Forum: Disarmament and International Security Committee
Topic: The Intercontinental Ballistic Missile
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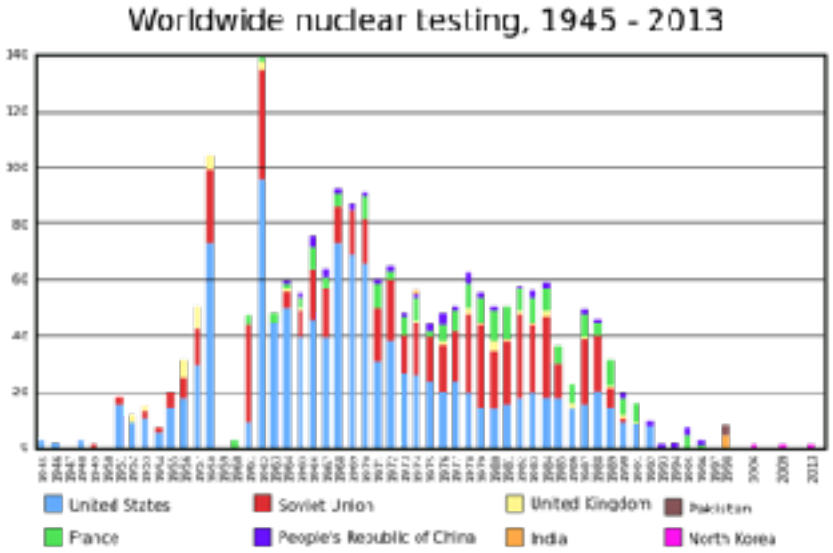
The Intercontinental Ballistic Missile

An intercontinental ballistic missile (ICBM) is a guided ballistic missile with a minimum range of 5,500 kilometres (3,400 mi) primarily designed for nuclear weapons delivery (delivering one or more thermonuclear warheads). Similarly, conventional, chemical, and biological weapons can also be delivered with varying effectiveness, but have never been deployed on ICBMs. Most modern designs support multiple independently targetable reentry vehicles (MIRVs), allowing a single missile to carry several warheads, each of which can strike a different target.

Early ICBMs had limited precision, which made them suitable for use only against the largest targets, such as cities. They were seen as a "safe" basing option, one that would keep the deterrent force close to home where it would be difficult to attack. Attacks against military targets (especially hardened ones) still demanded the use of a more precise manned bomber. Second- and third-generation designs (such as the LGM-118 Peacekeeper) dramatically improved accuracy to the point where even the smallest point targets can be successfully attacked.

ICBMs are differentiated by having greater range and speed than other ballistic missiles: intermediate-range ballistic missiles (IRBMs), medium-range ballistic missiles (MRBMs), short-range ballistic missiles (SRBMs) and tactical ballistic missiles (TBMs). Short and medium-range ballistic missiles are known collectively as theatre ballistic missiles.

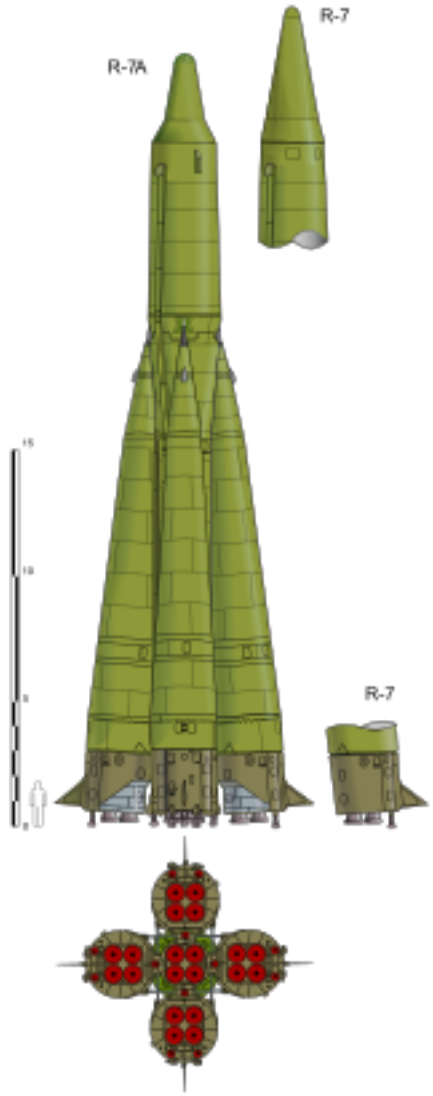
The history of the ICBM



Throughout history several states have attempted to develop nuclear weapons with ballistic capabilities. After the first use of nuclear weapons in 1945 many test were conducted to significantly expand the knowledge about nuclear weapons and their capabilities, The graph above shows all the test conducted by all states with successful nuclear development programs.

World War II

The development of the world's first practical design for an ICBM, A9/10, intended for use in bombing New York and other American cities, was undertaken in Nazi Germany by the team of Wernher von Braun under Projekt Amerika. The ICBM A9/A10 rocket initially was intended to be guided by radio, but was changed to be a piloted craft after the failure of Operation Elster. The second stage of the A9/A10 rocket was tested a few times in January and February 1945. The progenitor of the A9/A10 was the German V-2 rocket, also designed by von Braun and widely used at the end of World War II to bomb British and Belgian cities. All of these rockets used liquid propellants. Following the war, von Braun and other leading German scientists were relocated to the United States to work directly for the US Army through Operation Paperclip, developing the IRBMs, ICBMs, and launchers.



The image shows the schematics of the R-7 SEMYORKA,
which is the world's first ICBM

Cold War

In the immediate post-war era, the US and USSR both started rocket research programs based

on the German wartime designs, especially the V-2. In the US, each branch of the military started its own programs, leading to considerable duplication of effort. In the USSR, rocket research was centrally organized, although several teams worked on different designs. Early designs from both countries were short-range missiles, like the V-2, but improvements quickly followed.

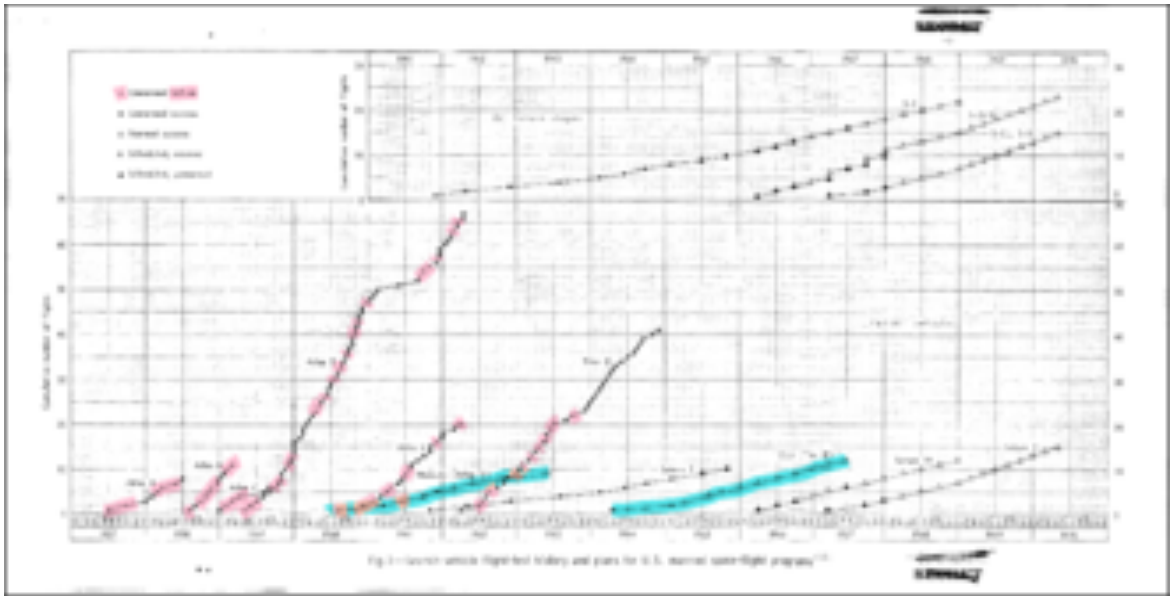
In the USSR early development was focused on missiles able to attack European targets. This changed in 1953 when Sergei Korolyov was directed to start development of a true ICBM able to deliver newly developed hydrogen bombs. Given steady funding throughout, the R-7 developed with some speed. The first launch took place on 15 May 1957 and led to an unintended crash 400 km (250 mi) from the site. The first successful test followed on 21 August 1957; the R-7 flew over 6,000 km (3,700 mi) and became the world's first ICBM. The first strategic-missile unit became operational on 9 February 1959 at Plesetsk in north-west Russia.
It was the same R-7 launch vehicle that placed the first artificial satellite in space, Sputnik, on 4 October 1957. The first human spaceflight in history was accomplished on a derivative of R-7, Vostok, on 12 April 1961, by Soviet cosmonaut Yuri Gagarin. A heavily modernized version of the R-7 is still used as the launch vehicle for the Soviet/Russian Soyuz spacecraft, marking more than 60 years of operational history of Sergei Korolyov's original rocket design.

An SM-65 Atlas, the first US ICBM, first launched in 1957

The U.S. initiated ICBM research in 1946 with the RTV-A-2 Hiroc project. This was a three-stage effort with the ICBM development not starting until the third stage. However, funding was cut after only three partially successful launches in 1948 of the second stage design, used to test variations on the V-2 design. With overwhelming air superiority and truly intercontinental bombers, the newly forming US Air Force did not take the problem of ICBM development seriously. Things changed in 1953 with the Soviet testing of their first thermonuclear weapon, but it was not until 1954 that the Atlas missile program was given the highest national priority.
The Atlas A first flew on 11 June 1957; the flight lasted only about 24 seconds before the rocket blew up. The first successful flight of an Atlas missile to full range occurred 28 November 1958.

The first armed version of the Atlas, the Atlas D, was declared operational in January 1959 at Vandenberg, although it had not yet flown. The first test flight was carried out on 9 July 1959,and the missile was accepted for service on 1 September.

The R-7 and Atlas each required a large launch facility, making them vulnerable to attack, and could not be kept in a ready state. Failure rates were very high throughout the early years of ICBM technology. Human spaceflight programs (Vostok, Mercury, Voskhod, Gemini, etc.) served as a highly visible means of demonstrating confidence in reliability, with successes translating directly to national defense implications. The US was well behind the Soviet Union in the Space Race, so U.S. President John F. Kennedy increased the stakes with the Apollo program, which used Saturn rocket technology that had been funded by President Dwight D. Eisenhower.



1965 graph of USAF Atlas and Titan ICBM launches, cumulative by month with failures highlighted (pink), showing how NASA's use of ICBM boosters for Projects Mercury and Gemini (blue) served as a visible demonstration of reliability at a time when failure rates had been substantial.

These early ICBMs also formed the basis of many space launch systems. Examples include R-7, Atlas, Redstone, Titan, and Proton, which was derived from the earlier ICBMs but never deployed as an ICBM. The Eisenhower administration supported the development of solid-fueled missiles such as the LGM-30 Minuteman, Polaris and Skybolt. Modern ICBMs tend to be smaller than their ancestors, due to increased accuracy and smaller and lighter warheads, and use solid fuels, making them less useful as orbital launch vehicles.

The Western view of the deployment of these systems was governed by the strategic theory of Mutual Assured Destruction. In the 1950s and 1960s, development began on Anti-Ballistic

Missile systems by both the U.S. and USSR; these systems were restricted by the 1972 ABM treaty. The first successful ABM test were conducted by the USSR in 1961, that later deployed a fully operating system defending Moscow in the 1970s (see Moscow ABM135 system below).

