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European Nuclear Forces, Operations, and Modernization

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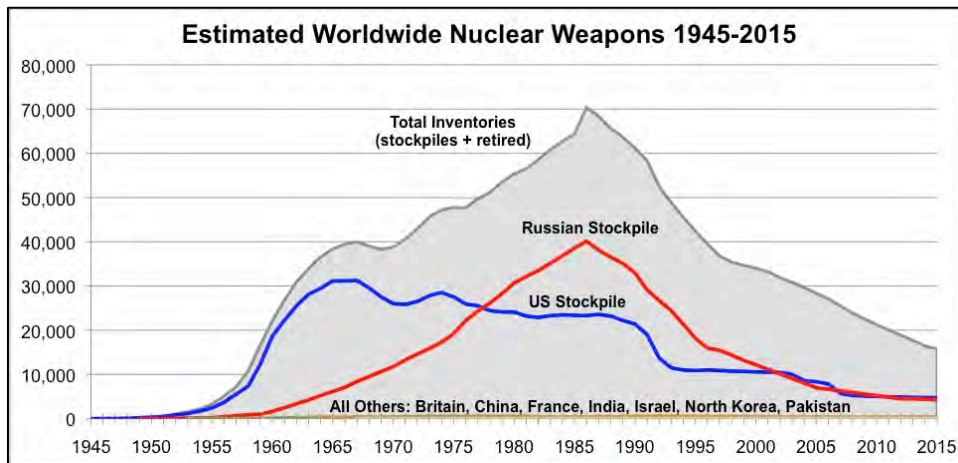
Presentation for

FAS-BASIC Roundtable on the State of the UK and European Debates on Nuclear Weapons

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History and Status



More than 125,000 warheads produced since 1945

Peak of 64,500 stockpiled warheads in 1986 (70,300 if including retired warheads)

- US stockpile peaked early (1967)
- Russian stockpile peaked late (1986)

Enormous reductions since 1986 peak:

- ~54,000 warhead stockpile reduction
- ~47,000+ warheads dismantled



~10,000 warheads in stockpiles (~16,000 if counting retired warheads awaiting dismantlement)

US and Russia possess 90% of global inventory (94% if counting retired warheads); **each has more than 4 times more warheads than rest of world combined**; 15 times more than third-largest stockpile (France)

Decreasing: US, Russia, Britain, France

Increasing: China, Pakistan, India

Israel relatively steady; North Korea trying

Europe

Significant reductions since Cold War

Nearly all forces pulled back

Significant forces remain:

- 3 European nuclear weapon states
- US forward deployment continues
- 5 non-nuclear weapons states have semi-nuclear status
- Russia has ~2,000 non-strategic nuclear warheads for air-, naval-, army-, and defense-forces
- NATO has ~180 US bombs in Europe (more in US) and 54 French air-launched cruise missiles



Russia: Modernization

Gradual phase-out of soviet-era systems and partial replacement with “new” systems by early-mid 2020s

Replacement began two decades ago

Old System	New System	MIRV	First Deployed
SS-18	Sarmat (“heavy” ICBM)	Yes	(2018-2020?)
SS-19	SS-27 Mod 1 (Topol M)	No	2097
	SS-27 Mod 2 (RS-24)	Yes	2014
SS-25	SS-27 Mod 1 (Topol-M)	No	2006
	SS-27 Mod 2 (RS-24)	Yes	2010
	SS-27 Mod 3 (RS-26)	Yes	2016?
	SS-27 Mod 4 (Rail)	Yes	2019?
SS-N-18	SS-N-32 (Bulava)	Yes	2015-2017?
SS-N-23	SS-N-32 (Bulava)	Yes	2017-2025?
Tu-95MS	PAK-DA		2020-2030?
Tu-160	PAK-DA		2020-2030?

