2020

BALLISTIC AND CRUISE MISSILE THREAT

DEFENSE INTELLIGENCE BALLISTIC MISSILE ANALYSIS COMMITTEE

KEY FINDINGS

Many countries view ballistic and cruise missile systems as cost-effective weapons and symbols of national power, especially when those systems are armed with weapons of mass destruction. However, numerous types of ballistic and cruise missiles have achieved dramatic improvements in accuracy that allow them to be used effectively with conventional warheads. Some weapon systems have characteristics of both ballistic and cruise missiles. For example, ballistic missile-launched hypersonic glide vehicles (HGVs) can maneuver in the atmosphere similar to cruise missiles, and future supersonic/hypersonic cruise missiles may be launched by large rocket boosters. Highly accurate ballistic and cruise missiles can be used to deter or counter adversary forces deploying to or operating within a defined space or theater.

Russia SS-27 ICBM TEL

NORTH KOREA

North Korea has a strong desire to develop long-range ballistic missile systems that can threaten the United States and its allies. During a 2012 military parade, North Korea unveiled its first intercontinental ballistic missile (ICBM), the Hwasong-13, and subsequently debuted the Hwasong-14 ICBM in an October 2015 parade. Flight testing of the Hwasong-10 (Musudan) intermediate-range ballistic missile (IRBM) began in April 2016 with a series of failures. North Korea followed those failures by launching multiple new missiles in 2017. In April 2017, North Korea also commenced flight testing of a new liquid-propellant IRBM, the Hwasong-12. That same year, North Korea performed the inaugural flight tests of the Hwasong-14 and Hwasong-15 ICBMs. Upon its launch in 2017, the Hwasong-14 marked the first flight-tested ICBM-class missile for North Korea. North Korea also flight tested several new solid-propellant missiles—including the Pukguksong-1 submarine-launched ballistic missile (SRBM), the Pukguksong-2 medium-range ballistic missile (MRBM), and short-range ballistic missiles (SRBM) - in 2016, 2017, and 2019, respectively.

IRAN

Tehran's desire to have a strategic counter to the United States could drive it to field an ICBM. Progress in Iran's space program could shorten a pathway to an ICBM, because space launch vehicles (SLV) use inherently similar technologies. Since 2008, Iran has conducted multiple launches of the two-stage Safir SLV, and the larger two-stage Simorgh SLV, which could serve as a test bed for developing ICBM technologies. Iran has developed the Qiam-1 SRBM and the fourth-generation Fateh-110 SRBM, and Tehran claims to be mass-producing ballistic missiles capable of striking ships. Iran has modified its Shahab 3 MRBM to extend its range and effectiveness and also claims to have deployed the two-stage, solid-propellant Sejjil MRBM. In 2015, Iran publicized the launch of the Emad-1, which officials claim is Iran's first long-range missile that is guided throughout flight and capable of hitting its targets with high-precision. Iranian officials have also announced plans for an Emad-2 with greater precision, as well as a new Sejjil that can be guided all the way to the target. In 2019, Iran publicized the launch of the Khorramshahr-2, which officials claim is Iran's deadliest long-range missile, using the fins installed on the warhead to enable guidance throughout flight. Iran is also developing a ground-launched land-attack cruise missile (LACM).

CHINA

China continues to have the most active and diverse ballistic missile development program in the world. It is developing and testing offensive missiles, forming additional missile units, upgrading missile systems, and developing methods to counter ballistic missile

defenses. China's deployed ballistic missile force, operated by the People's Liberation Army (PLA) Navy and PLA Rocket Force (formerly known as Second Artillery), is expanding in both number and diversity of system. China continues to field conventionally-armed SRBMs such as the CSS-6 (DF-15) and the CSS-7 (DF-11) opposite Taiwan, and has developed a number of mobile, conventionally-armed MRBMs and IRBMs. Missiles such as the CSS-11 (DF-16), CSS-22 (DF-17), CSS-5 Mod 4 (DF-21C) and Mod 5 (DF-21D), and CSS-18 (DF-26) are key components of the Chinese military modernization program, specifically designed to prevent adversary military forces' access to regional conflicts. The CSS-5 Mod 5 and a variant of the CSS-18 have anti-ship missions. China is also developing a shipborne anti–ship ballistic missile (ASBM) for export. China has ground and air-launched LACMs.

China CJ-10 & YJ-63 LACMs

China's nuclear-armed missile force is also expanding with the number of Chinese ICBM nuclear warheads capable of reaching the United States potentially expanding to well over 200 within the next 5 years. China is adding the CSS-10 Mod 2 (DF-31A) and CSS-4 Mod 3 (DF-5B) to the ICBM force; the DF-5B is China's first ICBM with multiple independently-targetable reentry vehicles (MIRVs). The CSS-N-14 SLBM gives China its first long-range, sea-based nuclear capability. China is also developing the CSS-20 (DF-41), a new MIRV-capable, road-mobile ICBM and the DF-31AG road-mobile ICBM. China attributed both nuclear and conventional missions to the CSS-18 displayed for the first time during the Victory Day Parade in September 2015.

China CSS-20 (DF-41) ICBMs

RUSSIA

Russia has approximately 1,400 deployed nuclear warheads on ICBMs and SLBMs capable of reaching the United States. Despite arms control limitations and resource constraints, development of new ICBM and SLBM systems is proceeding, and Russia is expected to retain the largest force of strategic ballistic missiles outside the United States. Testing of equipment associated with RS-26 Rubezh, which according to the Strategic Rocket Forces commander is based on the SS-27 ICBM, continued in 2018. The BULAVA SLBM was deployed on the new DOLGORUKIY-class SSBNs. Officials have stated that Russia is set to begin flight testing a new heavy, liquid-propellant ICBM called the Sarmat after multiple successful ejection tests of the missile during 2017 and 2018. In late 2019, Russia deployed the world's first ICBM-class hypersonic glide vehicle (HGV) system, the SS-19 Mod-4 Avangard. Russia also has various LACMs that can be launched from airborne, road-mobile, and naval platforms. According to open press reports, Russia has used air- and naval-launched LACMs several times in Syria.

China CSS-22 (DF-17) MRBM

Hypersonic Glide Vehicles (HGVs)

An emerging class of weapons that fly in the atmosphere following acceleration to hypersonic speeds by ballistic missile boosters.

THE THREAT

Guided cruise and ballistic missiles were first used when Germany attacked targets in England and Northern Europe with V-1 cruise missiles and V-2 ballistic missiles during World War II. Although these missiles were inaccurate, their use resulted in tens of thousands of Allied civilians being killed or injured, with substantial psychological effects.

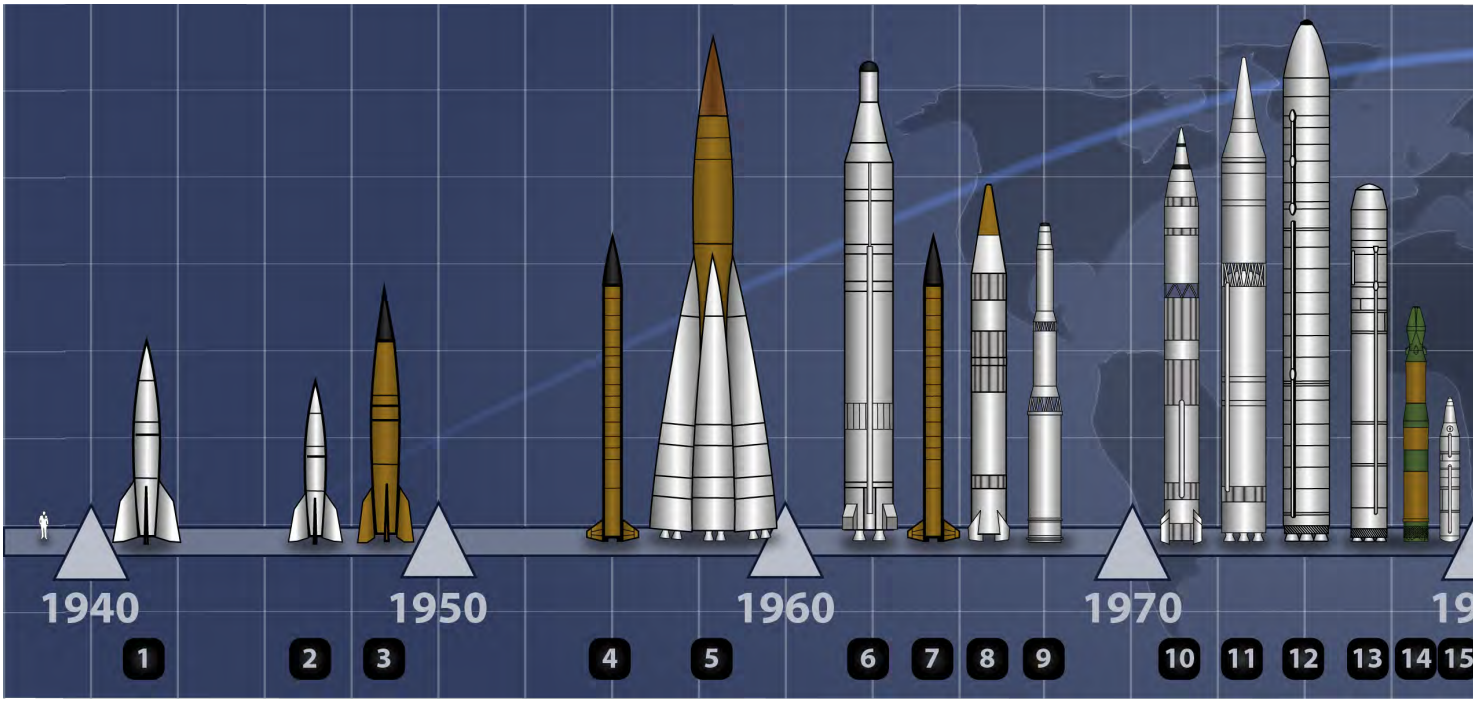
Ballistic and cruise missiles present a significant threat to US and Allied forces overseas, and to the United States homeland and territories. Missiles are attractive to many nations as they can be used effectively against an adversary with a formidable air defense system when an attack with manned aircraft would be impractical or too costly. In addition, missiles can be used as a deterrent or an instrument of coercion. Missiles also have the advantage of fewer maintenance, training, and logistic requirements than manned aircraft. Even limited use of these weapons could have devastating consequences if armed with chemical, biological, or nuclear warheads.

