sahmah 465	RaS 465	Oman	16 Jan 2012	67.554	L6
Ramlat as Sahmah 466	RaS 466	Oman	16 Jan 2012	36.352	L6
Ramlat as Sahmah 467	RaS 467	Oman	16 Jan 2012	53.39	H6
Ramlat as Sahmah 468	RaS 468	Oman	16 Jan 2012	230.583	LL6
Ramlat as Sahmah 469	RaS 469	Oman	17 Jan 2012	684	L6
Ramlat as Sahmah 471	RaS 471	Oman	31 Jan 2012	428.447	H4-6
Ramlat as Sahmah 472	RaS 472	Oman	31 Jan 2012	145.451	L6
Ramlat as Sahmah 473	RaS 473	Oman	31 Jan 2012	147.354	L6
Ramlat as Sahmah 475	RaS 475	Oman	1 Feb 2012	6.452	L5
Ramlat as Sahmah 476	RaS 476	Oman	1 Feb 2012	192.1	L6
Ramlat as Sahmah 478	RaS 478	Oman	1 Feb 2012	197.215	H4-6
Ramlat as Sahmah 479	RaS 479	Oman	1 Feb 2012	50.009	H5
Ramlat as Sahmah 480	RaS 480	Oman	2001	491	L6
Ramlat Fasad 006		Oman	27 Jan 2012	16.848	CO3
Ramlat Fasad 007		Oman	27 Jan 2012	15.281	H5
Ramlat Fasad 008		Oman	27 Jan 2012	13.873	H5
Ramlat Fasad 009		Oman	27 Jan 2012	5.875	H4-6
Ramlat Fasad 010		Oman	27 Jan 2012	1.293	H4
Ramlat Fasad 011		Oman	27 Jan 2012	1.484	L6
Ramlat Fasad 012		Oman	27 Jan 2012	75.43	L5
Ramlat Fasad 013		Oman	12 Mar 2004	40	L5
Roach Dry Lake 114	RhDL 114	United States	2010 June 12	35.7	H4
Santo Antônio do Descoberto		Brazil	2011 Dec 28	52150	Iron, IIAB

Sapopema		Brazil	2010	12000	Iron, IVA
Sayh al Uhaymir 528	SaU 528	Oman	2009 Sep 30	275	H-melt rock
Sayh al Uhaymir 565	SaU 565	Oman	2011 Mar	1953	LL3
Sayh al Uhaymir 576	SaU 576	Oman	1 Feb 2012	287.26	H4-6
Sayh al Uhaymir 577	SaU 577	Oman	2 Feb 2012	234.668	L5
Sayh al Uhaymir 578	SaU 578	Oman	Jan 2011	77.3	L5
Sayh al Uhaymir 579	SaU 579	Oman	Jan 2011	97.3	H6
Sayh al Uhaymir 580	SaU 580	Oman	7 Apr 2012	2.7	H6
Sayh al Uhaymir 582	SaU 582	Oman	2010 Mar 12	55000	L5
Sayh al Uhaymir 583	SaU 583	Oman	25 Nov 2004	68	L6
Sayh al Uhaymir 584	SaU 584	Oman	Jan 2011	434.6	H5
Sayh al Uhaymir 585	SaU 585	Oman	Jan 2011	1169.8	H4
Sayh al Uhaymir 586	SaU 586	Oman	2011 Jan	162.9	H4-5
Shişr 180		Oman	22 Jan 2012	45.544	H4/5
Shişr 181		Oman	22 Jan 2012	46.734	H4/5
Shişr 182		Oman	22 Jan 2012	34.733	H4/5
Shişr 183		Oman	24 Jan 2012	16.512	H4-6
Shişr 184		Oman	24 Jan 2012	55.861	L5
Shişr 185		Oman	25 Jan 2012	2274.554	L6
Shişr 186		Oman	25 Jan 2012	15.002	H6
Shişr 187		Oman	25 Jan 2012	694	H6
Shişr 188		Oman	2004	2440	H5
Shişr 189		Oman	2004	8300	L6
Shişr 190		Oman	12 Nov 2002	574	H4
Steingarden Nunataks 07007	STG 07007	Antarctica	2007	112.27	H5/6
Steins		United States	2005 Mar 20	65	LL4
Tartak		Poland	2008	7596	Iron, IIIAB
Tazizilet		Niger	2006	996	L5
Tequisquiapan		Mexico	2012	2316.1	Iron, IAB complex
Thiel Mountains 07003	TIL 07003	Antarctica	2007 Dec 24	18	CV3
Thiel Mountains 07014	TIL 07014	Antarctica	2007 Jan 2	3666	Eucrite
Thiel Mountains 07016	TIL 07016	Antarctica	2007 Jan 4	3490	Pallasite
Three Little Hills		United States	late 1980s	16	H5
Tilomonte 001		Chile	2013 Feb 22	1189	L6
Tinajdad		Morocco	2014 Sept 9	1860g	H5
Tirhert		Morocco	2014 Jul 9	8 to 10 kg	Eucrite-unbr
Tuanjie 001		China	2013 Jan 3	11000	H4
Tuanjie 002		China	2013 May 18	5000	L5
Tule Valley Hardpan 007	TVH 007	United States	2014 May 14	3.2	EL6
Tule Valley Hardpan 008	TVH 008	United States	2014 May 14	15	L6
Turgut		Turkey	April 1999	152000	Iron, ungrouped
Tuya		China	2013 Oct 20	11450	H5
Vicência		Brazil	21 Sept 2013	1540	LL3.2
White River		United States	24 June 2013	1920	L6