Diverse Nuclear Forces

Strategic

ICBM: 3 types being replaced by 2 (in 6 versions)

SLBM: 2 types being placed by 1

Bombers: 2 types being replaced by 1

Non-Strategic

Navy: SLCM, SAM, ASW missiles, torpedoes, depth bombs

Air Force: cruise missile, bombs

Army: short-range ballistic missiles, intermediate-range cruise missile

Defense: ballistic missile defense, air-defense, coastal defense

Russia: Modernization

ICBM

- SS-27 Mod 2 (mobile): replacing SS-25s at Novosibirsk, Tagil, Yoshkar-Ola
- SS-27 Mod 2 (silo): replacing SS-19s at Kozelsk
- SS-27 Mod 2 (rail): planned
- RS-26 (compact SS-27): to replace SS-25s at Irkutsk and Vypolzovo
- Sarmat “heavy ICBM”: to replace SS-28s at Dombrovsky and Uzhur



SSBN / SLBM

- SS-N-23 SLBM life-extension (Sineva/Layner) in Delta IV SSBN
- Borei SSBN: 8 planned (possibly 10-12)
- SS-N-32 (Bulava): fielding



Bombers

- Upgrades of some Tu-160 (Blackjack) and Tu-95 (Bear)
- New bomber (PAK PA) in development
- ALCM (Kh-102) in development



Tactical

- Tu-22M (Backfire) upgrade underway
- Su-34 (Fullback) fielding
- Yasen (Severodvinsk) SSN production
- SLCM (SS-N-30, Kaliber); deployment?
- GLCM test-launched; in production?
- SRBM (SS-26, Iskander) deploying
- SAM (S-400/SA-21) deploying (nuclear ?)
- ABM (A-135) upgrade planned

Russia: Modernization

Modernization, not “build-up”

Yet trend is that Russian reduction appears to be slowing or leveling off

Strategic force is leveling off over next decade:

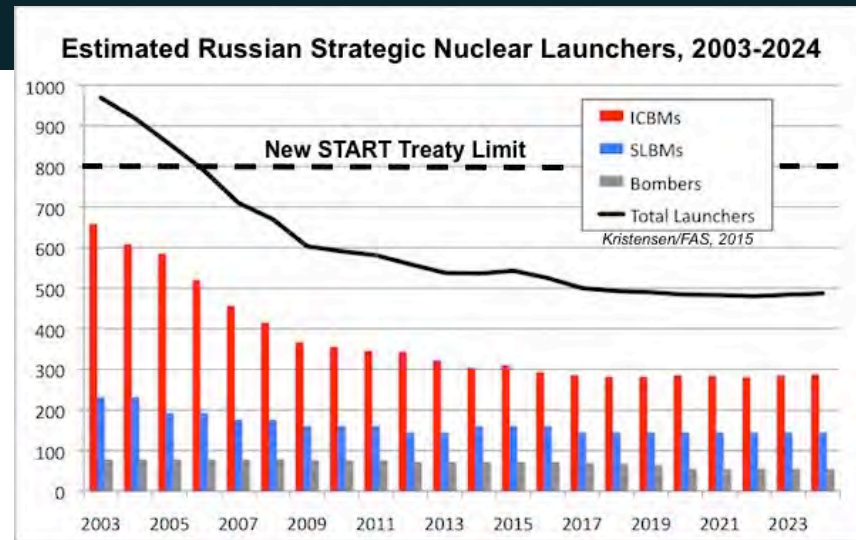
- Launchers just below 500

- Warheads around 2,400

Future force will be more mobile and more MIRVed

- Mobile is good for stability; MIRV is not

Note: financial crisis will likely effect projection by slowing down or even reducing deployments



Russia: ICBMs



Russia: Novosibirsk

Third SS-27 unit (39 Guards Missile Division).

First regiment with 9 SS-27 Mod 2 (RS-24) placed on “experimental combat duty” in 2013. Second in 2014

Satellite images show upgrade of regiment base and media photos show SS-27 Mod 2 launchers.

Remaining SS-25s are being phased out.



SS-27 Mod 2 TEL under camouflage (top) and upgrade of first of several regiment bases.



Russia: Tagil

Fourth SS-27 unit (42 Missile Division).

Part of first regiment with 6 SS-27 Mod 2 (RS-24) placed on “experimental combat duty” in 2013. Second regiment in 2014

Satellite images show complete reconstruction of regiment base (bottom) with 9 TEL garages for 3 SS-27 Mod 2 battalions, as well as upgrade of warhead storage and newly arrived camouflaged vehicles at supply base.