The ballistic and cruise missile threat continues to increase with the advancement and proliferation of missile technology. Missiles will continue to be a threat in future conflicts involving US forces. Ballistic missiles have been used in several conflicts over the last 30 years, including the Iran-Iraq war, the Afghan civil war, the war in Yemen, the 1991 and 2003 Persian Gulf conflicts, the Russian military actions in Chechnya and Georgia, in the conflicts in Syria and Ukraine, and most recently Iran against US forces in Iraq on 8 January 2020. Russia used land-attack cruise missiles for the first time during the conflict in Syria.

The US Armed Forces are responsible for countering the ballistic and cruise missile threat through deterrence, and if necessary active suppression. Threat suppression may include attacks on missile systems, both before launch and during flight, and attacks on their supporting infrastructure. This document includes information on a variety of the major current and projected foreign ballistic and cruise missiles.

The table and timeline depict selected ballistic missiles to highlight first flight tests, discovery of notable systems, and significant development achievements for various countries.

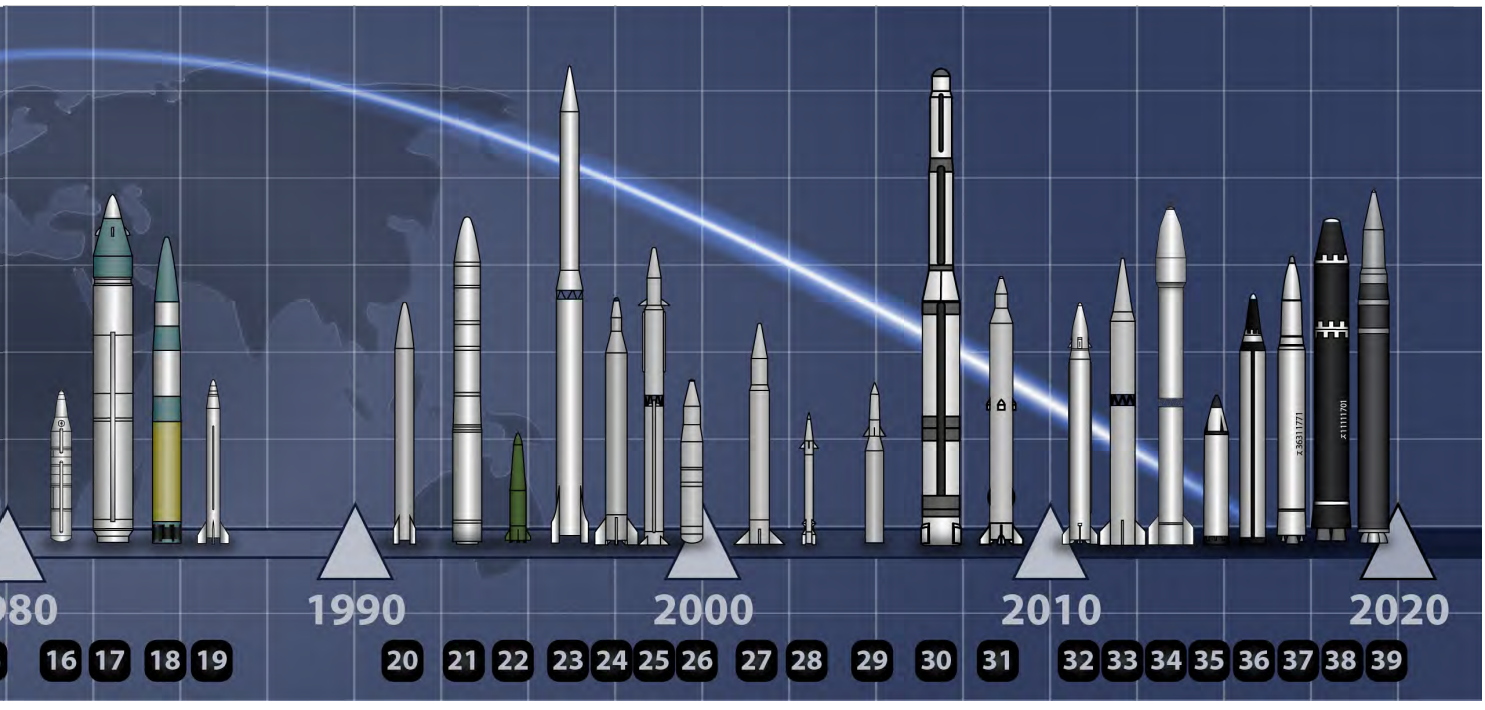
KEY BALLISTIC MISSILE SYSTEM HIGHLIGHTS



HISTORY OF NOTABLE BALLISTIC MISSILE SYSTEMS DEVELOPMENT

#	System	Country	Year	Range (km)
1	V-2 SRBM	Germany	1942	320
2	SS-1 SRBM	Soviet Union	1948	270
3	SS-2 SRBM	Soviet Union	1949	1,200
4	SS-3 MRBM	Soviet Union	1955	1,200
5	SS-6 ICBM	Soviet Union	1957	8,000+
6	SS-9 ICBM	Soviet Union	1963	10,200+
7	CSS-1 MRBM	China	1964	1,250
8	CSS-2 MRBM	China	1966	2,500
9	SS-13 ICBM	Soviet Union	1966	9,500
10	CSS-3 ICBM	China	1970	5,500+
11	CSS-4 ICBM	China	1971	12,000+
12	SS-18 ICBM	Russia	1973	10,000+
13	SS-19 ICBM	Russia	1973	9,000+
14	SS-20 IRBM	Russia	1976	5,500
15	CSS-5 MRBM	China	Late 1970s	1,750+
16	JL-1 SLBM	China	1981	1,700
17	SS-24 ICBM	Russia	1982	10,100+
18	SS-25 ICBM	Russia	1983	11,000+
19	SCUD-B SRBM	North Korea	1984	300
20	No Dong MRBM	North Korea	1993	1,200+

#	System	Country	Year	Range (km)
21	SS-27 ICBM	Russia	1994	11,000+
22	SS-26 SRBM	Russia	1996	350
23	Taepo Dong- MRBM	North Korea	1998	2,000+
24	Shahab 3 MRBM	Iran	1998	Up to 2,000
25	Agni-II MRBM	India	1999	2,000+
26	CSS-10 ICBM	China	1999	7,000+
27	Agni-I SRBM	India	2002	700
28	Fateh-110 SRBM	Iran	2002	300
29	CSS-5 Mod 5 MRBM	China	Mid-2000s	1,500+
30	Taepo Dong 2 ICBM/SLV	North Korea	2006	12,000+
31	Sejjil MRBM	Iran	2009	2,000
32	Emad-1 MRBM	Iran	2015	Up to 2,000
33	Shaheen-3 MRBM	Pakistan	2015	2,750
34	Ababeel IRBM	Pakistan	2017	2,200
35	Pukguksong-2 MRBM	North Korea	2017	1,000+
36	Hwasong-12 IRBM	North Korea	2017	4,500+
37	Hwasong-14 ICBM	North Korea	2017	10,000+
38	Hwasong-15 ICBM	North Korea	2017	12,000+
39	SS-19 Mod-4 ICBM/HGV	Russia	2019	10,000+



WARHEADS AND TARGETS

Ballistic and cruise missiles can be armed with conventional or nonconventional warheads. Conventional warheads rely on the detonation of an explosive and are designed for various effects. Nonconventional warheads include weapons of mass destruction (nuclear, biological, and chemical weapons) and non-lethal warheads that are designed to disable equipment rather than harm personnel. Conventional, biological, and chemical weapons are packaged in unitary (single) warheads or submunitions (multiple small bomblets that are released at altitude to disperse over an area).