The 1972 SALT treaty froze the number of ICBM launchers of both the U.S. and the USSR at existing levels, and allowed new submarine-based SLBM launchers only if an equal number of land-based ICBM launchers were dismantled. Subsequent talks, called SALT II, were held from 1972 to 1979 and actually reduced the number of nuclear warheads held by the U.S. and USSR. SALT II was never ratified by the United States Senate, but its terms were nevertheless honored by both sides until 1986, when the Reagan administration "withdrew" after accusing the USSR of violating the pact.
In the 1980s, President Ronald Reagan launched the Strategic Defense Initiative as well as the MX and Midgetman ICBM programs.

China developed a minimal independent nuclear deterrent entering its own cold war after an ideological split with the Soviet Union beginning in the early 1960s. After first testing a domestic built nuclear weapon in 1964, it went on to develop various warheads and missiles. Beginning in the early 1970s, the liquid fuelled DF-5 ICBM was developed and used as a satellite launch vehicle in 1975. The DF-5, with range of 10,000 to 12,000 km (6,200 to 7,500 mi) long enough to strike the western US and the USSR, was silo deployed with the first pair in service by 1981 with possibly twenty missiles in service by the late 1990s. China also deployed the JL-1 Medium-range ballistic missile with a reach of 1,700 kilometres (1,100 mi) aboard the ultimately unsuccessful type 92 submarine.

Post-Cold War

Deployment history of land-based ICBM, 1959-2014

In 1991, the United States and the Soviet Union agreed in the START I treaty to reduce their deployed ICBMs and attributed warheads.

As of 2016, all five of the nations with permanent seats on the United Nations Security Council have operational long-range ballistic missile systems; Russia, the United States, and China also have land-based ICBMs (the US missiles are silo-based, while China and Russia have both silo and road-mobile (DF-31, RT-2PM2 Topol-M missiles).

Israel is believed to have deployed a road mobile nuclear ICBM, the Jericho III, which entered service in 2008; an upgraded version is in development.

India successfully test fired Agni V, with a strike range of more than 5,000 km (3,100 mi) on 19 April 2012, claiming entry into the ICBM club.The missile's actual range is speculated by foreign researchers to be up to 8,000 km (5,000 mi) with India having downplayed its capabilities to avoid causing concern to other countries.

By 2012 there was speculation by some intelligence agencies that North Korea is developing an ICBM. North Korea successfully put a satellite into space on 12 December 2012 using the 32-metre-tall (105 ft) Unha-3 rocket. The United States claimed that the launch was in fact a way to test an ICBM. In early July 2017, North Korea claimed for the first time to have tested successfully an ICBM capable of carrying a large thermonuclear warhead.

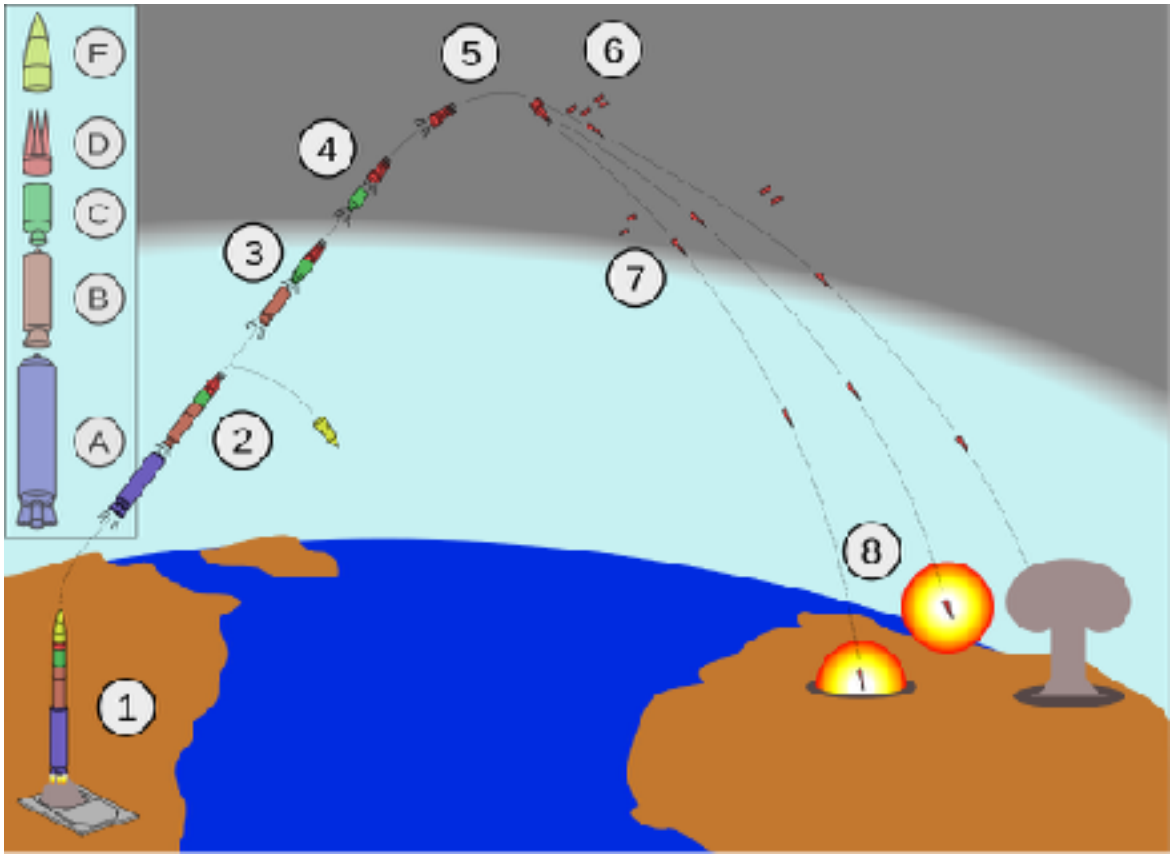
In July 2014, China announced the development of its newest generation of ICBM, the Dongfeng-41 (DF-41), which has a range of 12,000 kilometres (7,500 miles), capable of reaching the United States, and which analysts believe is capable of being outfitted with MIRV technology.

Most countries in the early stages of developing ICBMs have used liquid propellants, with the known exceptions being the Indian Agni-V, the planned but cancelled[South African RSA-4 ICBM, and the now in service Israeli Jericho III.

The RS-28 Sarmat (Russian: РС-28 Сармат; NATO reporting name: SATAN 2), is a Russian liquid-fueled, MIRV-equipped, super-heavy thermonuclear armed intercontinental ballistic

missile in development by the Makeyev Rocket Design Bureau from 2009, intended to replace the previous R-36 missile. Its large payload would allow for 10 heavy warheads or 15 lighter ones or up to 24 hypersonic glide vehicles Yu-74, or a combination of warheads and massive amounts of countermeasures designed to defeat anti-missile systems;it was heralded by the Russian military as a response to the U.S. Prompt Global Strike.

How an ICBM works



Modern ICBMs typically carry multiple independently targetable reentry vehicles (MIRVs).A MIRV is a ballistic missile payload containing several thermonuclear warheads, each capable of being aimed to hit a different target. By contrast, a unitary warhead is a single warhead on a single missile. An intermediate case is the multiple reentry vehicle (MRV) missile which carries several warheads which are dispersed but not individually aimed. Only the United States, United Kingdom, Russian Federation, France, Israel, and China are known to currently possess MIRV missiles.
The military purpose of a MIRV is fourfold:

Enhance first-strike proficiency for strategic forces.

Providing greater target damage for a given thermonuclear weapon payload. Several small warheads cause much more target damage area than a single warhead alone. This in turn reduces the number of missiles and launch facilities required for a given destruction level - much the same as the purpose of a cluster munition.
With single warhead missiles, one missile must be launched for each target. By contrast, with a MIRV warhead the post-boost (or bus) stage can dispense the warheads against multiple targets across a broad area.

Reduces the effectiveness of an anti-ballistic missile system that relies on intercepting individual warheads. While a MIRV attacking missile can have multiple warheads (3–12) on United States and Russian missiles, or 14 in a maximum payload shorter-range configuration of the Trident II now barred by START), interceptors may have only one warhead per missile. Thus, in both a military and an economic sense, MIRVs render ABM systems less effective, as the costs of maintaining a workable defense against MIRVs would greatly increase, requiring multiple defensive missiles for each offensive one. Decoy reentry vehicles can be used alongside actual warheads to minimize the chances of the actual warheads being intercepted before they reach their targets. A system that destroys the missile earlier in its trajectory (before MIRV separation) is not affected by this but is more difficult, and thus more expensive to implement.

Images of MIRV warheads reentering the atmosphere.

After launch, a booster pushes the missile and then falls away. Most modern boosters are solid-fueled rocket motors, which can be stored easily for long periods of time. Early missiles used liquid-fueled rocket motors. Many liquid-fueled ICBMs could not be kept fueled all the time as the cryogenic fuel liquid oxygen boiled off and caused ice formation, and therefore fueling the rocket was necessary before launch. This procedure was a source of significant operational delay, and might allow the missiles to be destroyed by enemy counterparts before they could be used. To resolve this problem the United Kingdom invented the missile silo that protected the missile from a first strike and also hid fuelling operations underground.

Once the booster falls away, the remaining "bus" releases several warheads, each of which continues on its own unpowered ballistic trajectory, much like an artillery shell or cannonball. The warhead is encased in a cone-shaped reentry vehicle and is difficult to detect in this phase of flight as there is no rocket exhaust or other emissions to mark its position to defenders. The high speeds of the warheads make them difficult to intercept and allow for little warning, striking targets many thousands of kilometers away from the launch site (and due to the possible locations of the submarines: anywhere in the world) within approximately 30 minutes.

Many authorities say that missiles also release aluminized balloons, electronic noise-makers, and other items intended to confuse interception devices and radars.

As the nuclear warhead reenters the Earth's atmosphere its high speed causes compression of the air, leading to a dramatic rise in temperature which would destroy it if it were not shielded in some way. As a result, warhead components are contained within an aluminium honeycomb substructure, sheathed in a pyrolytic carbon-epoxy synthetic resin composite material heat shield.

Warheads are also often radiation-hardened (to protect against nuclear-tipped ABMs or the nearby detonation of friendly warheads), one neutron-resistant material developed for this purpose in the UK is three-dimensional quartz phenolic.

Accuracy of the warheads is limited by the accuracy of the navigation system and the available geodetic information.

Flight phases

The following flight phases can be distinguished:

Boost phase: 3 to 5 minutes; it is shorter for a solid-fuel rocket than for a liquid-propellant rocket; depending on the trajectory chosen, typical burnout speed is 4 km/s (2.5 mi/s), up to 7.8 km/s (4.8 mi/s); altitude at the end of this phase is typically 150 to 400 km (93 to 249 mi).

Midcourse phase: approx. 25 minutes—sub-orbital spaceflight with a flightpath being a part of an ellipse with a vertical major axis; the apogee (halfway through the midcourse phase) is at an altitude of approximately 1,200 km (750 mi); the semi-major axis is between 3,186 and 6,372 km (1,980 and 3,959 mi); the projection of the flightpath on the Earth's surface is close to a great circle, slightly displaced due to earth rotation during the time of flight; the missile may release several independent warheads and penetration aids, such as metallic-coated balloons, aluminum chaff, and full-scale warhead decoys.

Reentry/terminal phase (starting at an altitude of 100 km, 62 mi): 2 minutes – impact is at a speed of up to 7 km/s (4.3 mi/s) (for early ICBMs less than 1 km/s (0.62 mi/s)).

ICBMs usually use the trajectory which optimizes range for a given amount of payload (the minimum-energy trajectory); an alternative is a depressed trajectory, which allows less payload, shorter flight time, and has a much lower apogee.