Willcox Playa 008	United States	2006 Feb 05	28.7	L6
Wolcott	United States	19 April 2013	838	L5
Yarovoye	Russia	May 1991	10700	Iron, IIIAB
Yuanyang	China	2010	140000	Iron, IAB-MG
Yucca 030	United States	2011 Oct 8	0.8	H-metal

4. Corrected entries

Name	abbrev	reason
Chelyabinsk		Updated mass and described recovery
Dronino		Fixed mass to agree with text
Miller Range 090697	MIL 090697	Reclassified in AMN 35(2)
Northwest Africa 3340	NWA 3340	Corrected O isotopes
Sasagase		Revised year of fall
Steingarden Nunataks 07002	STG 07002	Revised Fa, Fs, shock
Steingarden Nunataks 07003	STG 07003	Revised Fa and Fs
Steingarden Nunataks 07004	STG 07004	Revised Fa and Fs
Steingarden Nunataks 07013	STG 07013	Updated mass and added synonym

5. Listing of institutions and collections

Abbrev	Address
Aaronson:	Sahara Overland Ltd., Harhora, Temara, 12000, Morocco
AMNH:	Department of Earth and Planetary Sciences, American Museum of Natural History, Central Park West, New York, NY 10024, United States
App:	Department of Geology, 572 Rivers St., Appalachian State University, Boone, NC 28608, United States
ASU:	Center for Meteorite Studies, Arizona State University, Tempe, Arizona 85287-1404, United States
Bart:	Bartoschewitz Meteorite Laboratory, Lehmweg 53, D-38518 Gifhorn, Germany
Bern:	University of Bern, University of Bern, Hochschulstrasse 4, CH-3012 Bern, Switzerland
CalTech:	Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, CA 91124, United States
Cascadia:	Cascadia Meteorite Laboratory, Portland State University, Department of Geology, Room 17 Cramer Hall, 1721 SW Broadway, Portland, OR 97201, United States
CEREGE:	CEREGE BP 80 Avenue Philibert, Europole de l'Arbois 13545 Aix-en-Provence Cedex 4 France, France
CIW:	Carnegie Insitution Washington, Geophysical Laboratory, 5251 Broad Branch Rd.,