Conventional warheads are optimized for specific types of targets. For example, submunitions may be used to create craters in an airfield runway or a carrier flight deck, optimize the dispersal of anti-personnel munitions, or deploy non-lethal substances. Various penetrator warheads can be employed to damage hardened or underground facilities and equipment. A kinetic penetrator, which uses a relatively small amount of explosive surrounded by a heavy metal casing, can pass through a hardened structure, such as a bunker, to destroy its contents. A tandem penetrator can utilize an explosively formed projectile to create a pilot hole that a follow-through grenade can pass. These penetrators are likely effective against metallic structures such as hangars and carrier decks.

Russia SS-N-32 Bulava SLBM

Many ballistic missiles and several types of LACMs carry nuclear warheads. Most of these warheads have an explosive force that far exceeds the destructive power of the atomic bombs used in World War II.

Chemical and biological weapons are attractive to some countries because they are much easier to produce than nuclear weapons. Accuracy is not very important for these weapons when used against urban areas or large concentrations of military forces. Chemical and biological weapons can be packaged in submunitions to be dispersed over a wide area, although effective dispersion from a ballistic missile can be challenging. They are capable of producing massive casualties, inducing panic and chaos in civilian populations, and severely degrading military operations.

North Korea Hwasong-12 IRBM

Russia BEAR H with Kh-101 LACMs

Russia SS-21 CRBM

Iran Zolfaghar SRBM

North Korea Hwasong-10 (Musudan) IRBM

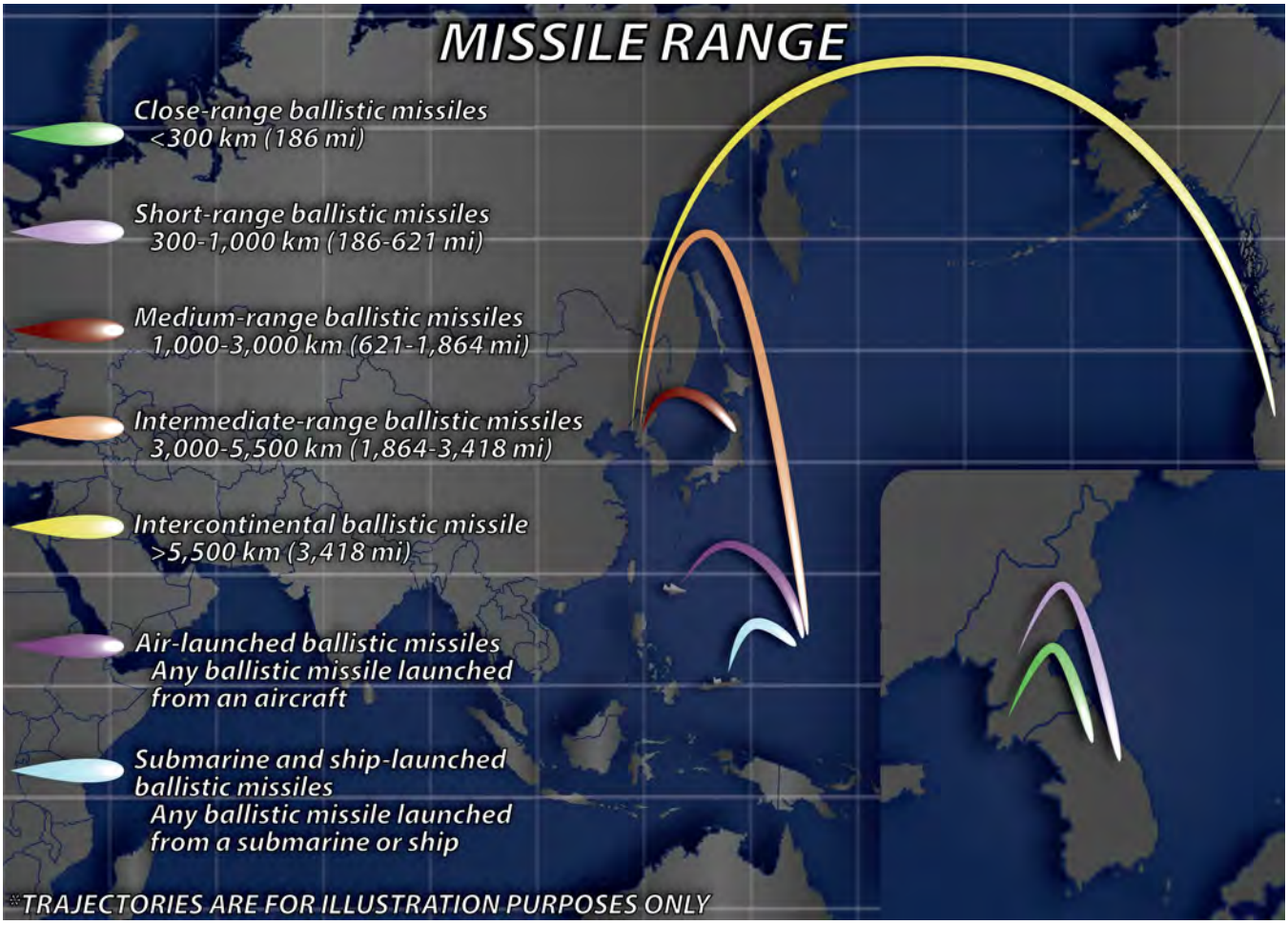
North Korea Hwasong-15 ICBM

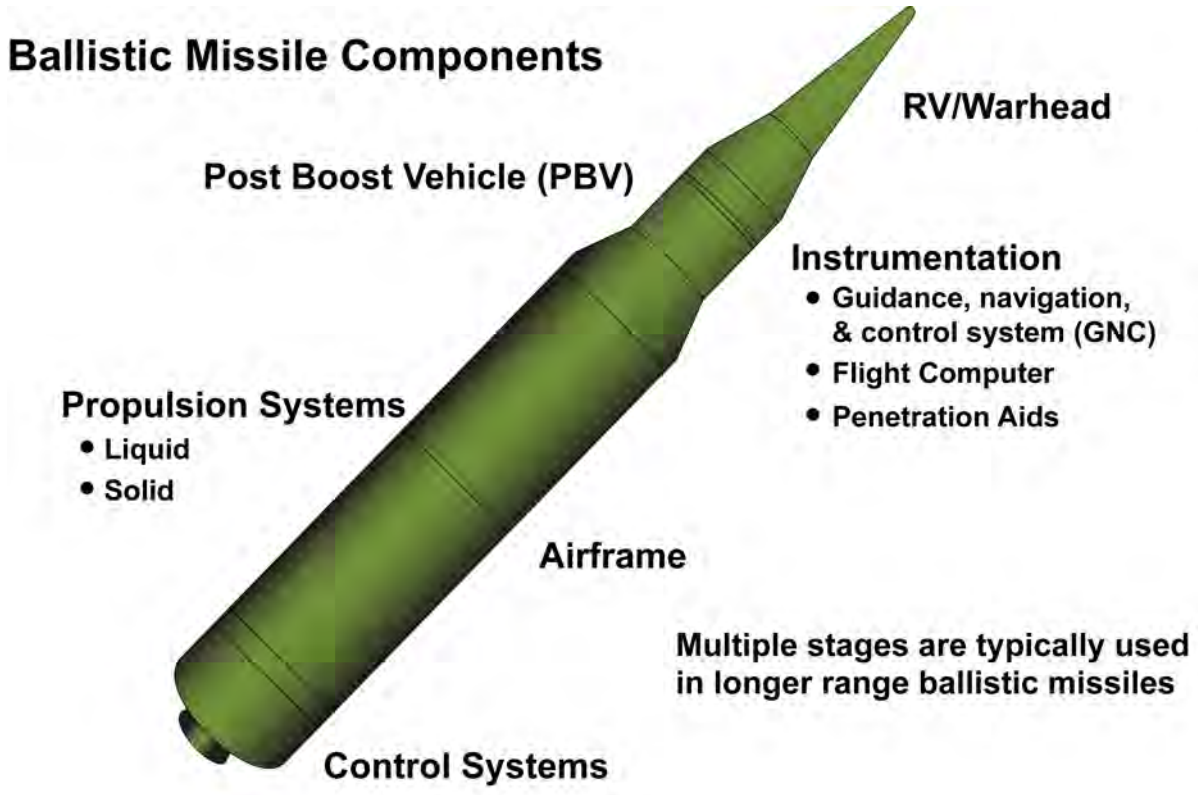
BALLISTIC MISSILES

Ballistic missiles can be deployed in silos and other fixed facilities, on submarines, surface ships, road- and rail-mobile launchers and on aircraft. Mobile missiles can provide greater pre-launch survivability. The last decade has seen a dramatic increase in ballistic missile capabilities and combat effectiveness.