Mobility

ICBMs can be deployed from multiple platforms:

In missile silos, which offer some protection from military attack (including, the designers hope, some protection from a nuclear first strike)

On submarines: submarine-launched ballistic missiles (SLBMs); most or all SLBMs have the long range of ICBMs (as opposed to IRBMs)

Type	NATO Name	Minimum Range (km)	Maximum Range (km)	Country	Status
RSM-54 R-29RMU2 “Layner”		8,300	12,000	Soviet Union / Russia	Operational
UGM-96 Trident I (C-4)			12,000	United States	Decommissioned
UGM-133 Trident II (D5LE)			12,000	United States	Operational
UGM-133 Trident II (D5)			12,000	United Kingdom	Operational
JL-3			11,000	China	Being tested [36]
M51		8,000	10,000	France	Operational
RSM-40[31] R-29 “Vysota”	SS-N-8 “Sawfly”	7,700	9,000	Soviet Union / Russia	Decommissioned
RSM-56 R-30 “Bulava”	SS-NX-32[34]	8,000	8,300	Soviet Union / Russia	Operational

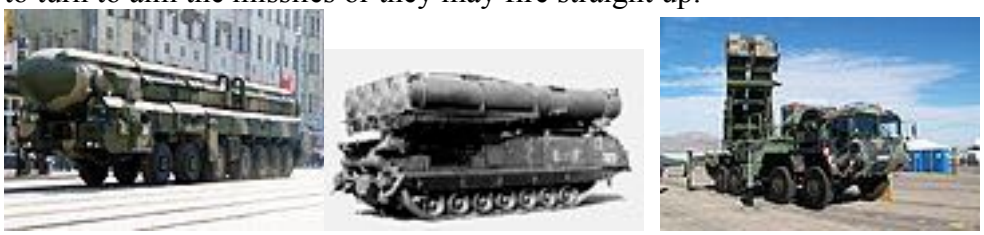
RSM-54 R-29RMU “Sineva”	SS-N-23 “Skiff”		8,300	Soviet Union / Russia	Operational
RSM-54 R-29RM “Shtil”	SS-N-23 “Skiff”		8,300	Soviet Union / Russia	Decommissioned (Under rebuild to R-29RMU “Sineva”)[33]
RSM-52[31] R-39 “Rif”	SS-N-20 “Sturgeon”		8,300	Soviet Union / Russia	Decommissioned
JL-2		7,400	8,000	China	Operational
RSM-50[31] R-29R “Vysota”	SS-N-18 “Stingray”		6,500	Soviet Union / Russia	Decommissioned
M45			6,000	France	Operational
K-5			6,000	India	Under development[38][39]
M4			5,000	France	Decommissioned
UGM-73 Poseidon (C-3)			4,600	United States	Decommissioned
UGM-27 Polaris (A-3) and Chevaline			4,600	United Kingdom	Decommissioned
UGM-27 Polaris (A-1 through A-3)			4,600	United States	Decommissioned
RSM-45 R-31	SS-N-17 “Snipe” [31]		4,500	Soviet Union / Russia	Decommissioned

R-27K	SS-NX-13		3,600	Soviet Union / Russia	Never operational[32]
K-4			3,500	India	Test fired from Arihant class submarine.[37]
M2			3,200	France	Decommissioned
R-27	SS-N-6	2,400	3,000	Soviet Union / Russia	Decommissioned
M20			3,000	France	Decommissioned
M1			3,000	France	Decommissioned
Pukkuksong-1/ KN-11		500	2,500	North Korea	Under development[40]
JL-1[35]			2,500	China	Decommissioned (never fully operational)
K-15 Sagarika		750	1,900	India	Operational
R-21	SS-N-5		1,650	Soviet Union / Russia	Decommissioned
R-13	SS-N-4		600	Soviet Union / Russia	Decommissioned

On heavy trucks called TEL; this applies to one version of the Topol which may be deployed from a self-propelled mobile launcher, capable of moving through roadless terrain, and launching a missile from any point along its route

A transporter erector launcher (TEL) is a missile vehicle with an integrated prime mover that can carry, elevate to firing position and launch one or more missiles. Such vehicles exist for both surface-to-air missiles and surface-to-surface missiles. Early such missiles were launched from fixed sites and had to be loaded onto trucks for transport, making them more vulnerable to attack since once they were spotted by the enemy they could not easily be relocated, and if they were it often took hours or even days to prepare them for launch once they reached their new site.

A transporter erector launcher and radar (TELAR) is the same as a TEL but also incorporates part or all of the radar system necessary for firing the surface-to-air missile(s). Such vehicles have the capability of being autonomous, greatly enhancing their effectiveness. With this type of system each vehicle can fight regardless of the state or presence of support vehicles. The TEL or TELAR may have a rotating turntable that it can use to aim the missiles. The vehicle may have to turn to aim the missiles or they may fire straight up.



Mobile launchers on rails; this applies, for example, to РТ-23УТТХ “Молодец” (RT-23UTTH “Molodets”—SS-24 “Scalpel”)

The last three kinds are mobile and therefore hard to find. During storage, one of the most important features of the missile is its serviceability. One of the key features of the first computer-controlled ICBM, the Minuteman missile, was that it could quickly and easily use its computer to test itself.

Specific ICBMs

Typ	Minimum Range (km)	Maximum Range (km)	Country	Status
LGM-30 Minuteman III		13,000	United States	
LGM-30F Minuteman II		11,265	United States	Decommissioned
LGM-30A/B Minuteman I		10,186	United States	Decommissioned

LGM-118 Peacekeeper		14,000		Decommissioned
MGM-134 Midgetman		11,000	 United States	Decommissioned
Titan II (SM-68B, LGM-25C)		16,000	 United States	Decommissioned

Titan I (SM-68, HGM-25A)		11,300	United States	Decommissioned
SM-65 Atlas (SM-65, CGM-16)		10,138	United States	Decommissioned
RTV-A-2 Hiroc	2,400	8,000	United States	Decommissioned
RS-28 Sarmat		10,000	Russia	
RS-26 Rubezh	6,000	12,600	Russia	

RS-24 “Yars” (SS-29)		11,000	Russia	
RT-2UTTH “Topol M” (SS-27)		11,000	Russia	
UR-100N		10,000	Soviet Union	
R-36 (SS-18)	10,200	16,000	Soviet Union	
RT-23 Molodets		11,000	Soviet Union	Decommissioned
RT-2PM “Topol” (SS-25)		10,000	Soviet Union	Decommissioned

RT-21 Temp 2S		**10,500**	 **Soviet Union**	**Decommissioned**
R-9 Desna		**16,000**	 **Soviet Union**	**Decommissioned**
R-16		**13,000**	 **Soviet Union**	**Decommissioned**

R-26		12,000	Soviet Union	Decommissioned
MR-UR-100 Sotka	10,250	10,320	Soviet Union	Decommissioned
UR-100		10,600	Soviet Union	Decommissioned

UR-200		**12,000**	 **Soviet Union**	**Decommissioned**
RT-20		**11,000**	 **Soviet Union**	**Decommissioned**
RT-2		**10,186**	 **Soviet Union**	**Decommissioned**

R-7 Semyorka		8,000	Soviet Union	Decommissioned
DF-4	5,500	7,000	China	
DF-31	7,200	11,200	China	
DF-5	12,000	15,000	China	
DF-41	12,000	15,000	China	
KN-08	1,500	12,000	North Korea	
Hwasong-14	6,700	10,000	North Korea	
Hwasong-15		13,000	North Korea	
Agni-V	5,000	8,000	India	

Testing of the Peacekeeper re-entry vehicles at the Kwajalein Atoll. All eight fired from only one missile. Each line, if its warhead were live, represents the potential explosive power of about 300 kilotons of TNT, about nineteen times larger than the detonation of the atomic bomb in Hiroshima.

Specific types of ICBMs (current, past and under development) include:
Russia, the United States, China, North Korea and India are the only countries currently known to possess land-based ICBMs, Israel has also tested ICBMs but is not open about actual deployment.

The United States currently operates 405 ICBMs in three USAF bases. The only model deployed is LGM-30G Minuteman-III. All previous USAF Minuteman II missiles were destroyed in accordance with START II, and their launch silos have been sealed or sold to the public. The powerful MIRV-capable Peacekeeper missiles were phased out in 2005.

The Russian Strategic Rocket Forces have 286 ICBMs able to deliver 958 nuclear warheads: 46 silo-based R-36M2 (SS-18), 30 silo-based UR-100N (SS-19), 36 mobile RT-2PM "Topol" (SS-25), 60 silo-based RT-2UTTH "Topol M" (SS-27), 18 mobile RT-2UTTH "Topol M" (SS-27), 84 mobile RS-24 "Yars" (SS-29), and 12 silo-based RS-24 "Yars" (SS-29).[34]
China has developed several long range ICBMs, like the DF-31. The Dongfeng 5 or DF-5 is a 3-stage liquid fuel ICBM and has an estimated range of 13,000 kilometers. The DF-5 had its first flight in 1971 and was in operational service 10 years later. One of the downsides of the missile was that it took between 30 and 60 minutes to fuel. The Dong Feng 31 (a.k.a. CSS-10) is a medium-range, three-stage, solid-propellant intercontinental ballistic missile, and is a land-based variant of the submarine-launched JL-2.
The DF-41 or CSS-X-10 can carry up to 10 nuclear warheads, which are MIRVs and has a range of approximately 12,000–14,000 km (7,500–8,700 mi). The DF-41 deployed in underground Xinjiang, Qinghai, Gansu and Inner Mongolia area. The mysterious underground subway ICBM carrier systems they called "Underground Great Wall Project".
Israel is believed to have deployed a road mobile nuclear ICBM, the Jericho III, which entered service in 2008. It is possible for the missile to be equipped with a single 750 kg (1,650 lb) nuclear warhead or up to three MIRV warheads. It is believed to be based on the Shavit space launch vehicle and is estimated to have a range of 4,800 to 11,500 km (3,000 to 7,100 mi).In November 2011 Israel tested an ICBM believed to be an upgraded version of the Jericho III.
India has a series of ballistic missiles called Agni. On 19 April 2012, India successfully test fired its first Agni-V, a three-stage solid fueled missile, with a strike range of more than 7,500 km (4,700 mi). The missile was test-fired for the second time on 15 September 2013. On 31 January 2015, India conducted a third successful test flight of the Agni-V from the Wheeler Island facility. The test used a canisterised version of the missile, mounted over a Tatra truck.

Notable examples.

The LGM-118 Peacekeeper

The LGM-118 Peacekeeper, also known as the MX missile (for Missile-eXperimental), was a land-based ICBM deployed by the United States starting in 1986. The Peacekeeper was a MIRV missile that could carry up to 10 re-entry vehicles, each armed with a 300-kiloton W87 warhead in a Mk.21 reentry vehicle (RV). A total of 50 missiles were deployed starting in 1986, after a

long and contentious development program that traced its roots into the 1960s.
MX was designed to allow the US to ride out a sneak attack by the Soviet ICBM fleet and then launch a counterattack. In order for the counterattack to be effective, MX had to have three qualities; the ability to be rapidly re-targeted so it would only be attacking those Soviet missiles known to still be in their silos, enough accuracy to allow a small warhead to kill an enemy silo so more warheads could be packed on a single MX missile, and a basing system that meant enough of the missiles would survive an attack that the counterattack would be effective. Among these three, the basing issue remained an unsolved problem and the subject of much criticism during the MX's development.
After considerable debate, President Reagan announced that the newly named Peacekeeper would be put into service in existing LGM-30 Minuteman silos, a temporary solution until a final basing solution was decided. During the same period, the US and USSR were involved in negotiations on the START II treaty, under which ICBMs were allowed to carry only a single warhead. As the Minuteman fleet could carry a single warhead for far less money, and the Peacekeeper was proving highly unreliable in the field, the US agreed to remove the Peacekeeper from their nuclear force as part of this treaty. Although START II was not ratified by the United States, the missiles were removed anyway, with the last one going out of service on 19 September 2005. Their advanced W87 warheads were slated to be moved to the Minuteman III.