Remaining SS-25s being phased out.



Construction of SS-27 Mod 2 base (bottom); camouflaged vehicles at supply base (top left); upgrade to warhead storage (top right). Image: 2 Jun 2014



Russia: Submarines

Modernization from Delta to Borey:

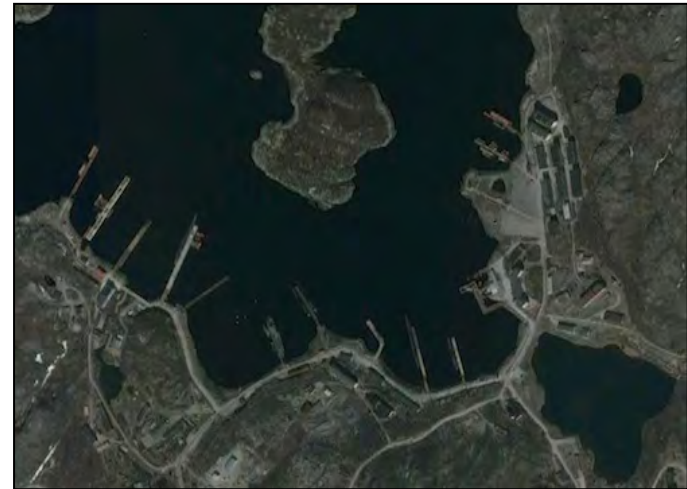
6 Delta IV, each with 16 SS-N-23 (Sineva modification)

Will likely be replaced by Borey SSBN in 2017-2025

3 Delta III, each with 16 SS-N-18

Will be replaced by Borey SSBN in 2015-?

8 Borey (planned), each with 16 SS-N-32 (Bulava)



Russia's SSBN fleet is based at Yagelnaya (Gadzhiyevo) on the Kola Peninsula in the Barents Sea (top) and Rybachiy on the Kamchatka Peninsula in the Pacific.



A Borey SSBN captured in the Kola Bay on 20 July 2014 with the aircraft carrier Admiral Kuznetsov.



Russia: Submarine Missiles

Implications of modernization:

SSBN fleet will remain relatively stable around 8-9 SSBNs.

SLBMs stable at some 144 missiles.

Significant increase in warheads from 528 to 800.

Weapons System	Missiles (2014)	Warheads (2014)	Missiles (2024)	Warheads (2024)
SS-N-18	48*	144	0	0
SS-N-23 (Sineva)	96**	384	32	128
SS-N-32 (Bulava)	-	-	112***	672
Total	144	528	144	800

* It is possible that only two Delta IIIs with 32 SS-N-18s are operational.
 ** Not all six Delta IVs are operational any given time; normally 1-2 boats are in overhaul.
 *** Assume 7 of 8 planned Borey SSBNs have entered service.

Russia: Bombers

A new subsonic, low-observable long-range bomber (PAK-DA) is under development. A Tupolev design apparently was selected in 2013. Expected deployment in the mid-2020s to replace:

Tu-95MS (Bear): roughly 60 left of which perhaps 50 are operational. Carries AS-15B ALCM and bombs. Being upgraded to increase conventional capability. Reliability low

Tu-160 (Blackjack): roughly 15 left of which perhaps 13 are operational. Carries AS-15A ALCM and bombs. Upgrade to increase conventional capability; new production announced

Su-22M3 (Backfire): Intermediate-range but sometimes considered strategic. Carries AS-4 ALCM and bombs. Being upgraded to increase conventional capability



A new nuclear ALCM (Kh-102) has been under development for some time, probably to replace the aging AS-15 on the Tu-95MS and Tu-160 bombers.