	NW, Washington DC 20015, United States
CSIC-IEEC:	Institute of Space Sciences (CSIC-IEEC), Campus UAB, Facultat de Ciències, Torre C-5 Parells, 2ª planta, E-08193 Bellaterra, Barcelona, Spain
DMUH:	Dedovsk Museum of Universe History, Russia
DPitt:	Darryl Pitt, 225 West 83rd Street, New York, NY 10024, United States
DST-PI:	Dipartimento di Scienze della Terra, Università di Pisa, Via S. Maria 53, 56126 Pisa, Italy
Farmer:	Michael Farmer, P.O. Box 86059, Tucson, AZ 85754-6059, United States
Franco:	Michel Franco (of Caillou Noir), 100 Chemin des Campenes 74400 Les Praz de Chamonix, France
GeoZS:	Geological Survey of Slovenia, Dimiceva 14, 1000 Ljubljana, Slovenia
GHupé:	Gregory M. Hupé, 9003 Placid Lakes Blvd., Lake Placid, FL 33852, United States
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Hmani:	A. Hmani Moroccan Imports, 13 rue Jules Hardouin Mansart, 92600 Asnières, France
Ibaraki:	Department of Materials and Biological Sciences, Institute of Astrophysics and Planetary Science, Ibaraki University, 2-1-1 Bunkyo, Mito 310-8512, Japan
IfP:	Institut für Planetologie, Wilhelm-Klemm-Str. 10, 48149 Münster, Germany
IGEM:	Institute of Geology of Ore Deposits, Petrography, Mineralogy, and Geochemistry, Russian Academy of Sciences, Staromonetny Per., 35, Moscow, 119017 , Russia
IGEO-UFRJ:	Instituto de Geociências, Universidade Federal do Rio de Janeiro, Brazil
IGGCAS:	Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100029, China
IJS:	Jozef Stefan Institute, Jamova 39, 1000 Ljubljana , Slovenia
JSC:	Mailcode KT, 2101 NASA Parkway, NASA Johnson Space Center, Houston, TX 77058, United States
KCCU:	Kingsborough College of the City University of New York, Brooklyn, NY 11235, United States
Kiel:	Geologisches und Mineralogisches Museum, Institut für Geowissenschaften, Christian-Albrechts-Universität Kiel, Ludewig-Mayn-Str. 10, D-24118 Kiel, Germany, Germany
KOPRI:	Korea Polar Research Institute, 26 Songdomirae-ro, Yeonsu-gu, Incheon, Korea, 406-840, South Korea
Kuntz:	Fabien Kuntz, France
Labenne:	23, rue de Esperance, 75013 Paris, France

MHNGE:	Muséum d’histoire naturelle, Route de Malagnou 1, CH-1211 Genève 6 , Switzerland
MMC:	Museo del Meteorito, Tocopilla 401, San Pedro de Atacama, Chile. or Alonso de Ercilla 1250, La Herradura, Coquimbo, Chile, Chile
MNA-SI:	Museo Nazionale dell'Antartide, Università di Siena, Via Laterina 8, I-53100 Siena, Italy
MNB:	Museum für Naturkunde, Invalidenstrasse 43, D-10115 Berlin, Germany
MNHNP:	Museum National d'Histoire Naturelle, 61 Rue Buffon, LMCM-CP52, 75005 Paris, France, France
MSCM:	Mineralogical State Collection, Munich, Theresienstr. 41, 80333 Munich, Germany
MSUR:	Department of Geology, Moscow State University, Vorobjovy Gory, Moscow, 119899, Russia
NAU:	Geology, Bldg 12 Knoles Dr Northern Arizona University, Flagstaff, AZ 86011, United States
NIPR:	Antarctic Meteorite Research Center, National Institute of Polar Research, 10-3 Midori-cho, Tachikawa, Tokyo 190-8518, Japan
NMBE:	Natural History Museum Bern Bernastrasse 15 CH-3005 Bern Switzerland, Switzerland
NMNS:	National Museum of Nature and Science, 4-1-1 Amakubo, Tsukuba, Ibaraki 305-0005, JAPAN, Japan
NotreD:	University of Notre Dame, Notre Dame, Indiana 46556, United States
NTF:	Faculty of Natural Sciences and Engineering, Askerceva 12, 1000 Ljubljana, Slovenia
OkaU:	Institute for Study of the Earth's Interior, Okayama University, Misasa Tottori 682-0193, Japan
OU:	Planetary and Space Sciences Department of Physical Sciences The Open University Walton Hall Milton Keynes MK7 6AA United Kingdom, United Kingdom
PMani:	Philip Mani, 20726 Stone Oak Parkway, Suite 116, San Antonio, TX 78258 , United States
PMO:	Purple Mountain Observatory, Nanjing, China
PRIC:	Polar Research Institute of China, 451 Jinqiao Road, Shanghai 200129, China
PSF:	Planetary Studies Foundation,10 Winterwood Lane, Unit B, Galena, Illinois 61036-9283, United States
PThomas:	Philippe Thomas, Meteoritica, La Chave, 07690 St André en Vivarais, France
Ralew:	Stefan Ralew, Kunibertstraße 29, 12524 Berlin, Germany
RBINS:	Marleen De Ceukelaire Royal Belgian Institute of Natural Sciences, rue Vautier 29 - 1000 Brussels, Belgium
Reed:	Blaine Reed, P.O. Box 1141, Delta, CO 81416, United States
Rio:	Museu Nacional, Quinta da Boa Vista, Rio de Janeiro, CEP 20940-040, Brazil
ROM:	Royal Ontario Museum, 100 Queen's Park, Toronto, Ontario M5S 2C6, Canada