The RT-2PM2 «Topol-M»

The RT-2PM2 «Topol-M» (Russian: РТ-2ПМ2 «Тополь-М», NATO reporting name: SS-27 "Sickle B", other designations: SS-27 Mod 1, RS-12M1, RS-12M2, formerly incorrectly RT-2UTTKh) is one of the most recent intercontinental ballistic missiles to be deployed by Russia, and the first to be developed after the dissolution of the Soviet Union. It was developed from the RT-2PM Topol mobile intercontinental ballistic missile.
In its Russian designation PT stands for "ракета твердотопливная", raketa tverdotoplivnaya ("solid fuel rocket"), while УТТХ – for "улучшенные тактико-технические характеристики," uluchshenniye taktiko-tekhnicheskie kharakteristiki ("improved tactical and technical characteristics"). "Topol" (тополь) in Russian means "white poplar". It is designed and produced exclusively by the Moscow Institute of Thermal Technology, and built at the Votkinsk Machine Building Plant.

Characteristics

The Topol-M is a cold-launched, three-stage, solid-propellant, silo-based or road-mobile intercontinental ballistic missile. The missile's length is 22.7 m and the first stage has a body diameter of 1.9 m. The mass at launch is 47,200 kg, including the 1,200 kg payload. Topol-M carries a single warhead with an 800 knot yield but the design is compatible with MIRV warheads. The missile can carry four to six warheads along with decoys. Its minimum range is estimated to be 2,000 km and the maximum range 10,500 km.
It is reputed to have the highest accuracy of any Russian ICBM ,an accuracy of 200m. The body of the rocket is made by winding carbon fiber.
The Topol-M may be deployed either inside a reinforced missile silo or from an APU launcher mounted on the MZKT-79221 "Universal" 16-wheeled transporter-erector-launcher. This mobile launcher is capable of moving through roadless terrain, and launching a missile from any point along its route. The designation for the silo-based Topol-M missile is believed to be RS-12M2,

while the mobile version is RS-12M1.

ICBM Defense Methods and systems

Missile defense

The Arrow 2 anti-ballistic missile

The Aegis Ballistic Missile Defense System. A RIM-161 Standard Missile 3 anti-ballistic missile is launched from USS Shiloh, a U.S. Navy Ticonderoga-class cruiser.

Phased Array Ballistic Missile Early Warning System at RAF Fylingdales

Missile defense is a system, weapon, or technology involved in the detection, tracking, interception, and destruction of attacking missiles. Originally conceived as a defence against nuclear-armed intercontinental ballistic missiles (ICBMs), its application has broadened to include shorter-ranged non-nuclear tactical and theater missiles.
The United States, Russia, China, India, Israel, and France have all developed such air defense systems. In the United States, missile defense was originally the responsibility of the U.S. Army. The U.S. Missile Defense Agency has developed maritime systems and command and control that will eventually be transferred to the Navy and Air Force for operation and sustainment.

NATO missile defense system

HMS Diamond firing an Aster missile for the first time in 2012.

Mechanisms

The Conference of National Armaments Directors (CNAD) is the senior NATO committee which acts as the tasking authority for the theater missile defense program. The ALTBMD

Program Management Organization, which comprises a Steering Committee and a Program Office hosted by the NATO C3 Agency, directs the program and reports to the CNAD. The focal point for consultation on full-scale missile defense is the Reinforced Executive Working Group. The CNAD is responsible for conducting technical studies and reporting the outcome to the Group. The NRC Ad hoc Working Group on TMD is the steering body for NATO-Russia cooperation on theater missile defense.

Missile defense

By early 2010, NATO will have an initial capability to protect Alliance forces against missile threats and is examining options for protecting territory and populations. This is in response to the proliferation of weapons of mass destruction and their delivery systems, including missiles of all ranges. NATO is conducting three missile defense–related activities:

Active Layered Theater Ballistic Missile Defense System capability

Active Layered Theater Ballistic Missile Defense System is "ALTBMD" for short.

As of early 2010, the Alliance has an interim capability to protect troops in a specific area against short-range and medium-range ballistic missiles (up to 3,000 kilometers).

The end system consist of a multi-layered system of systems, comprising low- and high-altitude defenses (also called lower- and upper-layer defenses), including Battle Management Command, Control, Communications and Intelligence (BMC3I), early warning sensors, radar, and various interceptors. NATO member countries provide the sensors and weapon systems, while NATO has developed the BMC3I segment and facilitate the integration of all these elements.

Missile Defense for the protection of NATO territory

A Missile Defense Feasibility Study was launched after NATO's 2002 Prague summit. The NATO Consultation, Command and Control Agency (NC3A) and NATO's Conference of National Armaments Directors (CNAD) were also involved in negotiations. The study concluded that missile defense is technically feasible, and it provided a technical basis for ongoing political and military discussions regarding the desirability of a NATO missile defense system.

During the 2008 Bucharest summit, the alliance discussed the technical details as well as the political and military implications of the proposed elements of the U.S. missile defense system in Europe. Allied leaders recognized that the planned deployment of European-based U.S. missile defense assets would help protect North American Allies, and agreed that this capability should be an integral part of any future NATO-wide missile defense architecture. However, these opinions are in the process of being reconstructed given the Obama administration's decision in 2009 to replace the long-range interceptor project in Poland with a short/medium range interceptor.

Russian Foreign Minister Sergei Lavrov has stated that NATO's pattern of deployment of Patriot missiles indicates that these will be used to defend against Iranian missiles in addition to the stated goal of defending against spillover from the Syrian civil war.

Notable examples of ballistic missile defense systems .

Aegis Ballistic Missile Defense System

The Aegis Ballistic Missile Defense System (Aegis BMD or ABMD) is a United States Department of Defense Missile Defense Agency program developed to provide missile defense against short to intermediate-range ballistic missiles. It is part of the United States national missile defense strategy. Aegis BMD (also known as Sea-Based Midcourse) is designed to intercept ballistic missiles post-boost phase and prior to reentry.
It enables warships to shoot down enemy ballistic missiles by expanding the Aegis Combat System with the addition of the AN/SPY-1 radar and Standard missile technologies. Aegis BMD-equipped vessels can transmit their target detection information to the Ground-Based Midcourse Defense system and, if needed, engage potential threats using the RIM-161 Standard Missile 3 (SM-3) mid-course interceptors and the RIM-156 Standard Missile 2 Extended Range Block IV (SM-2 Block IV) or RIM-174 Standard Extended Range Active Missile (SM-6) terminal-phase interceptors.

Aegis Combat System

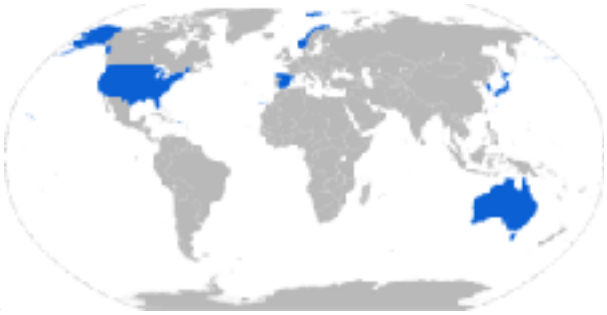
USS Lake Champlain, a Ticonderoga-class Aegis guided missile cruiser, launched in 1987. Beginning with USS Bunker Hill (CG-52), this version is equipped with the Mark 41 VLS system, whereas earlier versions were equipped with the Mark-26 twin-arm missile launcher system.

The Aegis Combat System is an integrated naval weapons system developed by the Missile and Surface Radar Division of RCA, and now produced by Lockheed Martin. It uses powerful

computer and radar technology to track and guide weapons to destroy enemy targets.
Initially used by the United States Navy, Aegis is now used also by the Japan Maritime Self-Defense Force, Spanish Navy, Royal Norwegian Navy, and Republic of Korea Navy. Over 100 Aegis-equipped ships have been deployed in five navies worldwide. The Royal Australian Navy selected the Aegis system for placement on its new Air Warfare Destroyers, and it is part of NATO's European missile defense system.

Current operators

Australia
Japan
Norway
South Korea
Spain
United States



1

2

1:Countries with AEGIS
2:Japanese destroyer equipped with CIWS

Close-in weapon system

A close-in weapon system (CIWS), often pronounced “sea-whiz”, is a point-defense weapon system for detecting and destroying incoming missiles and enemy aircraft which have penetrated the outer defenses, typically mounted shipboard in a naval capacity. Nearly all classes of modern warships are equipped with some kind of CIWS device.
There are two types of CIWS systems. A gun-based CIWS usually consists of a combination of radars, computers, and multiple-barrel, rotary rapid-fire cannons placed on a rotating gun mount. Missile systems use infra-red, passive radar/ESM or semi-active radar terminal guidance to guide missiles to the targeted enemy aircraft or other threats. In some cases, CIWS are used on land to protect military bases. In this case, the CIWS can also protect the base from shell and rocket
Fire.

RIM-116 Rolling Airframe Missile	
 **A RAM being launched from USS New Orleans in 2013.**	
Type	**Close-in weapons system**
Place of origin	**United States and Germany**
Service history	
In service	**1992-present**
Used by	**See operators**
Production history	
Designer	**General Dynamics (now Raytheon) / Diehl BGT Defence**
Designed	**1976**

Manufacturer	**General Dynamics (now Raytheon) / Diehl BGT Defence**
Unit cost	**US$998,000 (FY2014)[1]**
Produced	**1985–present**
Variants	**See variants**
Specifications	
Weight	**5,777 kg (12,736 lb) (launcher) 73.5 kilograms (162 lb 1 oz) (missile)**
Length	**2.79 m (9 ft 2 in) (missile)**
Warhead	**blast fragmentation warhead**
Warhead weight	**11.3 kg (24 lb 15 oz)**
Wingspan	**434 mm (17.1 in)**
Propellant	**solid**
Operational range	**9 km (5.6 mi)**
Speed	**In excess of Mach 2 (1,522 mph; 2,450 km/h)**
Guidance system	**three modes—passive radio frequency/infrared homing, infrared only, or infrared dual mode enabled (radio frequency and infrared homing)**
Launch platform	**Mk 144 Guided Missile Launcher (GML) of the Mk 49 Guided Missile Launching System (GMLS)**

The RIM-116 Rolling Airframe Missile (RAM) is a small, lightweight, infrared homing surface-to-air missile in use by the American, German, Japanese, Greek, Turkish, South Korean, Saudi Arabian, and Egyptian navies. It was intended originally and used primarily as a point-defense weapon against antiship cruise missiles. The missile is so-named because it rolls around its longitudinal axis to stabilize its flight path, much like a bullet fired from a rifled barrel. It is, as of 2005, the only U.S. Navy missile to operate in this manner.

The Rolling Airframe Missiles, together with the Mk 49 Guided Missile Launching System (GMLS) and support equipment, make up the RAM Mk 31 Guided Missile Weapon System (GMWS). The Mk-144 Guided Missile Launcher (GML) unit weighs 5,777 kilograms (12,736 lb) and stores 21 missiles. The original weapon cannot employ its own sensors prior to firing so it must be integrated with a ship's combat system, which directs the launcher at targets. On American ships it is integrated with the AN/SWY-2 Ship Defense Surface Missile System (SDSMS) and Ship Self-Defense System (SSDS) Mk 1 or Mk 2 based combat systems.

SeaRAM, a RAM launcher variant equipped with independent sensors derived from the Vulcan Phalanx CIWS, is being installed on Littoral Combat Ships and certain Arleigh Burke-class destroyers.

A-135 Moscow anti-ballistic missile system

The A-135 (NATO: ABM-3 Gorgon) anti-ballistic missile system is a Russian military complex deployed around Moscow to counter enemy missiles targeting the city or its surrounding areas. It became operational during 1995. It is a successor to the previous A-35, and complies with the 1972 Anti-Ballistic Missile Treaty.
The A-135 system attained "alert" (operational) status on February 17, 1995. It is operational although its 51T6 (NATO reporting name: SH-11) component was deactivated in February 2007. A newer missile is expected to replace it. There is an operational test version of the system at the test site in Sary Shagan, Kazakhstan.