All to be replaced by PAK-DA bomber, possibly by mid-2020s (subsonic, stealthy)

Russia: Non-Strategic Weapons

Weapons System	Remarks
Air Force	
AS-4 ALCM	1967: 48 years old. For Tu-22M3
Bombs	For Tu-22M3, Su-24M, Su-34
Navy	
SS-N-9 (Malakhit)	1969: 45 years old. For ships.
SS-N-12 (Bazalt)	1976: 38 years old. For subs.
SS-N-15 (Vyuga)	1969: 47 years old. For subs/ships.
SS-N-16 (Vodopad)	1981: 33 years old. For subs.
SS-N-19 (Granit)	1980: 34 years old. For ships.
SS-N-21 (Granat)	1987: 27 years old. For subs.
SS-N-22 (Moskit)	1981: 22 years old. For ships.
SS-N-30X (Kalibr)	(2015). For subs. Replacing SS-N-21?
Torpedoes (550/650 mm)	For subs.
Depth Bombs	For ASW aircraft and helicopters.
Army	
SS-21 (Tochka)	1981: 33 years old.
SS-26 (Iskander-M)	2005: Replacing SS-21.
Defense	
S-300/A-135/coastal	Nuclear status of newer systems uncertain.

Large leftover warhead inventory of almost entirely Soviet-era weapons

Reduced by at least 75% since 1991

Most estimates vary from 1,800 to 2,000 warheads. DOD mentions unofficial estimates of 2,000-4,000

All warheads in central storage; not with/on delivery vehicles

Of current force, only three types are being modernized. Future plans are unknown

Most SLCMs probably to be replaced by conventional missiles

“The general purpose forces – to include dual-use nonstrategic nuclear forces – will continue to acquire new equipment for the near-term, but deliveries will be small and largely consist of modernized Soviet-era weapons.”

US Defense Intelligence Agency, 2013

United States: Modernization

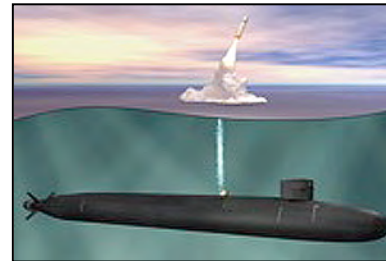
ICBM

- Minuteman III life-extension completing
- Warhead fuzes/interoperable warhead planned
- GBSD (ICBM replacement) in development



SSBN / SLBM

- Trident II D5 SLBM life-extension development
- SSBN replacement development (12 planned)
- W76-1 warhead life-extension deploying
- W88-1 warhead life-extension development



Bombers

- Upgrade of B-2 and B-52 underway
- LRS-B next-generation bomber in development
- B61-12 guided standoff bomb in development
- LRSO (ALCM) replacement in development



Tactical

- F-35A nuclear capability in development
- B61-12 guided standoff bomb in development

Infrastructure

- Uranium Processing Facility (secondaries) construction
- Plutonium production facilities (primaries) construction
- Warhead surveillance/simulation facilities upgrade

United States: NATO Modernization

- Modification of B61 bomb from “dumb” bomb to guided, standoff B61-12 with guided tail kit assembly that increases targeting accuracy and efficiency: one type can cover all bomb missions (tactical as well as strategic)*

Integration on F-15E in 2013-2018

Integration on F-16 in 2015-2018

Integration on Tornado in 2015-2017

- B61-12 First Production Unit in 2020; stockpiling from 2024

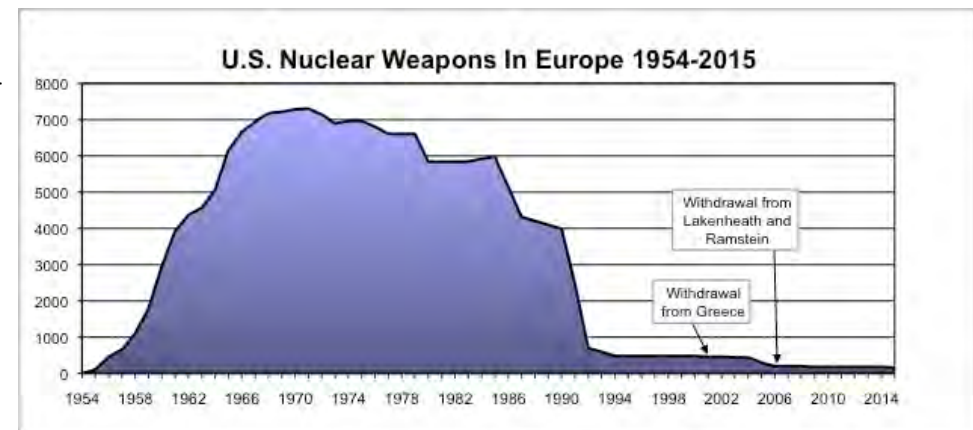
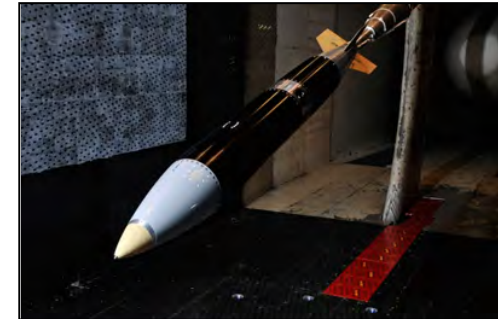
- Addition of nuclear-capability to F-35A fighter-bomber