Some shorter range missiles remain intact until the warhead detonates, whereas, others have a warhead in a reentry vehicle (RV) that separates from the booster. Most long-range ballistic missiles also feature separating payloads, with some long-range ballistic missiles carrying up to 10 RVs per missile. RVs reenter the Earth's atmosphere at very high velocities, on the order of 6-8 kilometers per second (Mach 23+) at ICBM ranges. Some types of reentry vehicles have the capability to maneuver to avoid defenses and/or increase accuracy. Hypersonic glide vehicles (HGVs) are being developed as a new type of payload launched by ballistic missiles. HGVs are maneuverable vehicles that travel at hypersonic (greater than Mach 5) speed and spend most of their flight at much lower altitudes than a typical ballistic missile. The combination of high speed, maneuverability, and relatively low altitude makes them challenging targets for missile defense systems. Russia deployed the worlds first HGV in 2019, and China publicly revealed a missile carrying an HGV, also in 2019.

Ballistic missiles can use solid- or liquid-propellant rocket propulsion systems. The trend in modern missile systems has been toward the use of solid propellants because of their reduced logistical requirements and simplicity of operation. However, some nations have greater access to liquid-propellant technology and continue to develop new liquid-propellant missiles. In addition, liquid-propellant missiles can be more efficient than solid-propellant missiles for very heavy payloads. The missiles with the world's heaviest payloads, the Russian SS-18 and Chinese CSS-4, are liquid-propellant ICBMs, and Russia is developing a new heavy-lift, liquid-propellant ICBM called the Sarmat.





Multi-stage missiles, with each stage having its own independent propulsion system, are more efficient for longer range missions. ICBMs typically have two or three stages, with powerful liquid-propellant engines or solid-propellant motors to propel the payload toward its target, and a post-boost vehicle (PBV) with a much smaller propulsion system. A PBV can be used to improve the RV deployment accuracy for a single-RV missile. For a missile with a MIRV payload, the PBV is used to release RVs so that they follow different trajectories, allowing them to hit separate targets. Certain ICBMs with MIRV payloads can hit targets separated by over 1,500 kilometers with a single missile.

Many ballistic missiles carry penetration aids to improve the chances of an RV defeating a ballistic missile defense system. Penetration aids are devices intended to deceive, obscure, or jam sensors used to detect and track missiles and RVs. They are of increasing importance to countries developing and operating ballistic missiles. Other techniques that complicate missile defense operations include separating payloads, multiple RVs, depressed trajectories, and boost-phase, midcourse, or terminal maneuvers.

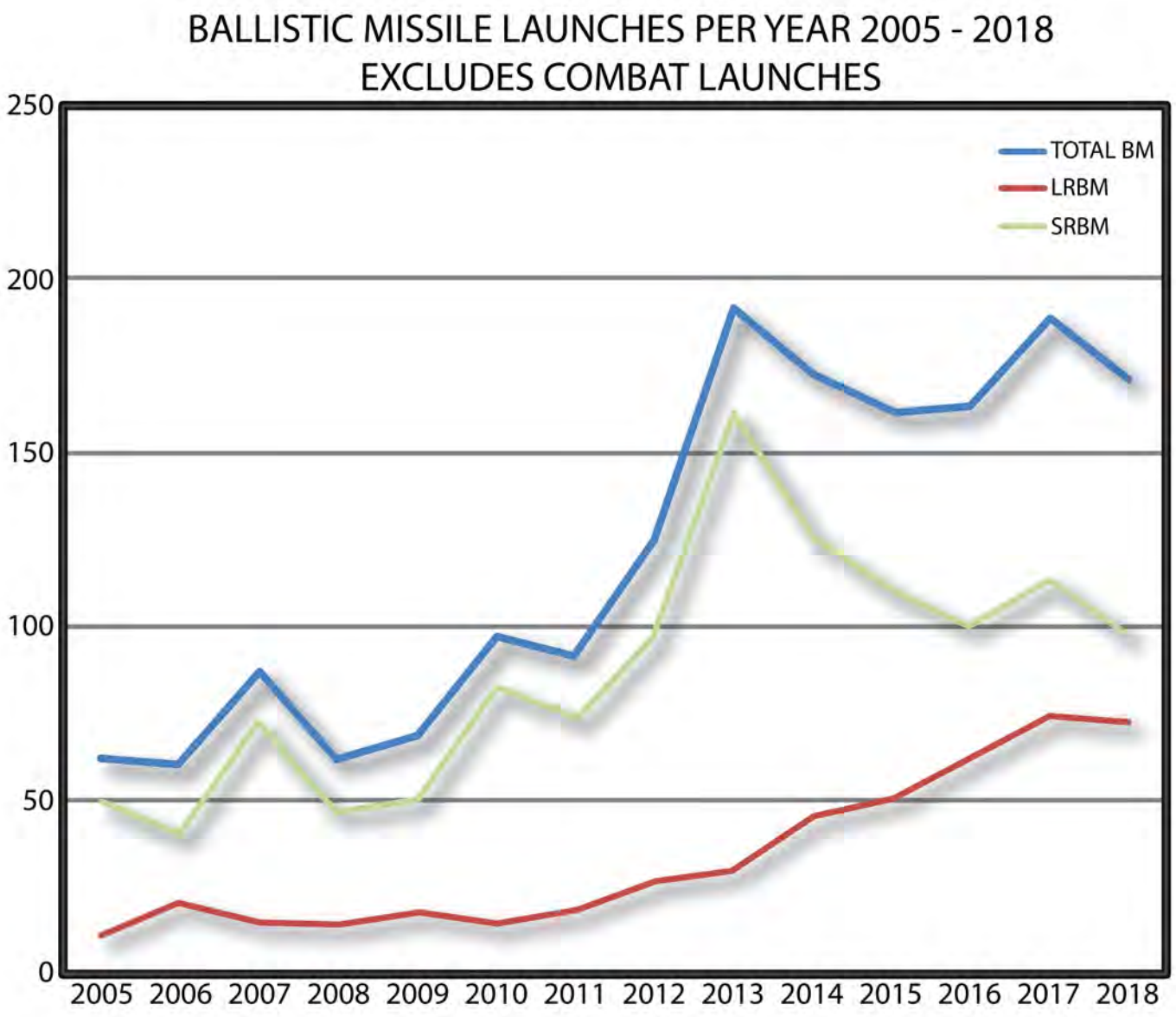
An ICBM with a high-quality inertial guidance system is capable of delivering an RV within a few hundred meters of the target after a flight of 10,000 kilometers. For many missiles, accuracy can be greatly improved by utilizing satellite-aided navigation. Missiles also can use maneuvering RVs with terminal sensors to attain very high accuracy. The use of improved guidance techniques and a maneuver capability can allow conventionally-armed ballistic missiles to be used effectively against many fixed targets, as well as moving targets such as ships at sea.

As increasingly modern guidance technology is proliferated, countries will be able to improve the accuracy and lethality of their missile forces. However, even a missile with a guidance system only accurate enough to hit a large city is capable of inflicting massive casualties when armed with a weapon of mass destruction.

LAUNCH TRENDS

Over the last decade, there has been a significant increase in worldwide ballistic missile testing. The emphasis on ballistic missile development around the world is noted by Chinese scholars who stated in 2010 that, "ballistic missiles have become an important factor that influences the world political setup, controls the battlefield posture, and even decides the outcome of war" and "it is appropriate to say that ballistic missiles have become an important sign of national defense strength and symbol of national status."

The graphic below depicts the approximate number of ballistic missiles launched per year from 2005 to 2018. In the graphic, ballistic missiles are categorized by range, regardless of launch platform; missiles with a range of 1,000 km or greater are classified as long-range ballistic missiles (LRBM) and missiles with a range from 300 km – 1,000 km are classified as short-range ballistic missiles (SRBM). This graphic does not include close-range ballistic missiles (CRBM), which are missiles with a range less than 300 km, or ballistic missiles launched in combat.