The real danger of ICBM

"Someday, not too distant, there can come streaking out of somewhere – we won't be able to hear it, it will come so fast – some kind of gadget with an explosive so powerful that one projectile will be able to wipe out completely this city of Washington."
US Army General Hap Arnold,1943

'Which missile can be considered as the world's most dangerous Intercontinental Ballistic missile?'
All nuclear armed ICBM's are dangerous, the most dangerous may surprise you.
That's the Russian SS-18 SATAN with 10 warheads and more than 16000 km range,

This missile belongs to R-36 Missile family. The missile name is R-36 M2 Voevoda. NATO named this weapon as SS-18 Satan. Satan or Saitan in Arabic word which means devil. This missile was deployed in August 1988. This missile is Silo launched Intercontinental ballistic missile. This missile has a accuracy of 250-500 CEP(Circular error probable). This missile has a range of 16,000km without MIRV for a yield of 20Mt and 11,000km with MIRV for a yield of 0.55 to 0.75 Mt. According to some reports, the missile of this type could carry between 14 and 19 warheads and even as many as 20.

Missiles of the R-36M/SS-18 family have never been deployed with more than ten warheads, but given their large throw-weight (8.8 tonnes as specified in SALT), they have the capacity to carry considerably more detonation power.

In the entire history of the human race, there has never been a weapon as destructive as the Russian SS-18 ICBM. To understand the true power of this doomsday weapon, try comparing it to the nuclear warhead the United States used to obliterate Hiroshima.

The Hiroshima bomb had an explosive yield of ‘only’ 15kt or 15,000 tonnes of TNT equivalent, and yet it killed 70,000 people. In comparison, a single SS-18 carries up to 10 separate nuclear warheads of around 750 KT each. Some missiles are armed with one humongous 20,000 kt warhead.

During the early years of the missile age, the United States led Russia in technology and numbers but by the early 1970s when the SS-18 started entering service in significant numbers, Moscow had closed the missile gap and started pulling ahead inexorably. In 1990 Moscow had a stockpile of around 40,000 nuclear warheads (vs 28,000 for the US) but by just using the 3,000 warheads on its SS-18s it could wipe out all human life in the continental United States in 30 minutes.

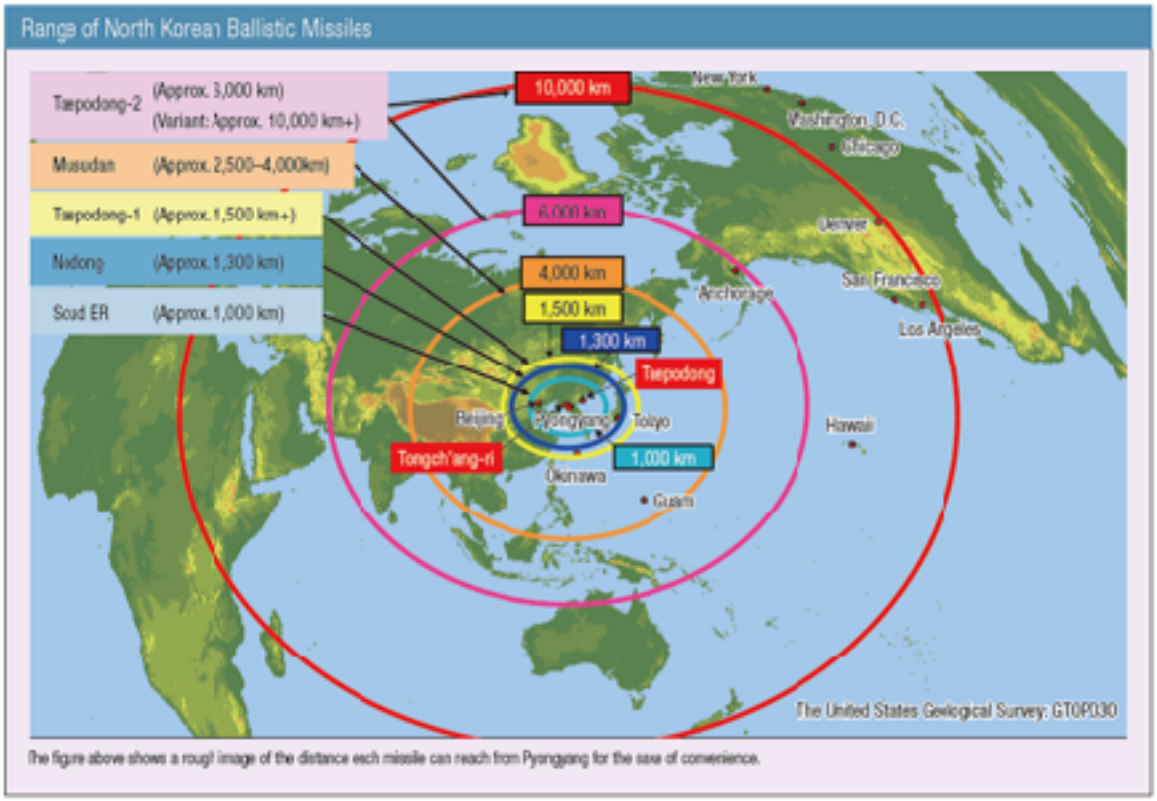
The SS-18 weights a gargantuan 209,000 kg. The highly accurate Russian missile can not only penetrate and destroy American missile silos, which are hardened to 300 psi, but its own silos

are hardened to a stupendous 6000 psi, making the missile all but impregnable. Amazingly, for a missile of its weight and length (102 feet) it can side wind (move in a series of S-shaped curves to evade antimissile defenses) and its micro-electronics are hardened to function even under nuclear attack.

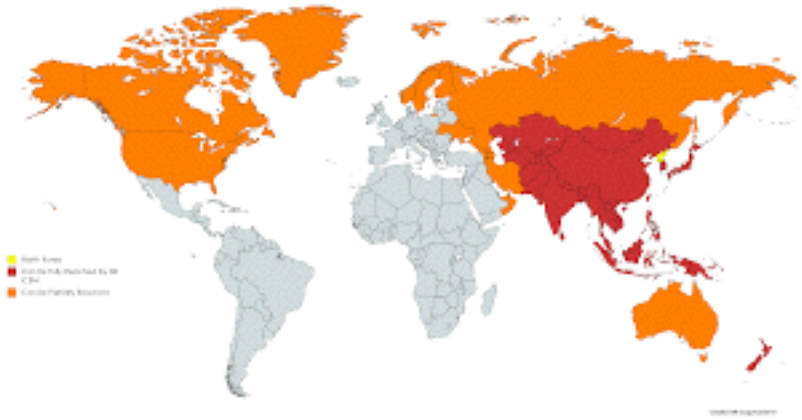
With just this example we can all understand that ICBMs are probably the most dangerous yet easily controllable weapon humanity has effectively developed.

The North Korean ICBM Program

In 2017, North Korea conducted a series of missile and nuclear tests that demonstrated the country's ability to launch ballistic missiles beyond its immediate region and suggested that North Korea's nuclear weapons capability was developing at a faster rate than had been assessed by the U.S. intelligence community. This, coupled with a regular joint U.S.–South Korea military exercise undertaken in August 2017, as well as U.S. threats, raised international tensions in the region and beyond.



North Korean missile range



Countries within range of North Korean missiles.

In his New Year's Day speech on January 2, 2017, Kim Jong-un, the leader of North Korea, said that the country was in the "last stage" of preparations to test-fire an intercontinental ballistic missile (ICBM).

On May 3, North Korea issued a rare and harshly worded criticism of its chief ally, China, stating that "One must clearly understand that the D.P.R.K.'s line of access to nukes for the existence and development of the country can neither be changed nor shaken[…] And that the D.P.R.K. will never beg for the maintenance of friendship with China, risking its nuclear program which is as precious as its own life, no matter how valuable the friendship is… China should no longer try to test the limits of the D.P.R.K.'s patience[…] China had better ponder over the grave consequences to be entailed by its reckless act of chopping down the pillar of the D.P.R.K.-China relations." The harsh commentary also accused the Chinese media (which is tightly controlled by the government) of dancing to the tune of the U.S.
In early August 2017, The Washington Post reported an assessment, made by the U.S. Defense Intelligence Agency in July 2017, which said that North Korea had successfully developed nuclear warheads for missiles capable of reaching the U.S. mainland (a miniaturized nuclear warhead that can fit inside its missiles).

Kim Jong-un's order for the first test of Hwasong-14

CBM test-flight on 4 July.

On July 4 North Korea conducted the first publicly announced flight test of its ICBM Hwasong-14, timed to coincide with the U.S. Independence Day celebrations. This flight had a claimed range of 933 kilometres (580 mi) eastwards into the Sea of Japan (East Sea of Korea) and reached an altitude of 2,802 kilometres (9,193,000 ft) during a 39-minute flight. The U.S. government experts classified the missile launch as a big step in Pyongyang's quest to acquire a nuclear-tipped weapon capable of hitting the U.S.North Korea declared it was now "a full-fledged nuclear power that has been possessed of the most powerful inter-continental ballistic rocket capable of hitting any part of the world".

USFK said in a statement dated July 4, 2017: ″Eighth U.S. Army and Republic of Korea (ROK) military personnel conducted a combined event exercising assets countering North Korea's destabilizing and unlawful actions on July 4.″ South Korea′s Hyunmoo-2B and U.S. Army Tactical Missile System missiles were launched during the drill.

Missile test over Japan on 29 August

On August 29, just before 6 am JST, North Korea launched a missile which flew over Hokkaido, Japan. The missile reached an altitude of 550 km and flew a total distance of around 2,700 km before crashing into the Pacific. The missile was not shot down by the Japanese military. This was the third time, with two prior events in 1998 and 2009, that a North Korean missile had passed over Japanese territory. However, in both of those prior cases, North Korea had claimed that they were launching satellites. The missile prompted activation of the J-Alert warning system in Tohoku and Hokkaido, advising people to seek shelter. The launch was scheduled on the 107th anniversary of the Japan-Korea annexation treaty, and KCNA said that it was "a bold plan to make the cruel Japanese islanders insensible on bloody August 29". The missile launched was said to have followed a much flatter trajectory than those tested earlier in 2017.

An emergency UN Security Council meeting was called for later that day to discuss the event.

In a statement issued by the White House in response to the launch, US President Donald Trump said that "All options are on the table" regarding North Korea.

U.S. response at the end of August

On August 30, President Trump issued a statement via Twitter saying "The U.S. has been talking to North Korea and paying them extortion money, for 25 years. Talking is not the answer!". However, when asked by reporters at a meeting with South Korean Defence Minister Song Young-Moo whether diplomacy was off the table, US Secretary of Defence James Mattis stated that "We're never out of diplomatic solutions" and "We always look for more. We're never complacent".

On August 31, the US flew a squadron of bombers, including two nuclear-capable B-1B's and four F-35's, and conducted bombing drills in what US Pacific Command described as a "direct response to North Korea's intermediate range ballistic missile launch", referring to North Korea's IRBM launch on August 29.

Sixth nuclear test and aftermath: September 2017

On September 3, at 3:31 am UTC, the United States Geological Survey reported that it had detected a magnitude 6.3 earthquake in North Korea near the Punggye-ri test site. Given the shallow depth of the quake and its proximity to North Korea's primary nuclear weapons testing facility, experts concluded that the country had conducted a sixth nuclear weapon test since the country first exploded a nuclear device in 2006.North Korea claimed that they had tested a hydrogen bomb capable of being mounted on an ICBM. The independent seismic monitoring agency NORSAR estimated that the blast had a yield of around 120 kilotons. An official KCNA statement of September 3, also claimed North Korea's ability to conduct a "super-powerful EMP attack".

On the same day, U.S. Defense Secretary James Mattis speaking on behalf of the White House, warned there would be "a massive military response" to any threat from North Korea against the United States, including Guam, or its allies.

