GEOLOGIC MAPPPING OF ASCRAEUS MONS VOLCANO, MARS AT 1:1M SCALE. W. B. Garry[1] and J. R. Zimbelman[1], [1] Center for Earth and Planetary Studies, Smithsonian Institution, PO Box 37012, National Air and Space Museum MRC 315, Washington, D.C. 20013-7012, garryw@si.edu.

Introduction: We will present preliminary results for a 1:1,000,000 scale geologic map of Ascraeus Mons volcano, Mars. When finished, this map will complement previously published geologic maps of Pavonis Mons and Arsia Mons at the same scale [1, 2].

Previous Work: Zimbelman [3] produced a geologic map of Ascraeus Mons as part of his dissertation work, but the map was never formally published. A mosaic of Viking Orbiter images served as the base map. Three main units were mapped and subdivided: Shield, Plains, and Additional (e.g. craters, ridged terrains).

Geologic Setting: Ascraeus Mons is one of four large shield volcanoes in the Tharsis region. Basal dimensions are 375 x 870 km [4]. The latter measurement includes the aprons of lava that extend from the northeast and southwest flanks. The elevation of the summit is 18.1 km [4]. Fields of lava flows and distinct flow margins surround the base of the volcano, but individual flows on the flanks are not as prominent as they are along the base. We are interested in studying lava flows at the base of Ascraues Mons that reach several hundred kilometers in length as part of this mapping project.

Data and Methods: The map will be produced in a digital format in compliance with USGS guidelines. Mapping will be done in a geo-referenced environment using either ArcGIS or Canvas with a GIS extension. A mosaic of THEMIS daytime IR (231.55 m/pixel) will serve as the initial base map, but we will obtain or create a higher resolution base map later in the mapping process. Visible images available from several sources will be used to distinguish between various geologic relations and contacts as needed.

Scientific Rationale: Mapping of Ascraeus Mons will allow us to: 1) characterize the dimensions, morphology, and emplacement style of lava flows at the summit, on the flanks, and at the base to quantify eruption parameters at these various locations on the volcano; 2) constrain the source regions for lava flows and relative timing between various flow fields; 3) determine relationship of the chasmata on the southern end of the Ascraeus Mons to the lava flows on the southeast apron (Figure 2); 4) interpret possible origins for the chaotic material along the southwest perimeter of Ascraeus Mons and how it may be similar to larger aprons of material observed at Pavonis and Arsia Mons (Figure 3).

Initial mapping of individual flows at the base of the volcano indicate that they originate from the southern perimenter and saddle between Pavonis Mons, but the flows wrap around either side of Ascraeus Mons and trend to both the northwest and northeast. Flows also originate from the fan on the northeast, but the longer flows from the volcano (e.g. >100 km) tend to originate from the southern perimeter. We are particularly interested in channeled lava flows >100 km, because they relate to our previous research on long, channeled lava flows [5, 6]. By mapping individual lava flows we will be able to characterize flow fields by dominant flow style (e.g. channel or non-channeled) and typical flow dimensions within the field. Analysis of the individual flows and flow fields will allow us to calculate eruption and emplacement parameters for areas around the volcano.

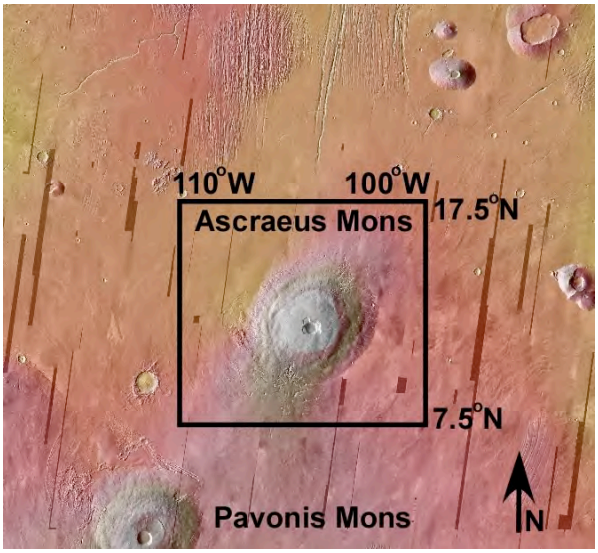

Figure 1. Boundary of the proposed geologic map for Ascraeus Mons. Base image is MOLA overlain on THEMIS daytime IR Mosaic (Courtesy of NASA/JPL/ASU).