Iran Qiam-1 SRBM

Russia SS-25 ICBM

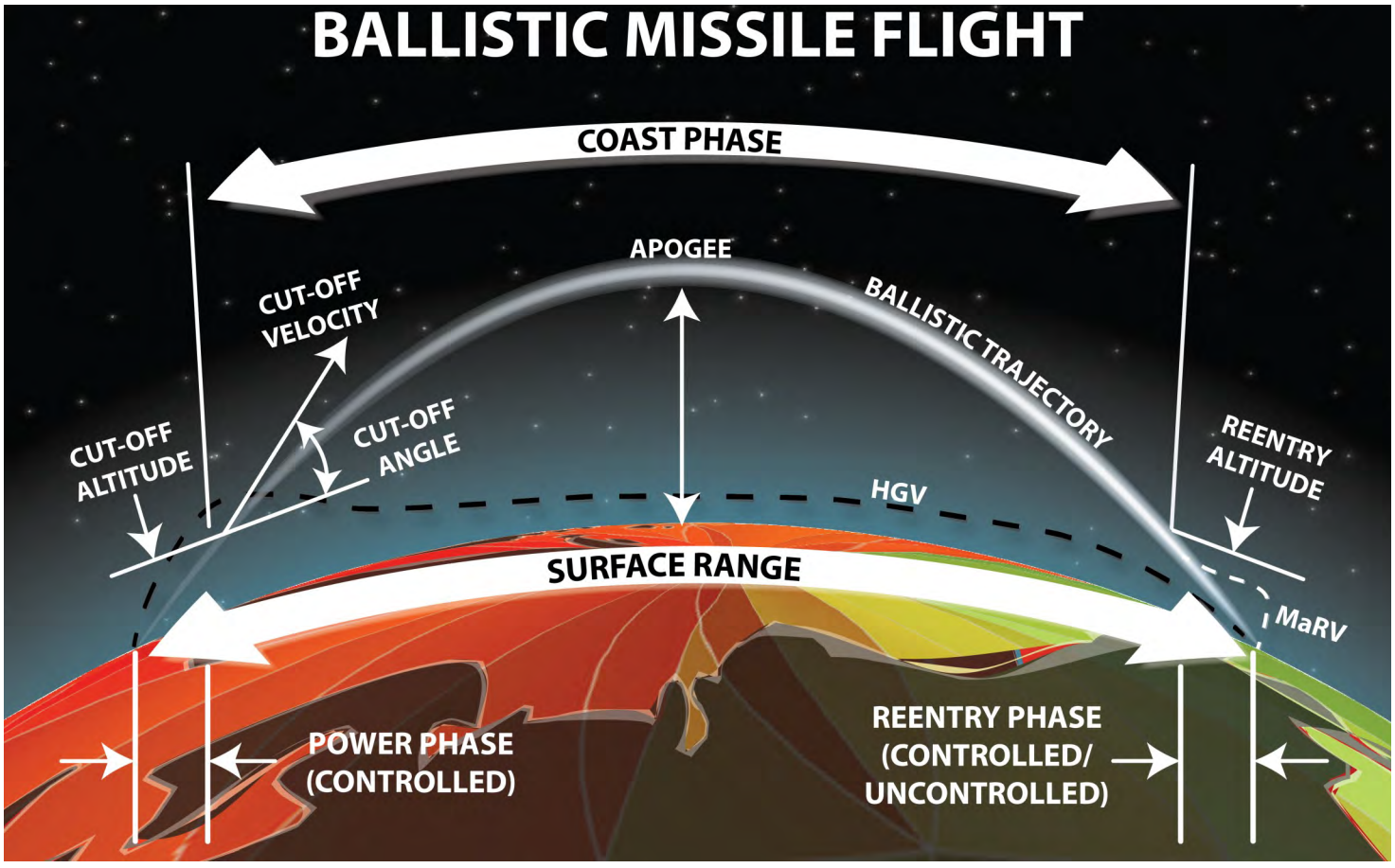
Russia SS-18 Mod 5 ICBM

North Korea Hwasong-14 ICBM

IN-FLIGHT MANEUVERABILITY, ACCURACY, & DEFENSE PENETRATION

Traditionally, a ballistic missile is understood to be a projectile that assumes a free-fall trajectory after a boost phase using internal guidance. Some newer "ballistic" missiles are stretching this definition as they move beyond purely ballistic trajectories, and are including maneuvers during flight and various means to increase accuracy. Some missiles today have characteristics of both ballistic and cruise missiles. Modern ballistic missiles can include maneuvers during boost, midcourse, and/or terminal phases of flight. Some ballistic missiles payloads remain in the atmosphere for large portions of their flight with control provided by aerodynamic surfaces. In-flight maneuvers, combined with guidance updates, can allow ballistic missiles to be precision strike weapons.

Nearly all of our adversaries are concerned with US missile defenses and have devised various methods to complicate missile defense operations. Traditional countermeasures include penetration aids such as balloons, chaff, decoys, and jammers, whereas in-flight maneuverability or multiple RVs serve as more modern forms of missile defense countermeasures.



Russia SS-18 Mod 5 ICBM Launch Canister

Pakistan Shaheen-2 MRBM

Iran Emad-1 MRBM

Russia SS-27 Mod 2 ICBM

CLOSE-RANGE BALLISTIC MISSILES (CRBM)

Iran CSS-8 CRBM

States including Russia, China, North Korea, Pakistan, India, and Iran are likely pursuing increased accuracy, range, and lethality for their close-range ballistic missile systems. China is likely marketing and/or producing multiple CRBMs with a maximum range of just under 300 km and marketing the B611MR and WS-640 CRBMs, which are equipped with an anti-radiation homing seeker. CRBM variants currently in research and development (R&D) or in production worldwide are included in the chart on page 15.

China and Russia are producing and marketing CRBMs with various warheads. These warheads likely include dual-purpose improved conventional munition (DPICM), thermobaric, and high explosive

China BP-12A CRBM

India Prithvi II CRBM

warheads. The improved accuracy of CRBMs, as compared to unguided artillery rockets, increases the probability that the warhead blast-wave or the warhead's fragments will reach the intended target and neutralize it.

Iran and North Korea are likely progressing towards producing the Fadjr-5 Aero CRBM and KN-SS-9, respectively. If the Iranians and North Koreans use satellite navigation systems (such as GPS) onboard their CRBMs, then the miss distance of these CRBMs could be reduced to tens of meters. Increased CRBM accuracy would be a force multiplier for both the Iranian and North Korean artillery forces by giving them precision strike capability against high priority targets.

Russia SS-21 Mod 3 CRBM

Russia SS-21 Mod 2

Pakistan Hatf-9

China BRE7

China M20

CLOSE-RANGE BALLISTIC MISSILES

COUNTRY/SYSTEMS	MAX RANGE (km)
BRAZIL	
SS-150	150
CHINA	
WS-22	40
BRE7/Fire Dragon 40	40
GR1/King Dragon 60	70
BRC-3 (300-mm PHL-03/AR2/AR1/AR1A/AR3)	70
A100-111	80
A100-311	120
WS-64	280
BRC-4 (300-mm PHL-03/AR2/AR1/AR1A/AR3)	130
BRE-2(300-mm PHL-03/AR2/AR1/AR1A/AR3)	150
BRE-3/Fire Dragon 140 (300-mm PHL-03/AR2/AR1/AR1A/AR3)	150
BP-12A	280
B611	150
M20	280
WS-2 (HE, TBX, DPICM)	200
WS-3	200
A300	280
B611M	260
BRE-8/Fire Dragon 280 (370-mm AR3)	280
INDIA	
Pinaka-II Guided	65
Prithvi I	150
Prahar	150
Prithvi II	250
IRAN	
Fadjr-5 Aero	>75
CSS-8	150
Zelzal	250
SYRIA	
SS-21 Mod 2	70

COUNTRY/SYSTEMS	MAX RANGE (km)
ISRAEL	
Romach (“Magic Spear”)	35
STRIKES	40
ACCULAR	40
MLRS-TCS	45
JUMPER	50
ExTRA (HE, Cluster, Penetration, MIMS)	150
Predator Hawk	250
LORA	300
NORTH KOREA	
Toksa	120
KN-SS-9	200
PAKISTAN	
Hatf-1	50
NASR (Hatf-9)	60
Abdali (Hatf-2)	200
RUSSIA	
122-mm Guided	40
SS-21 Mod 2	70
9M55 (F, K, K1, K3, K4, K5, K6, K7, S)	70
9M5 (25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37)	90
SS-21 Mod 3	120
9M542	120
SERBIA	
Guided 128-mm	21
Jerina-1	285
SOUTH KOREA	
130 MM CRBM	36
Chunmoo I 239-mm CRBM	80
Chunmoo-II 400-mm CRBM	180
Chunmoo III 600-mm CRBM	290
THAILAND	
DTI-1G	150
TURKEY	
TRG-122 CRBM	35
“Tiger” 300-mm CRBM	120
TRG-230 CRBM	70
Bora	280

Note: All ranges are approximate.

SHORT-RANGE BALLISTIC MISSILES (SRBM)

Russia SS-26 SRBM

Several countries are now producing and/or developing SRBM systems, while many other countries have purchased SRBMs or SRBM technologies.

The Russian SS-1C Mod 1, also called the SCUD B, has been exported to more countries than any other type of guided ballistic missile, and has proven to be a versatile and adaptable weapon. For example, the Iraqi SCUD missiles used during the 1991 Persian Gulf War were modified to double their range. North Korea has produced its own version of the SCUD B and developed extended range variants including the SCUD C, the SCUD D, and the SCUD ER.