Integration of B61-12 in 2015-2021

Use by US Air Force, Italy, Netherlands, and Turkey

- B61-12 will also be integrated onto strategic bombers (B-2A and new LRS-B)

- B61-12 cost: more than a decade worth of European Reassurance Initiatives



* Note: Only new digital aircraft (F-35A, B-2A, LRS-B) will be able to use tail kit; older analog aircraft (Tornado, F-15E, F-16) can not use increased accuracy.

United States: NATO Modernization

Security and infrastructure upgrades underway at USAF base at Incirlik, Turkey

50 B61 bombs stored

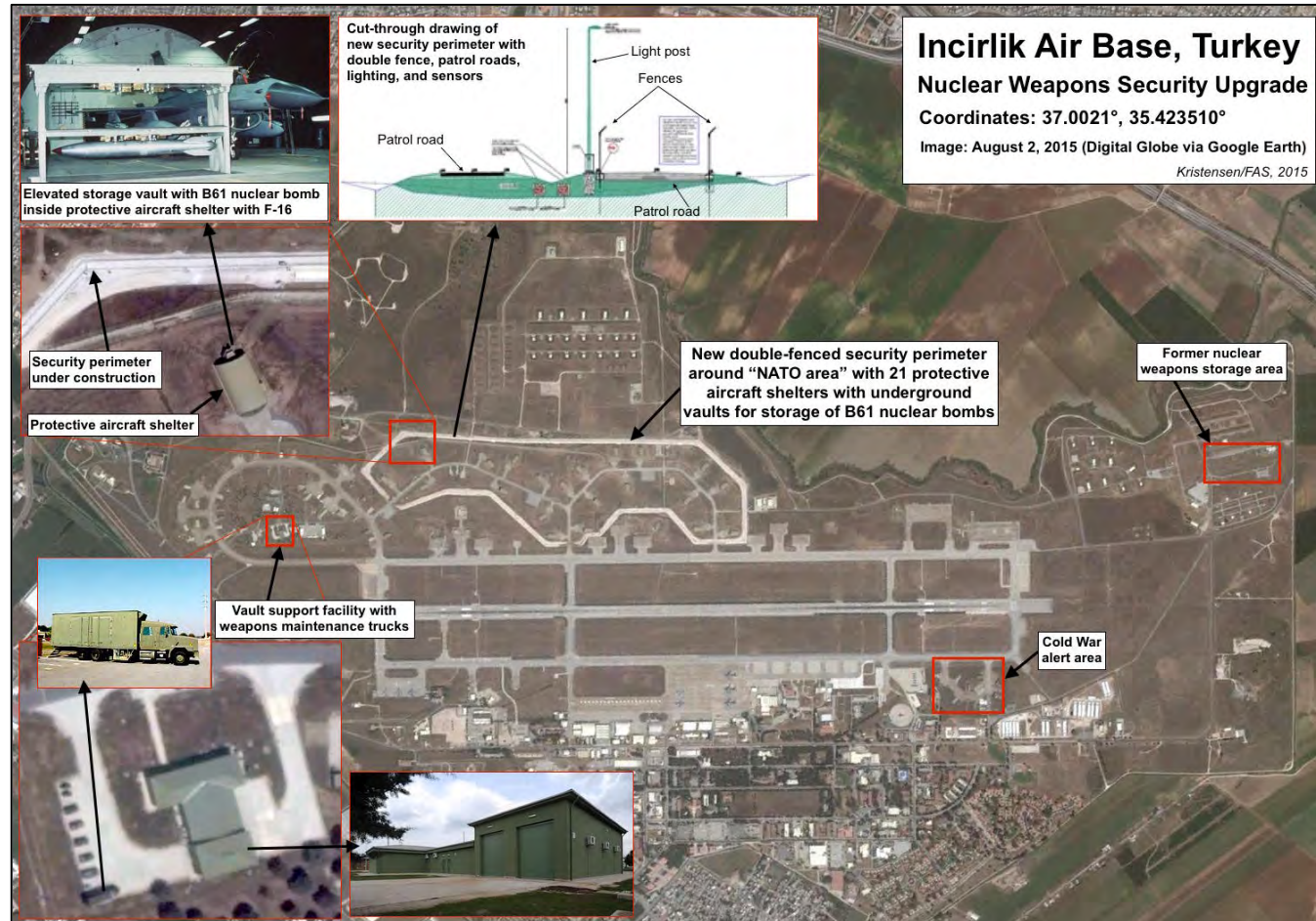
Only 110 km (68 miles) from border with war-torn Syria