Early on September 4, the Republic of Korea (South Korea) conducted a ballistic missile exercise that involved the South's Hyunmoo ballistic missile and the F-15K fighter jets, which was billed to be in response to North's detonation. The state news agency Yonhap said the South's military had carried out a live-fire exercise simulating an attack on the North's nuclear site, hitting "designated targets in the East Sea".

On the same day, the UN Security Council convened to discuss further measures against North Korea;the leaked draft the relevant UNSC resolution prepared by the U.S. was said to call for an oil embargo on North Korea, ban on the country's exports of textiles, on the hiring of North Korean workers abroad as well as personal sanctions against Kim Jong-un. Despite resistance from China and Russia, the United States on 8 September formally requested a vote of the United Nations Security Council on the U.S. resolution. UNSC 2375 passed on September 11 as a significantly watered-down version of the United States' request.

In an interview on September 4, Liu Jieyi, China's ambassador to the United Nations, called for dialogue, saying that the issue needed to be resolved "peacefully". He said, "China will never allow chaos and war on the peninsula."

President Vladimir Putin speaking to the Chinese press on September 5, 2017, described U.S. proposals for further sanctions on Pyongyang as "useless"; he said, "Ramping up military hysteria in such conditions is senseless; it's a dead end."Russian Foreign Minister Sergey

Lavrov has likened the war of words between U.S. President Donald Trump and North Korean leader Kim Jong-un to a kindergarten fight between two children, saying "Together with China we'll continue to strive for a reasonable approach and not an emotional one like when children in a kindergarten start fighting and no-one can stop them."

A plan proposed by both China and Russia calls for a joint freeze (freeze-for-freeze) — of North's missile tests, and U.S. and South Korean military exercises; the next step would be starting talks. The joint initiative of Russia and China envisages the involved parties' commitment to "four nos": concerning regime change, regime collapse, accelerated reunification, and military deployment north of the thirty-eighth parallel.
On September 6, Donald Trump, after a telephone conversation with China′s Xi Jinping, said that the United States would not tolerate North Korea′s provocations, although military action was not his "first choice".
On September 10, the Secretary General of the North Atlantic Treaty Organization Jens Stoltenberg said in an interview with BBC television: "The reckless behavior of North Korea is a global threat and requires a global response and that of course also includes NATO"; when asked whether an attack on the U.S. Pacific territory of Guam would trigger NATO's Article 5, he said: "I will not speculate about whether Article 5 will be applied in such a situation."

Missile test over Japan on September 15

On September 14, North Korea issued a threat to "sink" Japan, and turn the US to "ashes and darkness". The statement drew strong condemnation from Yoshihide Suga, who described the speech as "extremely provocative and egregious". The next day, an IRBM was fired from near Pyongyang and flew over Hokkaido, Japan before splashing down in the western Pacific about two thousand kilometers off Cape Erimo at about 7:16 am local time.
The missile traveled 3,700 kilometres (2,300 mi) achieving a maximum apogee of 770 kilometres (480 mi) during its 19-minute flight. It is the furthest any North Korean IRBM missile has gone above and beyond Japan. On September 18, North Korea announced that any further sanctions would only cause acceleration of their nuclear program.

U.S. and China agree on "pressure"

On September 18, the White House said president Donald Trump and Chinese president Xi Jinping had discussed North Korea's continued nuclear weapons and ballistic missile tests and committed to "maximising pressure on North Korea through vigorous enforcement" of UN Security Council resolutions on North Korea; North Korea said the sanctions would accelerate its nuclear program.

Trump's speech at UN GA, and Kim Jong-un's response

U.S. President Donald Trump giving his address at the 72nd Session of the United Nations General Assembly

On September 19, Donald Trump, in his first address to the United Nations General Assembly, said that the United States: “if it is forced to defend itself or its allies, we will have no choice but to totally destroy North Korea. Rocket Man [Kim Jong-un] is on a suicide mission for himself and for his regime. The United States are ready, willing and able, but hopefully this will not be necessary.” Also, without mentioning it by name, Donald Trump criticised China for maintaining relations with NK, calling it “an outrage that some nations would not only trade with such a regime, but would arm, supply, and financially support a country that imperils the world with nuclear conflict”.

On September 20, U.S. president Donald Trump signed an executive order that further toughened U.S. sanctions against North Korea: the U.S. Treasury was thereby authorised to target firms and financial institutions conducting business with NK. Commenting on the executive order, Treasury Secretary Steven Mnuchin said, “Foreign financial institutions are now on notice that going forward they can choose to do business with the United States or North Korea, but not both.”

On September 21, responding directly for the first time to President Trump’s threat, North Korea’s leader Kim Jong-un in his capacity of Chairman of State Affairs of DPRK called Trump a “mentally deranged U.S. dotard” and vowed the “highest level of hard-line countermeasure in history.” (The ad hominem insults aside, no reference was made to the “hostile policy” of the United States, a staple of North Korean statements otherwise.) Foreign minister Ri Yong-ho likewise alluded to Trump as a barking dog,and furthermore remarked that North Korea might be considering the largest test of a hydrogen bomb ever in the Pacific Ocean,which would constitute the first atmospheric nuclear test in the world since 1980 (last performed by China).

On September 25, North Korea’s Foreign Minister Ri Yong Ho accused Trump of declaring war on his country, referring to Trump’s recent tweet that North Korea “won’t be around much longer.”

The White House responded that the USA has not declared war.

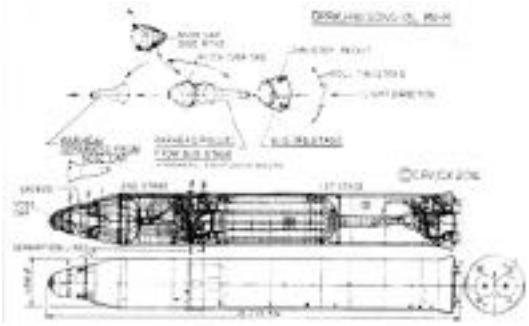
On September 30, Rex Tillerson stated while on a trip to China, that the U.S and North Korea were in “direct contact”. “We have lines of communications to Pyongyang” he said, “We’re not in a dark situation”. He further stated that the U.S was “probing” the possibility of direct talks. “So stay tuned”. The Associated Press has claimed that a long-used back-channel has been re-opened in the past months, the ‘New York Channel’, facilitating communication between Washington and Pyongyang. The next day however, Trump made a series of posts on Twitter which seemed to undermine Tillerson’s efforts, claiming that Tillerson was “wasting his time” trying to negotiate with North Korea and that “we’ll do what has to be done”.

Former CIA Director John O. Brennan, during a Q&A session at Fordham University on October 18, remarked that “I think the prospects of military conflict in the Korean peninsula are greater than they have been in several decades… I don’t think it’s likely or probable, but if it’s a 1-in-4 or 1-in-5 chance, that’s too high.”
On November 20, 2017, Trump officially announced re-listing North Korea as a State Sponsor of Terrorism.

Argument about nuclear armament of South Korea and Japan

An argument emerged in both South Korea and Japan about the nuclear option, driven by worry that the United States might hesitate to defend the countries if doing so might provoke a missile launched from the North at major U.S. cities. In South Korea, polls show that 60 percent of the population favors building nuclear weapons, and that nearly 70 percent want the United States to reintroduce tactical nuclear weapons, which were withdrawn in 1991. In October, Hong Jun-pyo, one of the leading South Korean opposition figures, argued “only by deploying tactical nuclear weapons on South Korean territory can we negotiate with North Korea on an equal footing.” Republican Senator John McCain urged that the U.S. should consider deploying nuclear weapons to South Korea. Former United States Secretary of State Henry Kissinger mentioned “If North Korea continues to have nuclear weapons, nuclear weapons must spread in the rest of Asia.”

Hwasong-14



Schematics of the HWASONG-14 ICBM

LEFT:HWASONG-14 ICBM, RIGHT:HWASONG-15 ICBM

Range of the HWASONG-15 ICBM

NK leader Kim Jong-Un watching the test of the HWASONG-14 misssile.

Hwasong-14	
Type	Intercontinental ballistic missile
Place of origin	North Korea
Service history	

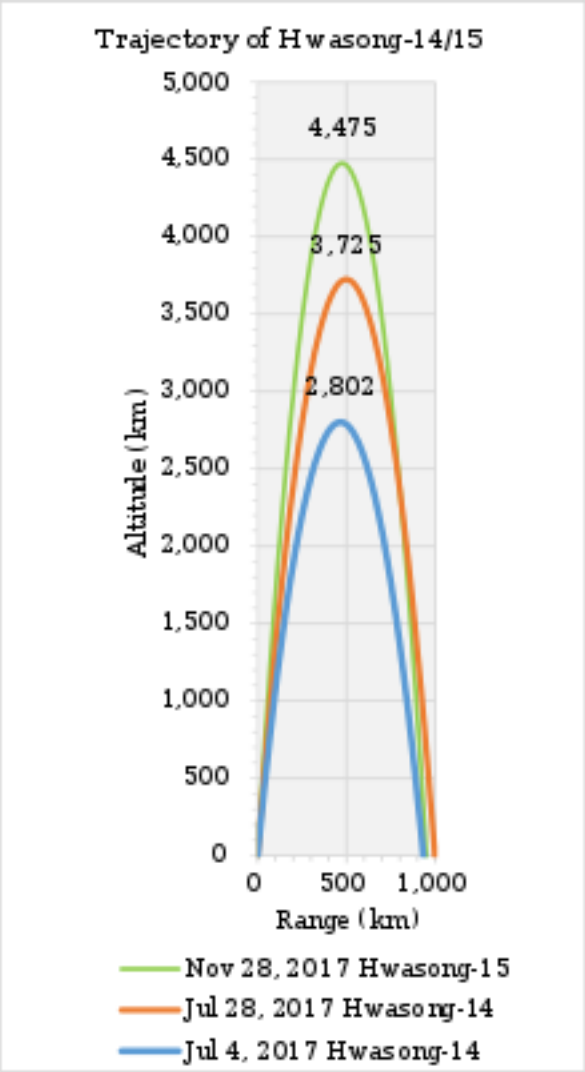
In service	**First successful test on 4 July 2017**
Used by	**North Korea**
Production history	
Produced	**2017 - present**
No. built	**Unknown**
Specifications	
Weight	**33.8 tons**
Length	**19.5 m (63 ft)[1]**
Diameter	**1.7 m (5.5 ft)**
Warhead weight	**500kg[2]**
Engine	**Two-stage Liquid-fuel rocket[3] 453kN, 46-48 tonne-force.[4]**
Propellant	**UDMH/N204**
Operational range	**6,700-10,000 km (4,200-6,200 mi)[5][6][7][8][9][10]**
Flight altitude	**~3720 km**
Launch platform	**Road-mobile TEL[11]**
Korean name	
Chosŏn'gŭl	**화성 14호**
Hancha	**火星14号**
Revised Romanization	**Hwaseong-14**
McCune-Reischauer	**Hwasŏng-14**

The Hwasong-14 (hancha: 火星 14号, meaning Mars-14), also known under alternative US designation codename KN-20, is a mobile intercontinental ballistic missile developed by North Korea. It had its maiden flight on 4 July 2017, which coincided with the United States' Independence Day. North Korea is the only known operator of this missile.

Design

The Hwasong-14 is likely a two-staged version of the Hwasong-12 first tested in May 2017. The second stage appears to have increased its range. The first stage engine appears very similar to the Hwasong-12. With a single liquid fuel engine, it has four Vernier thrusters for stability and guidance.

A detailed analysis by the Bulletin of the Atomic Scientists claims that the current variant of the Hwasong-14 may not even be capable of delivering a first-generation nuclear warhead to Anchorage, Alaska. But even if North Korea is now capable of fabricating a relatively light-weight, “miniaturized” atomic bomb that can survive the extreme reentry environments of long-range rocket delivery, it will, with certainty, not be able to deliver such an atomic bomb to the lower 48 states of the United States with the rocket tested on July 3 and July 28.