Summary: The final result will be a digitally produced 1:1,000,000 scale map of Ascraeus Mons published by the USGS for the I-Map series. This will complete the mapping series for the three Tharsis Montes volcanoes on Mars.

Figure 2. (a) Apron on southern side of Ascraeus Mons. Box outlines field of view for THEMIS image. (b) THEMIS Visible V14083011(18 m/pixel). Chaotic, intertwined, valley networks at the top of image and lava flows are present at the bottom. The chaotic nature of the chasmata and the relation of them to the apron and lava flows will be investigated in this study. Images courtesy of NASA/JPL/ASU.

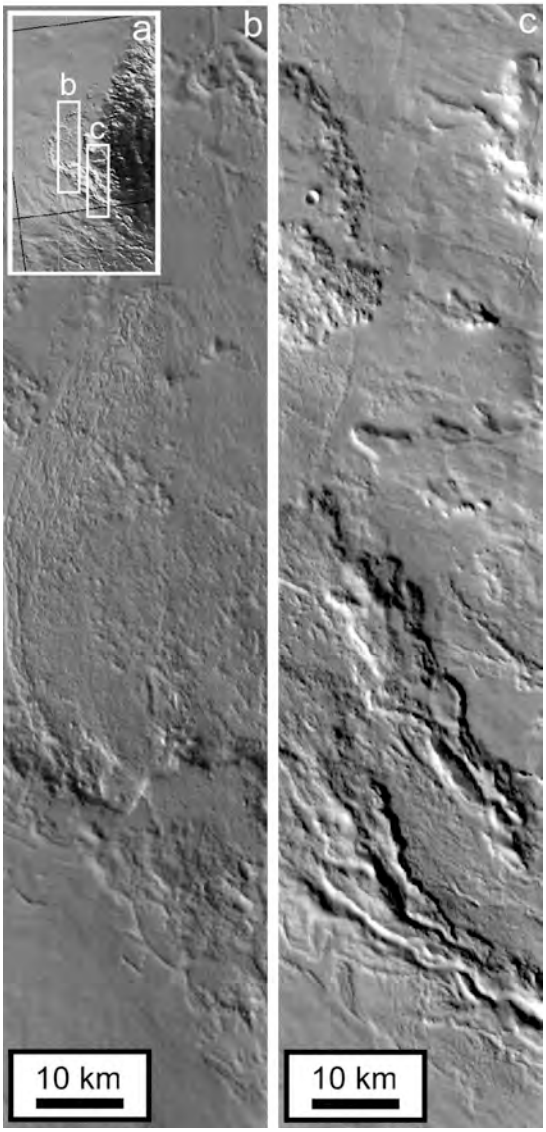

Figure 3. (a) Context image of western Ascraeus Mons. Zimbelman [3] mapped this area along the western perimeter of Ascraeus Mons as moutainous, knobby, and ridged terrains. We will characterize this area in further detail using THEMIS Infrared (b, c) and Visible images. (b) THEMIS Infrared I07893024 and (c) THEMIS Infrared I08230015 (100 m/pixel). Images courtesy of NASA/JPL/ASU.

References: [1] Scott D. H. et al. (1998) USGS Geologic Map I-2561. [2] Scott D. H. and Zimbelman J. R. (1995) USGS Geologic Map I-2480. [3] Zimbelman J. R. (1984) Ph.D. Thesis, Arizona State Univ. [4] Plescia J. B. (2004) *JGR, 109*, E03003, doi: 10.1029/2002JE00203. [5] Garry W. B. et al. (in press) *JGR-Planets*. [6] Zimbelman et al. (in review) *JVGR*.