New SRBM systems are in development in several countries. China has deployed a very large force of modern solid-propellant SRBMs in the vicinity of Taiwan. In August 2010, Iranian officials hailed the successful test firing of the liquid-propellant Qiam-1 SRBM. Around the same time, the Iranian Minister of Defense told reporters that the third generation of the Fateh-110 missile had been successfully test fired, and that the system was officially delivered to the missile force in September 2010. North Korea began testing three new solid-propellant SRBMs in 2019, each with multiple missiles per launcher.

In 2012, Iran claimed to have also successfully flight tested a fourth-generation Fateh-110. Iran has also flight tested an anti-ship capable variant of its Fateh-110 missile. A seeker has likely been added to the missile to improve the system's accuracy against sea-based targets. Iran is also fielding newer longer-range solid-propellant SRBMs including the Zolfaghar and Fateh-313.

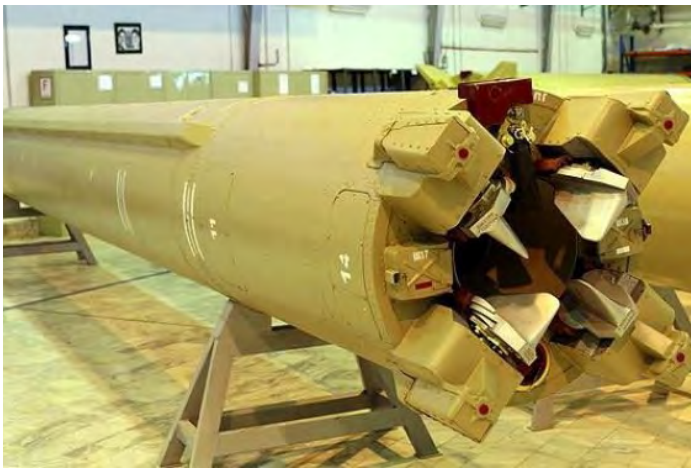
Recent conflicts have highlighted missile defense capabilities, motivating ballistic missile developers to pursue missile defense countermeasures. Some SRBM

India Agni I SRBM

China CSS 7-Mod 2 SRBM

developers have already begun to develop countermeasures such as maneuverable RVs (MaRVs), and are expected to continue countermeasure development. Iran also added a MaRV to the Qiam missile, likely to improve the systems overall accuracy.

On 7 January 2020, Iran launched at least 15 SRBMs at U.S. forces in Iraq in retaliation for the death of Qasem Soleimani. Those missiles included the Fateh-313 and the Qiam with a MaRV and demonstrated the accuracy of these two systems as they impacted near buildings and equipment on Al Asad Air Base.



Iran Qiam-1 SRBM Jet Vane System

China CSS-6 Mod 3 SRBM

Multi-Country SCUD-C SRBM

Pakistan Ghaznavi SRBM

Russia SS-26 Iskander SRBM

China CSS-11 Variants

SHORT-RANGE BALLISTIC MISSILES

COUNTRY/SYSTEMS	PROPELLANT	DEPLOYMENT MODE	MAXIMUM RANGE (km)	NUMBER OF LAUNCHERS*
CHINA				
CSS-6 Mod 1	Solid	Road-Mobile	600	More than 200
CSS-6 Mod 2	Solid	Road-Mobile	850+	
CSS-6 Mod 3	Solid	Road-Mobile	725+	
CSS-7 Mod 1	Solid	Road-Mobile	300	
CSS-7 Mod 2	Solid	Road-Mobile	600	
CSS-11 Mod 1	Solid	Road-Mobile	700+	
CSS-11 Mod 2	Solid	Road-Mobile	700+	
INDIA				
Agni I	Solid	Road-Mobile	700	Fewer than 75
IRAN				
Fateh-110	Solid	Road-Mobile	300	Fewer than 100
Fateh-313	Solid	Road-Mobile	500	
Shahab 1	Liquid	Road-Mobile	300	
Shahab 2	Liquid	Road-Mobile	500	
Qiam-1	Liquid	Road-Mobile & Silo	750	
Zolfaghar	Solid	Road-Mobile	700	
NORTH KOREA				
SCUD B	Liquid	Road-Mobile	300	Fewer than 100
SCUD C	Liquid	Road-Mobile	500	
PAKISTAN				
Ghaznavi	Solid	Road-Mobile	300	Fewer than 50
Shaheen I	Solid	Road-Mobile	750	
RUSSIA				
SCUD B (SS-1c Mod 1)	Liquid	Road-Mobile	300	Fewer than 200
SS-26 (Iskander-M/E)	Solid	Road-Mobile	350	
SYRIA				
Fateh-110	Solid	Road-Mobile	300	Fewer than 100
SCUD D	Liquid	Road-Mobile	700	

Note: All ranges are approximate

***The missile inventory may be larger than the number of launchers; launchers can be reused to fire additional missiles.**

MEDIUM-(MRBM) & INTERMEDIATE-RANGE BALLISTIC MISSILES (IRBM)

Iran Emad MRBM

New MRBM and/or IRBM systems have been flight tested or are in development in China, Iran, India, North Korea, Pakistan, and Russia, and many will be armed with nonconventional warheads. All of these countries except Iran have tested nuclear weapons.

Since 1987, Russia has been restricted from deploying ground-based ballistic missiles with a maximum range between 500 km and 5,500 km by the Intermediate-Range Nuclear Forces (INF) Treaty. In response to the announced US withdrawal from the INF Treaty in 2019, Russian officials indicated they plan to redirect funds to create land-based systems with ranges over 500 km. Russian Defense Minister Sergey Shoygu suggested creating land-based versions of sea- and air-launched missiles to shorten the development timeline, potentially referring to the sea-launched Tsirkon or the air-launched Kinzhal ALBM.

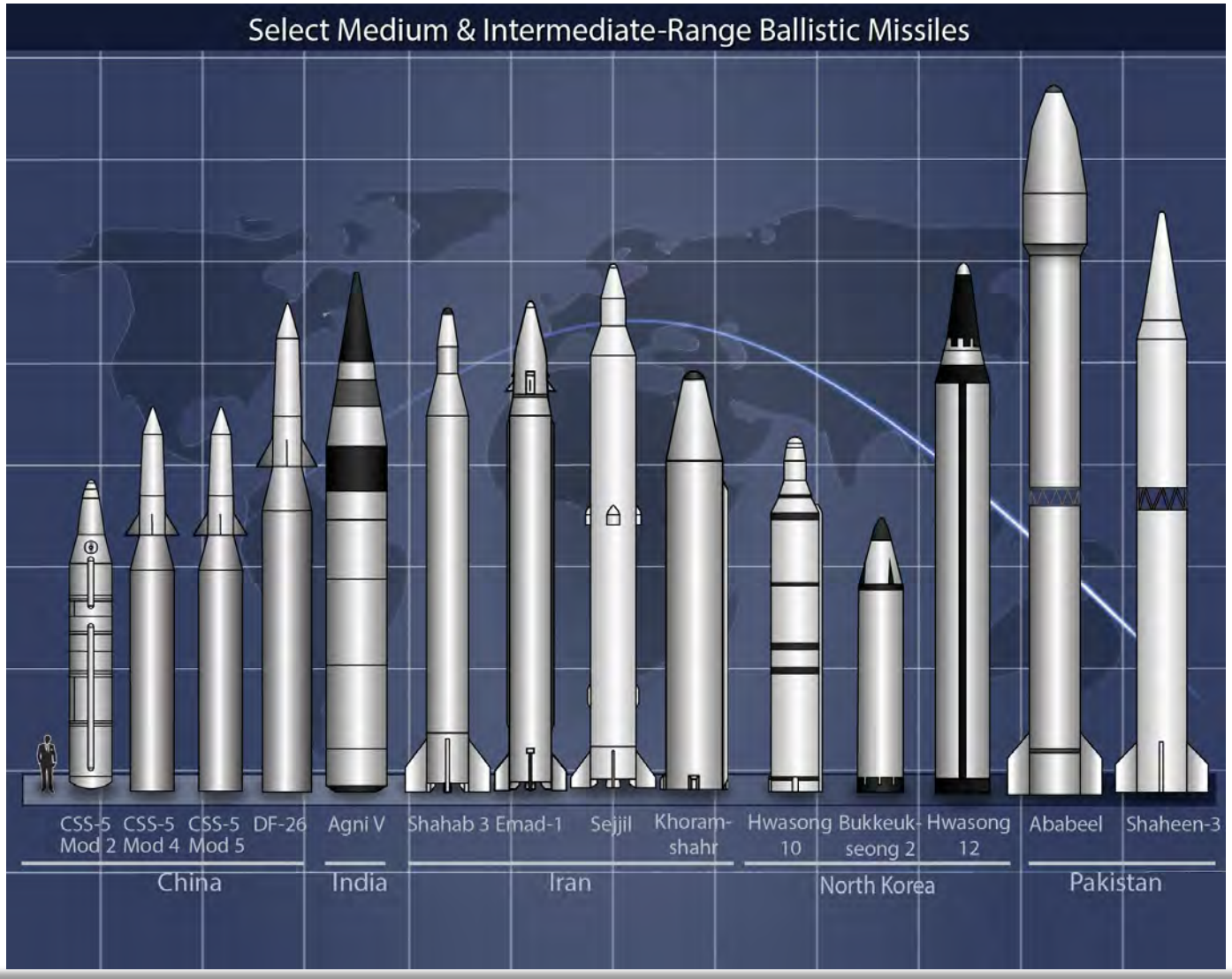
China continues to deploy nuclear-armed MRBMs to maintain regional nuclear deterrence, and its long-term, comprehensive military modernization is improving the capability of its conventionally-armed ballistic missile force to conduct high-intensity regional military operations, including “anti-access and area denial” (A2/AD) operations. Currently, China deploys the CSS-5 Mod 2 for regional nuclear deterrence. China has the conventionally-armed CSS-5 Mod 4 and Mod 5 MRBMs to conduct precision strikes. The CSS-5 Mod 4 (DF-21C) is intended to hold at risk or strike logistics and communication nodes, regional military bases and airfields, or ports. China has also deployed the CSS -5 Mod 5 (DF-21D), an anti-ship ballistic missile (ASBM) with a range exceeding 1,500 km and a maneuverable reentry vehicle (MaRV) that gives the PLA the capability to attack aircraft carriers in the western Pacific Ocean. According to a Chinese CCTV report, the DF-21D brigades are capable of quickly reloading in the field and launching multiple salvo strikes within a few hours. During the PLA’s 90th Anniversary Parade in July 2017, China displayed a new MRBM designated the DF-16G, which China claims features high accuracy, short preparation time, and an improved maneuverable terminal stage that can better infiltrate missile defense systems. As part of its National Day Parade in October 2019 celebrating the 70th Anniversary of the Peoples’ Republic of China, China displayed its DF-17 medium-range hypersonic missile.