Inside Turkey with an armed civil war

Similar upgrade at USAF base at Aviano, Italy

No similar upgrades seen yet at national bases in Belgium, Germany, Italy, Netherlands

Double security standards?



France: Modernization

SSBN / SLBM

- TNO warhead on M51.2 SLBM planned
- M51.3 SLBM in development

Bombers

- Rafale K3 to replace Mirage 2000N at Istres Air Base
- Next-generation ALCM in development

Infrastructure

- Megajoule at CESTA development
- Airix/Epure hydrodynamic test center at Valduc development (partly Joint French-UK warhead surveillance testing center)



Britain: Modernization

SSBN / SLBM

- SSBN (Vanguard replacement) in development (3-4 planned)
- SLBM (Trident II D5LE) in development (USA)
- Mk4A/W76-1 type warhead fielding

Infrastructure

- Joint UK-French warhead surveillance testing technology center development



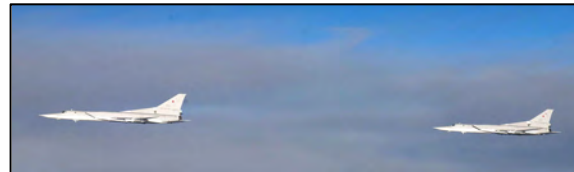
Operations

Both Russia and US/NATO are increasing/modifying operations of nuclear-capable forces

Russia: Long-range bomber flights increasing closer to NATO countries; “snap” exercises increasing in frequency, size, visibility; explicit nuclear threats issued by officials



Baltic Sea: Su-24 fighter-bomber intercept



Baltic Sea: Tu-22M bombers



Televised ICBM/SLBM launch



North Sea: Tu-95 bomber intercept



Baltic Sea: SS-N-22 SLCM loading



Luga: SS-26 return from Kaliningrad deployment

Operations

Both Russia and US/NATO are increasing/modifying operations of nuclear-capable forces

US/NATO: Long-range bombers integrated closer into EUCOM strike plans; exercises in Eastern Europe increasing in frequency, size, visibility; fighter-bomber rotational deployments and exercises in Baltic States, Poland, Sweden; first SSBN port visit to Europe in 25 years



F-16 deployments to Estonia, Poland, Sweden



B-52s, B-2 deployment to United Kingdom



B-52s over BALTOPS exercise



B-52 over Latvia



SSBN visit to Scotland

Conclusions and Recommendations

- Global nuclear arsenals have declined significantly; huge inventories remain
- The pace of reductions is slowing down; no negotiations about additional cuts
- All nuclear-armed states (and many of their allies) continue to attribute importance to nuclear weapons
- All nuclear-armed states have extensive and expensive modernization programs underway
- East-West crisis fueling adjustments to nuclear plans and operations
- Nuclear-capable forces increasingly used in forward operations to signal resolve
- Arms control efforts to reduce numbers and role of nuclear weapons essentially put on hold
- Conscious and deliberate initiatives needed to reduce role of nuclear-capable forces in East-West crisis and prevent role of nuclear weapons increasing