Seoul-NU:	Department of Earth Science Education, Room# 13-426, Seoul National University, Seoul, Korea, 151-748, South Korea
SGS:	Saudi Geological Survey, Jeddah, Saudi Arabia
SI:	Department of Mineral Sciences, NHB-119, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560, United States
SMNH:	Slovenian Museum of Natural History, Presernova 20, 1000 Ljubljana, Slovenia
SQU:	Sultan Qaboos University, College of Science, Earth Sciences Department, P.O. Box 36 Code 123 AlKhoud, Oman
Stehlik:	Harald Stehlik, 1220 Wien, Austria
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UAb:	1-26 Earth Sciences Building, University of Alberta, Edmonton, AB, T6G 2E3, Canada, Canada
UBP:	Universite Blaise Pascal, Clermont-Ferrand, France
UCD:	University of California Dept Earth and Planetary Sciences 2119 Earth and Physical Sciences One Shields Avenue Davis, CA 95616, United States
UChi:	University of Chicago, Chicago, IL 60637, United States
UCLA:	Institute of Geophysics and Planetary Physics, University of California, Los Angeles, CA 90095-1567, United States
UMan:	Department of Earth Sciences, University of Manchester, Oxford Road, Manchester, M139PL, United Kingdom
UNM:	Institute of Meteoritics MSC03 2050 University of New Mexico Albuquerque NM 87131-1126 USA, United States
UPC:	Institut de Tècniques Energètiques, Universitat Politècnica de Catalunya, Diagonal 647, ed. ETSEIB, 08028 Barcelona, Spain
UStutt:	Universität Stuttgart, Institut für Mineralogie und Kristallchemie, Azenbergstraße 18, D-70174 Stuttgart , Germany
UTehran:	School of Geology, University College of Science, University of Tehran, P.O. Box 14155-6455, Tehran, Iran
UTenn:	Planetary Geosciences Institute, Department of Earth and Planetary Sciences, University of Tennessee, 1412 Circle Drive, Knoxville, TN 37996-1410, United States
UWB:	University of Washington, Box 353010 Seattle, WA 98195, United States
UWO:	Department of Earth Sciences, University of Western Ontario, 1151 Richmond St., London, Ontario, Canada N6A 5B7, Canada
UWS:	University of Washington, Department of Earth and Space Sciences, 70 Johnson Hall, Seattle, WA 98195, United States
Verish:	Robert Verish, Meteorite-Recovery Lab, P.O. Box 463084, Escondido, CA 92046, United States
Vernad:	Vernadsky Institute of Geochemistry and Analytical Chemistry, Russia

VO:	Visnjan Observatory Istarska 5 HR-52463 Visnjan Croatia, Croatia
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6. Acknowledgments

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