Official Chinese media commentary described the DF-26 IRBM as “one carrier, many warheads.” Chinese media has stated the DF-26 can carry a conventional or nuclear payload and that it can launch conventional medium and long-range precision strikes against important targets on land and large ships at sea. It also requires little support equipment and has fast reaction times, according to descriptions in official Chinese media outlets.

Pakistan Shaheen-2 MRBM

North Korea has diversified its ballistic missile force to include longer-range solid- and liquid-propellant systems. North Korea first tested the Pukguksong-2—the land variant of the Pukguksong-1 SLBM tested in April 2016—from a tracked launcher. This marked an important milestone in North Korea's solid-propellant program for road-mobile systems. The Hwasong-10 (Musudan) experienced several in-flight failures in 2016, and in April 2017, North Korea debuted the Hwasong-12 IRBM with its inaugural launch. The Hwasong-12 IRBM flew twice more in April of 2017 and an additional three times by the end of 2017, to include two overflights of Japan (in August and September), for a total of six test flights. North Korea claims that the Hwasong-12 is meant to serve as a medium-long range strategic ballistic missile with a range of 3,000 – 4,000 km capable of reaching Guam.

Iran has an extensive missile development program. Iran has modified the Shahab 3 MRBM, which is derived from the North Korean No Dong, to extend its range and effectiveness, with the longest range variant reportedly being able to reach targets at a distance of about 2,000 km. Iran claims to have mass produced Shahab 3 missiles and has conducted multiple launches of the Sejjil, a solid-propellant MRBM with a claimed range of 2,000 km. In 2015, Iran publicized the launch of the Emad-1 missile, which officials claim is Iran's first long-range missile that is guided throughout flight and capable of hitting targets with high-precision. Iran also announced plans for an Emad-2 with greater precision than the Emad-1. In 2019, Iran publicized the launch of the Khorramshahr-2, which officials claim is Iran's deadliest long-range missile and is guided throughout flight using the fins installed on the warhead.



India continues to develop and improve its ballistic missiles. All of India's long-range missiles use solid propellants. The Agni II MRBM and Agni III IRBM are deployed. The Agni IV IRBM has been successfully flight tested seven times since a failure in 2010, but Indian officials still say further testing is required before deployment. The Agni V has been flight tested seven times, with the last five tests being launched from a sealed canister aboard a road-mobile launcher. More flight testing is required before deployment.

Pakistan continues to improve the readiness and capabilities of its Army Strategic Force Command and individual strategic missile groups through training exercises that include live missile firings. Pakistan has tested its solid-propellant Shaheen-2 MRBM seven times since 2004. In 2015, Pakistan began testing a longer range Shaheen-3 MRBM and, in January 2017, began testing the MIRV version of the Ababeel MRBM.

Iran Shahab 3 MRBM

NK Hwasong-10 IRBM

NK Pukguksong-2 MRBM

China CSS-22 (DF-17) MRBM

MEDIUM AND INTERMEDIATE-RANGE BALLISTIC MISSILES

COUNTRY/SYSTEMS	NUMBER OF STAGES	PROPELLANT	DEPLOYMENT MODE	MAXIMUM RANGE (km)	NUMBER OF LAUNCHERS*
CHINA					
CSS-5 Mod 2 MRBM	2	Solid	Road-Mobile	1,750+	Approximately 350
CSS-5 Mod 4 MRBM	2	Solid	Road-Mobile	1,500+	
CSS-5 Mod 5 MRBM	2	Solid	Road-Mobile	1,500+	
CSS-18 (DF-26) IRBM	2	Solid	Road-Mobile	3,000+	
CSS-22 (DF-17) MRBM	1	Solid	Road-Mobile	UNK	
INDIA					
Agni II MRBM	2	Solid	Rail-Mobile	2,000+	Fewer than 10
Agni III IRBM	2	Solid	Rail-Mobile	3,200+	Fewer than 10
Agni IV IRBM	2	Solid	Road-Mobile	3,500+	Not Yet Deployed
Agni V IRBM	3	Solid	Road-Mobile	5,000+	Not Yet Deployed
IRAN					
Shahab 3 MRBM	1	Liquid	Road-Mobile	Up to 2,000	Undetermined
Emad-1 MRBM	1	Liquid	Road-Mobile	Up to 2,000	Undetermined
Khorramshahr	1	Liquid	Road-Mobile	2,000	Undetermined
Khorramshahr-2	1	Liquid	Road-Mobile	2,000	Undetermined
Sejjil (Ashura) MRBM	2	Solid	Road-Mobile	2,000	Undetermined
NORTH KOREA					
Pukguksong-2 MRBM	2	Solid	Road-Mobile	1,000+	Undetermined
ER SCUD MRBM	1	Liquid	Road-Mobile	1,000	Undetermined
No Dong Mod 1/2 MRBM	1	Liquid	Road-Mobile	1,200+	Fewer than 100
Hwasong-12 IRBM	1	Liquid	Road-Mobile	4,500+	Undetermined
Hwasong-10 (Musudan) IRBM	1	Liquid	Road-Mobile	3,000+	Fewer than 50
PAKISTAN					
Ghuari MRBM	1	Liquid	Road-Mobile	1,250	Fewer than 50
Shaheen 2 MRBM	2	Solid	Road-Mobile	2,000	Fewer than 50
Shaheen 3 MRBM	2	Solid	Road-Mobile	2,750	Not Yet Deployed
Ababeel MRBM	3	Solid	Unknown	2,200	Not Yet Deployed
SAUDI ARABIA					
CSS-2 MRBM (Chinese-produced)	1	Liquid	Transportable	3,000	Fewer than 50

Note: All ranges are approximate

***The missile inventory may be larger than the number of launchers; launchers can be reused to fire additional missiles.**

INTERCONTINENTAL BALLISTIC MISSILES (ICBM)

Russia SS-25 ICBM

Both China and Russia currently deploy multiple types of ICBMs and are modernizing their ICBM forces. North Korea demonstrated its first ICBM-class systems in 2017, with the inaugural launch of the Hwasong-14 and then the Hwasong-15, later that same year. India is developing an ICBM, and Iran may also develop an ICBM.

On 5 February 2018, the limits prescribed by the New Strategic Arms Reduction Treaty were to be reached by both Russia and the United States. This treaty limits the United States and Russia each to no more than 1,550 warheads and 700 deployed launchers (including warheads on ICBMs and SLBMs, and counting each heavy bomber as one warhead). Russia retains over 1,000 nuclear warheads on ICBMs. Most of these missiles are maintained on alert, capable of being launched within minutes of receiving a launch order. Although the number of missiles in the Russian ICBM force will continue to decrease because of arms control agreements, aging missiles, and resource constraints, Russia probably will retain the largest ICBM force outside the United States. Efforts to maintain and modernize the force are underway.