Launch vehicle

Hwasong-15 Transporter erector vehicle

The 9 axle Transporter erector launcher (TEL) vehicle is larger compared to the 8 axle TEL vehicle of the Hwasong-14. However, just like the Hwasong-14, the launch footage indicates the missile was fired from a fixed launch pad, not from the vehicle.

The Anti-Ballistic Missile Treaty

The Anti-Ballistic Missile Treaty (ABM Treaty or ABMT) was an arms control treaty between the United States and the Soviet Union on the limitation of the anti-ballistic missile (ABM) systems used in defending areas against ballistic missile-delivered nuclear weapons. Under the terms of the treaty, each party was limited to two ABM complexes, each of which was to be limited to 100 anti-ballistic missiles.
Signed in 1972, it was in force for the next 30 years. Following the dissolution of the Soviet Union, in 1997 four former Soviet republics agreed with the United States to succeed the USSR's role in the treaty. In June 2002 the United States withdrew from the treaty, leading to its termination.

Background

Throughout the late 1950s and into the 1960s, the United States and the Soviet Union had been developing missile systems with the ability to shoot down incoming ICBM warheads. During this period, the US considered the defense of the US as part of reducing the overall damage inflicted in a full nuclear exchange. As part of this defense, Canada and the US established the North American Air Defense Command (now called North American Aerospace Defense Command).

By the early 1950s, US research on the Nike Zeus missile system had developed to the point where small improvements would allow it to be used as the basis of an operational ABM system. Work started on a short-range, high-speed counterpart known as Sprint to provide defense for the ABM sites themselves. By the mid-1960s, both systems showed enough promise to start development of base selection for a limited ABM system dubbed Sentinel. In 1967, the US announced that Sentinel itself would be scaled down to the smaller and less expensive Safeguard. Soviet doctrine called for development of its own ABM system and return to strategic parity with the US.
This was achieved with the operational deployment of the A-35 ABM system and its successors, which remain operational to this day.
The development of multiple independently targetable reentry vehicle (MIRV) systems allowed a single ICBM to deliver as many as ten separate warheads at a time. An ABM defense system could be overwhelmed with the sheer number of warheads.Upgrading it to counter the additional warheads would be economically unfeasible: The defenders required one rocket per incoming warhead, whereas the attackers could place 10 warheads on a single missile at a reasonable cost. To further protect against ABM systems, the Soviet MIRV missiles were equipped with decoys; R-36M heavy missiles carried as many as 40. These decoys would appear as warheads to an ABM, effectively requiring engagement of five times as many targets and rendering defense even less effective.

ABM Treaty

Jimmy Carter and Leonid Brezhnev signing SALT II treaty, June 18, 1979, in Vienna.
SALT: (Strategic Arms Limitation Talks)

The United States first proposed an anti-ballistic missile treaty at the 1967 Glassboro Summit Conference during discussions between U.S. Secretary of Defense Robert McNamara and Chairman of the Council of Ministers of the Soviet Union Alexei Kosygin. McNamara argued both that ballistic missile defense could provoke an arms race, and that it might provoke a first-strike against the nation fielding the defense. Kosygin rejected this reasoning. Following the proposal of the Sentinel and Safeguard decisions on American ABM systems, the Strategic Arms Limitation Talks began in November 1969 (SALT I). By 1972 an agreement had been reached to limit strategic defensive systems. Each country was allowed two sites at which it could base a defensive system, one for the capital and one for ICBM silos.

The treaty was signed during the 1972 Moscow Summit on May 26 by the President of the United States, Richard Nixon and the General Secretary of the Communist Party of the Soviet Union, Leonid Brezhnev; and ratified by the US Senate on August 3, 1972.
The 1974 Protocol reduced the number of sites to one per party, largely because neither country had developed a second site. The sites were Moscow for the USSR and the North Dakota Safeguard Complex for the US, which was already under construction.

Missiles limited by the treaty

The Treaty limited only ABMs capable of defending against "strategic ballistic missiles", without attempting to define "strategic". It was understood that both ICBMs and SLBMs are obviously "strategic". Both countries did not intend to stop the development of counter-tactical ABMs. The topic became disputable as soon as most potent counter-tactical ABMs started to be capable of shooting down SLBMs (SLBMs naturally tend to be much slower than ICBMs), nevertheless both sides continued counter-tactical ABM development.

US withdrawal

Presidents Vladimir Putin and George W. Bush sign SORT on 24 May 2002 in Moscow

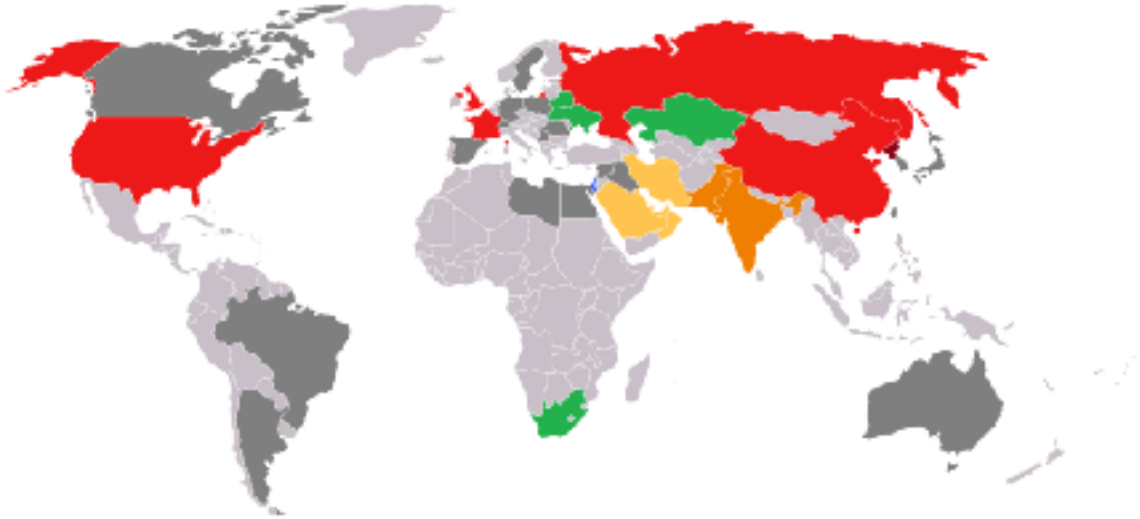
Although the Soviet Union ceased to exist in December 1991, in the view of the U.S. Department of State, the treaty continued in force. An additional memorandum of understanding was prepared in 1997, establishing Belarus, Kazakhstan, the Russian Federation, and Ukraine as successor states to the Soviet Union, for the purposes of the treaty.
On December 13, 2001, George W. Bush gave Russia notice of the United States' withdrawal from the treaty, in accordance with the clause that required six months' notice before terminating the pact—the first time in recent history that the United States has withdrawn from a major international arms treaty. This led to the eventual creation of the American Missile Defense Agency.
Supporters of the withdrawal argued that it was a necessity in order to test and build a limited National Missile Defense to protect the United States from nuclear blackmail by a rogue state. The withdrawal had many critics as well as supporters. John Rhinelander, a negotiator of the ABM treaty, predicted that the withdrawal would be a "fatal blow" to the Non-Proliferation Treaty and would lead to a "world without effective legal constraints on nuclear proliferation." The construction of a missile defense system was also feared to enable the US to attack with a nuclear first strike.
Russia and the United States signed the Strategic Offensive Reductions Treaty (SORT)in

Moscow on May 24, 2002. This treaty mandates cuts in deployed strategic nuclear warheads, but without actually mandating cuts to total stockpiled warheads, and without any mechanism for enforcement.

United Nations

In its landmark resolution 1653 of 1961, "Declaration on the prohibition of the use of nuclear and thermo-nuclear weapons," the UN General Assembly stated that use of nuclear weaponry "would exceed even the scope of war and cause indiscriminate suffering and destruction to mankind and civilization and, as such, is contrary to the rules of international law and to the laws of humanity".

The UN Office for Disarmament Affairs (UNODA) is a department of the United Nations Secretariat established in January 1998 as part of the United Nations Secretary-General Kofi Annan's plan to reform the UN as presented in his report to the General Assembly in July 1997. Its goal is to promote nuclear disarmament and non-proliferation and the strengthening of the disarmament regimes in respect to other weapons of mass destruction, chemical and biological weapons. It also promotes disarmament efforts in the area of conventional weapons, especially land mines and small arms, which are often the weapons of choice in contemporary conflicts.



World map with nuclear weapons development status represented by color.
Five "nuclear weapons states" from the NPT
Other states known to possess nuclear weapons
States formerly possessing nuclear weapons
States suspected of being in the process of developing nuclear weapons and/or nuclear programs
States which at one point had nuclear weapons and/or nuclear weapons research programs
States that possess nuclear weapons, but have not widely adopted them
While the vast majority of states have adhered to the stipulations of the Nuclear

Nonproliferation Treaty, a few states have either refused to sign the treaty or have pursued nuclear weapons programs while not being members of the treaty. Many view the pursuit of nuclear weapons by these states as a threat to nonproliferation and world peace.
Declared nuclear weapon states not party to the NPT:
Indian nuclear weapons: 80–100 active warheads
Pakistani nuclear weapons: 90–110 active warheads
North Korean nuclear weapons: <10 active warheads
Undeclared nuclear weapon states not party to the NPT:
Israeli nuclear weapons: 75–200 active warheads
Nuclear weapon states not party to the NPT that disarmed and joined the NPT as non-nuclear weapons states:
South African nuclear weapons: disarmed from 1989–1993
Former Soviet states that disarmed and joined the NPT as non-nuclear weapons states:
Belarus
Kazakhstan
Ukraine
Non-nuclear weapon states party to the NPT currently accused of seeking nuclear weapons:
Iran
Non-nuclear weapon states party to the NPT who acknowledged and eliminated past nuclear weapons programs:
Libya

Arms reduction treaties and non military solutions

United States and USSR/Russian nuclear weapons stockpiles, 1945-2014.
These numbers include warheads not actively deployed, including those on reserve status or scheduled for dismantlement. Stockpile totals do not necessarily reflect nuclear capabilities since they ignore size, range, type, and delivery mode.

After the 1986 Reykjavik Summit between U.S. President Ronald Reagan and the new Soviet General Secretary Mikhail Gorbachev, the United States and the Soviet Union concluded two important nuclear arms reduction treaties: the INF Treaty (1987) and START I (1991). After the end of the Cold War, the United States and the Russian Federation concluded the Strategic Offensive Reductions Treaty (2003) and the New START Treaty (2010).
When the extreme danger intrinsic to nuclear war and the possession of nuclear weapons became apparent to all sides during the Cold War, a series of disarmament and nonproliferation treaties were agreed upon between the United States, the Soviet Union, and several other states

throughout the world. Many of these treaties involved years of negotiations, and seemed to result in important steps in arms reductions and reducing the risk of nuclear war.

Key treaties

Partial Test Ban Treaty (PTBT) 1963: Prohibited all testing of nuclear weapons except underground.

Nuclear Non-Proliferation Treaty (NPT)—signed 1968, came into force 1970: An international treaty (currently with 189 member states) to limit the spread of nuclear weapons. The treaty has three main pillars: nonproliferation, disarmament, and the right to peacefully use nuclear technology.

Interim Agreement on Offensive Arms (SALT I) 1972: The Soviet Union and the United States agreed to a freeze in the number of intercontinental ballistic missiles (ICBMs) and submarine-launched ballistic missiles (SLBMs) that they would deploy.

Anti-Ballistic Missile Treaty (ABM) 1972: The United States and Soviet Union could deploy ABM interceptors at two sites, each with up to 100 ground-based launchers for ABM interceptor missiles. In a 1974 Protocol, the US and Soviet Union agreed to only deploy an ABM system to one site.

Strategic Arms Limitation Treaty (SALT II) 1979: Replacing SALT I, SALT II limited both the Soviet Union and the United States to an equal number of ICBM launchers, SLBM launchers, and heavy bombers. Also placed limits on Multiple Independent Reentry Vehicles (MIRVS).

Intermediate-Range Nuclear Forces Treaty (INF) 1987: Created a global ban on short- and long-range nuclear weapons systems, as well as an intrusive verification regime.

Strategic Arms Reduction Treaty (START I)—signed 1991, ratified 1994: Limited long-range nuclear forces in the United States and the newly independent states of the former Soviet Union to 6,000 attributed warheads on 1,600 ballistic missiles and bombers.

Strategic Arms Reduction Treaty II (START II)—signed 1993, never put into force: START II was a bilateral agreement between the US and Russia which attempted to commit each side to deploy no more than 3,000 to 3,500 warheads by December 2007 and also included a prohibition against deploying multiple independent reentry vehicles (MIRVs) on intercontinental ballistic missiles (ICBMs)

Strategic Offensive Reductions Treaty (SORT or Moscow Treaty)—signed 2002, into force 2003: A very loose treaty that is often criticized by arms control advocates for its ambiguity and lack of depth, Russia and the United States agreed to reduce their “strategic nuclear warheads” (a term that remained undefined in the treaty) to between 1,700 and 2,200 by 2012. Was superseded by New Start Treaty in 2010.

Comprehensive Test Ban Treaty (CTBT)—signed 1996, not yet in force: The CTBT is an international treaty (currently with 181 state signatures and 148 state ratifications) that bans all nuclear explosions in all environments. While the treaty is not in force, Russia has not tested a nuclear weapon since 1990 and the United States has not since 1992.

New START Treaty—signed 2010, into force in 2011: replaces SORT treaty, reduces deployed nuclear warheads by about half, will remain into force until at least 2021

Only one country has been known to ever dismantle their nuclear arsenal completely—the apartheid government of South Africa apparently developed half a dozen crude fission weapons during the 1980s, but they were dismantled in the early 1990s.

The Nuclear disarmament and its history

The Campaign for Nuclear Disarmament symbol, designed by Gerald Holtom in 1958.

Nuclear disarmament refers to both the act of reducing or eliminating nuclear weapons and to the end state of a nuclear-weapons-free world, in which nuclear weapons are completely eliminated. Nuclear disarmament groups include the Campaign for Nuclear Disarmament, Peace Action, Greenpeace, Soka Gakkai International, International Physicians for the Prevention of Nuclear War, Mayors for Peace, Global Zero, the International Campaign to Abolish Nuclear Weapons, and the Nuclear Age Peace Foundation. There have been many large anti-nuclear demonstrations and protests. On June 12, 1982, one million people demonstrated in New York City's Central Park against nuclear weapons and for an end to the cold war arms race. It was the largest anti-nuclear protest and the largest political demonstration in American history.

In recent years, some U.S. elder statesmen have also advocated nuclear disarmament. Sam Nunn, William Perry, Henry Kissinger, and George Shultz have called upon governments to embrace the vision of a world free of nuclear weapons, and in various op-ed columns have proposed an ambitious program of urgent steps to that end. The four have created the Nuclear Security Project to advance this agenda. Organisations such as Global Zero, an international non-partisan group of 300 world leaders dedicated to achieving nuclear disarmament, have also been established.
Proponents of nuclear disarmament say that it would lessen the probability of nuclear war occurring, especially accidentally. Critics of nuclear disarmament say that it would undermine deterrence.

Peace movements emerged in Japan and in 1954 they converged to form a unified "Japanese Council Against Atomic and Hydrogen Bombs". Japanese opposition to the Pacific nuclear

weapons tests was widespread, and “an estimated 35 million signatures were collected on petitions calling for bans on nuclear weapons”. In the United Kingdom, the first Aldermaston March organised by the Direct Action Committee and supported by the Campaign for Nuclear Disarmament took place on Easter 1958, when several thousand people marched for four days from Trafalgar Square, London, to the Atomic Weapons Research Establishment close to Aldermaston in Berkshire, England, to demonstrate their opposition to nuclear weapons. CND organised Aldermaston marches into the late 1960s when tens of thousands of people took part in the four-day events.

On November 1, 1961, at the height of the Cold War, about 50,000 women brought together by Women Strike for Peace marched in 60 cities in the United States to demonstrate against nuclear weapons. It was the largest national women’s peace protest of the 20th century.

In 1958, Linus Pauling and his wife presented the United Nations with the petition signed by more than 11,000 scientists calling for an end to nuclear-weapon testing. The “Baby Tooth Survey,” headed by Dr Louise Reiss, demonstrated conclusively in 1961 that above-ground nuclear testing posed significant public health risks in the form of radioactive fallout spread primarily via milk from cows that had ingested contaminated grass. Public pressure and the research results subsequently led to a moratorium on above-ground nuclear weapons testing, followed by the Partial Test Ban Treaty, signed in 1963 by John F. Kennedy and Nikita Khrushchev. On the day that the treaty went into force, the Nobel Prize Committee awarded Pauling the Nobel Peace Prize, describing him as “Linus Carl Pauling, who ever since 1946 has campaigned ceaselessly, not only against nuclear weapons tests, not only against the spread of these armaments, not only against their very use, but against all warfare as a means of solving international conflicts.”Pauling started the International League of Humanists in 1974. He was president of the scientific advisory board of the World Union for Protection of Life and also one of the signatories of the Dubrovnik-Philadelphia Statement.

In the 1980s, a movement for nuclear disarmament again gained strength in the light of the weapons build-up and statements of US President Ronald Reagan. Reagan had “a world free of nuclear weapons” as his personal mission, and was largely scorned for this in Europe. Reagan was able to start discussions on nuclear disarmament with Soviet Union. He changed the name “SALT” (Strategic Arms Limitation Talks) to “START” (Strategic Arms Reduction Talks).

On June 3, 1981, William Thomas launched the White House Peace Vigil in Washington, D.C.. He was later joined on the vigil by anti-nuclear activists Concepcion Picciotto and Ellen Benjamin.

On June 12, 1982, one million people demonstrated in New York City’s Central Park against nuclear weapons and for an end to the cold war arms race. It was the largest anti-nuclear protest and the largest political demonstration in American history.International Day of Nuclear Disarmament protests were held on June 20, 1983 at 50 sites across the United States.In 1986, hundreds of people walked from Los Angeles to Washington DC in the Great Peace March for Global Nuclear Disarmament.There were many Nevada Desert Experience protests and peace camps at the Nevada Test Site during the 1980s and 1990s.

On May 1, 2005, 40,000 anti-nuclear/anti-war protesters marched past the United Nations in New York, 60 years after the atomic bombings of Hiroshima and Nagasaki. In 2008, 2009, and 2010, there have been protests about, and campaigns against, several new nuclear reactor proposals in the United States.

There is an annual protest against U.S. nuclear weapons research at Lawrence Livermore National Laboratory in California and in the 2007 protest, 64 people were arrested. There have

been a series of protests at the Nevada Test Site and in the April 2007 Nevada Desert Experience protest, 39 people were cited by police. There have been anti-nuclear protests at Naval Base Kitsap for many years, and several in 2008.

What the future holds

Eliminating nuclear weapons has long been an aim of the pacifist politicians. But now many mainstream politicians, academic analysts, and retired military leaders also advocate nuclear disarmament. Sam Nunn, William Perry, Henry Kissinger, and George Shultz have called upon governments to embrace the vision of a world free of nuclear weapons, and in three Wall Street Journal opeds proposed an ambitious program of urgent steps to that end. The four have created the Nuclear Security Project to advance this agenda. Nunn reinforced that agenda during a speech at the Harvard Kennedy School on October 21, 2008, saying, "I'm much more concerned about a terrorist without a return address that cannot be deterred than I am about deliberate war between nuclear powers. You can't deter a group who is willing to commit suicide. We are in a different era. You have to understand the world has changed." In 2010, the four were featured in a documentary film entitled Nuclear Tipping Point.

The film is a visual and historical depiction of the ideas laid forth in the Wall Street Journal op-eds and reinforces their commitment to a world without nuclear weapons and the steps that can be taken to reach that goal.

Global Zero is an international non-partisan group of 300 world leaders dedicated to achieving nuclear disarmament.The initiative, launched in December 2008, promotes a phased withdrawal and verification for the destruction of all devices held by official and unofficial members of the nuclear club. The Global Zero campaign works toward building an international consensus and a sustained global movement of leaders and citizens for the elimination of nuclear weapons. Goals include the initiation of United States-Russia bilateral negotiations for reductions to 1,000 total warheads each and commitments from the other key nuclear weapons countries to participate in multilateral negotiations for phased reductions of nuclear arsenals. Global Zero works to expand the diplomatic dialogue with key governments and continue to develop policy proposals on the critical issues related to the elimination of nuclear weapons.

The International Conference on Nuclear Disarmament took place in Oslo in February, 2008, and was organized by The Government of Norway, the Nuclear Threat Initiative and the Hoover Institute. The Conference was entitled Achieving the Vision of a World Free of Nuclear Weapons and had the purpose of building consensus between nuclear weapon states and non-nuclear weapon states in relation to the Nuclear Non-proliferation Treaty.

The Tehran International Conference on Disarmament and Non-Proliferation took place in Tehran in April 2010. The conference was held shortly after the signing of the New START, and resulted in a call of action toward eliminating all nuclear weapons. Representatives from 60 countries were invited to the conference. Non-governmental organizations were also present.

Among the prominent figures who have called for the abolition of nuclear weapons are "the philosopher Bertrand Russell, the entertainer Steve Allen, CNN's Ted Turner, former Senator Claiborne Pell, Notre Dame president Theodore Hesburgh, South African Bishop Desmond Tutu and the Dalai Lama".

Others have argued that nuclear weapons have made the world relatively safer, with peace through deterrence and through the stability–instability paradox, including in south Asia.

Kenneth Waltz has argued that nuclear weapons have created a nuclear peace, and further nuclear weapon proliferation might even help avoid the large scale conventional wars that were so common prior to their invention at the end of World War II. In the July 2012 issue of Foreign Affairs Waltz took issue with the view of most U.S., European, and Israeli, commentators and policymakers that a nuclear-armed Iran would be unacceptable. Instead Waltz argues that it would probably be the best possible outcome, as it would restore stability to the Middle East by balancing Israel's regional monopoly on nuclear weapons. Professor John Mueller of Ohio State University, the author of Atomic Obsession, has also dismissed the need to interfere with Iran's nuclear program and expressed that arms control measures are counterproductive.

During a 2010 lecture at the University of Missouri, which was broadcast by C-SPAN, Dr. Mueller has also argued that the threat from nuclear weapons, especially nuclear terrorism, has been exaggerated, both in the popular media and by officials.

Former Secretary Kissinger says there is a new danger, which cannot be addressed by deterrence: "The classical notion of deterrence was that there was some consequences before which aggressors and evildoers would recoil. In a world of suicide bombers, that calculation doesn't operate in any comparable way".George Shultz has said, "If you think of the people who are doing suicide attacks, and people like that get a nuclear weapon, they are almost by definition not deterrable".

Andrew Bacevich wrote that there is no feasible scenario under which the US could sensibly use nuclear weapons. "For the United States, they are becoming unnecessary, even as a deterrent. Certainly, they are unlikely to dissuade the adversaries most likely to employ such weapons against us — Islamic extremists intent on acquiring their own nuclear capability. If anything, the opposite is true. By retaining a strategic arsenal in readiness (and by insisting without qualification that the dropping of atomic bombs on two Japanese cities in 1945 was justified), the United States continues tacitly to sustain the view that nuclear weapons play a legitimate role in international politics … ."

In The Limits of Safety, Scott Sagan documented numerous incidents in US military history that could have produced a nuclear war by accident. He concluded, "while the military organizations controlling U.S. nuclear forces during the Cold War performed this task with less success than we know, they performed with more success than we should have reasonably predicted. The problems identified in this book were not the product of incompetent organizations. They reflect the inherent limits of organizational safety. Recognizing that simple truth is the first and most important step toward a safer future."

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