The Russian SS-27 Mod 1 ICBM, a missile designed with countermeasures to ballistic missile defense systems, is now deployed in the silos of six regiments and on road-mobile launchers. A road-mobile MIRV version of the SS-27, the SS-27 Mod 2 (RS-24, YaRS), was first deployed in 2010, and continues to replace the aging SS-25. At least twelve mobile-missile regiments have already deployed, according to Russian press reports. Furthermore, Russia began deploying a silo-based version of the SS-27 Mod 2 in 2014 to replace the SS-19 Mod 3. In addition to the SS-27 ICBM, according to the commander of the Strategic Rocket Forces, Russia is developing a lighter and shorter-range road-mobile missile based on the SS-27 Mod 2, known as the RS-26 Rubezh (US designator SS-28). While the Russian press indicated the missile was initially tested to ICBM range, senior government officials have described the system as a “missile defense killer” capable of hitting targets anywhere in Europe. Although the Russian press reported that work on the RS-26 Rubezh was paused or cancelled, testing of Rubezh associated equipment continued in 2018.

In 2018, Russian President Vladimir Putin unveiled the development of two new ICBM systems, including an ICBM-class hypersonic glide vehicle (HGV) and a new, heavy-lift, liquid-propellant ICBM capable of flying trajectories over the south pole to approach the continental US from the south. The HGV system, named Avangard, is designed to penetrate the US missile defense system and strike at critical targets with a nuclear warhead. Russian officials claim Russia began to deploy the HGV mounted on SS-19 boosters at Dombarovskiy Missile Division in late 2019 and ultimately plans to deploy twelve Avangard systems at Dombarovskiy by 2027. The new liquid-propellant ICBM named Sarmat will replace the aging SS-18 Mod 5 (Voyevoda). Russia’s goal is to begin deployment of the Sarmat in 2021, initially at the Uzhur missile division.

China CSS-20 (DF-41) ICBM

China is strengthening its strategic nuclear deterrent force with the development and deployment of new ICBMs. China retains a relatively small number of nuclear-armed, liquid-propellant CSS-3 (DF-4) limited range ICBMs and CSS-4 (DF-5) ICBMs capable of reaching the United States.

China first displayed the CSS-4 Mod 3 (DF-5B) ICBM with a claimed MIRV payload in 2015. It is also modernizing its nuclear forces by adding more survivable, road-mobile

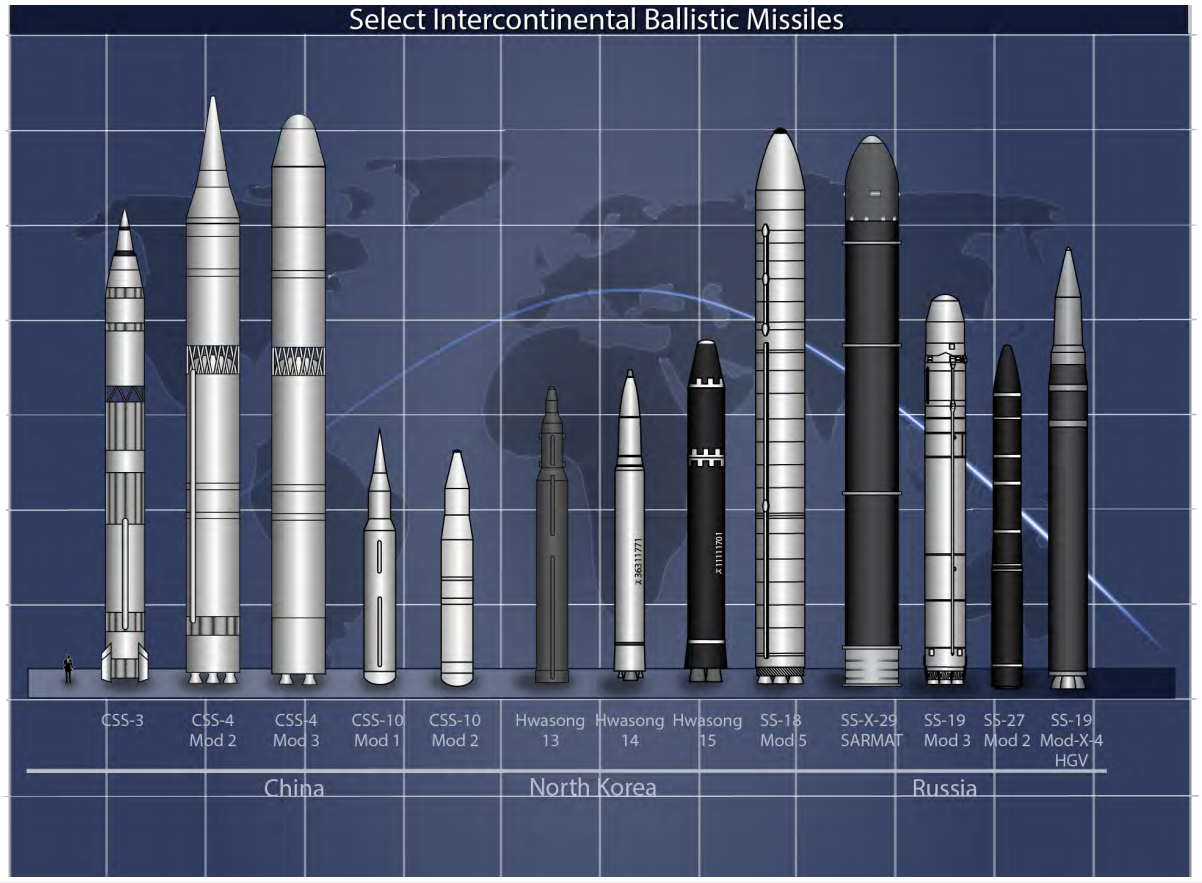
delivery systems. The road-mobile, solid-propellant CSS-10 Mod 2 has been deployed to units within the PLA Rocket Force and will allow for targeting of most of the continental United States. China is developing the CSS-20 (DF-41), a new MIRV capable, road-mobile ICBM, and the DF-31AG road-mobile ICBM. The number of warheads on Chinese ICBMs capable of threatening the United States is expected to grow to well over 100 in the next 5 years.

On 4 July 2017, North Korea performed the inaugural flight test of the Hwasong-14 ICBM, making it North Korea's first flight-tested ICBM-class system. The Hwasong-14 ICBM was flight tested again on 28 July 2017. Both of these launches flew on a highly lofted trajectory (high apogee but short range). For instance, the Hwasong-14 flight test on 28 July 2017 flew to an apogee of roughly 3,700 km, but a range of only around 1000 km into the Sea of Japan. Despite being flight tested at lofted trajectories for testing purposes, the system is capable of ICBM ranges of 10,000+ km. On 28 November 2017, North Korea introduced another ICBM-class system, the Hwasong-15. Like the Hwasong-14, the Hwasong-15 is a road-mobile two-stage liquid-propellant system. According to North Korea, the Hwasong-15 ICBM reached an altitude of roughly 4,475 km and a distance of roughly 950 km. Although it demonstrated a lofted trajectory like the Hwasong-14, the Hwasong-15's range could reach the continental US.

North Korea Hwasong-14 ICBM

Tehran's desire to have a strategic counter to the United States could drive it to field an ICBM. Additional progress in Iran's space program could shorten a pathway to an ICBM, because space launch vehicles use inherently similar technologies. Since 2008, Iran has conducted multiple launches of the two-stage Safir SLV and the larger Simorgh SLV.

India's Agni VI ICBM is reportedly in the design phase with a range of 6,000 km.



China CSS-10 ICBM Launch Canister on MEL

North Korea Hwasong-13 ICBM

Russia SS-27 ICBM TEL

North Korea Modified Hwasong-14 ICBM

North Korea Hwasong-15 ICBM

Russia Sarmat ICBM

Russia SS-27 ICBM

INTERCONTINENTAL BALLISTIC MISSILES

COUNTRY/SYSTEMS	NUMBER OF STAGES	WARHEADS PER MISSILE	PROPELLANT	DEPLOYMENT MODE	MAXIMUM RANGE (km)	NUMBER OF LAUNCHERS*
CHINA						
CSS-3 ICBM	2	1	Liquid	Transportable	5,500+	10 to 15
CSS-4 Mod 2 ICBM	2	1	Liquid	Silo	12,000+	About 20
CSS-4 Mod 3 ICBM	2 + PBV	Multiple	Liquid	Silo	12,000+	
CSS-10 Mod 1 ICBM	3	1	Solid	Road-Mobile	7,000+	5 to 10
CSS-10 Mod 2 ICBM	3	1	Solid	Road-Mobile	11,000+	15+
DF-31AG ICBM	3	UNK	Solid	Road-Mobile	UNK	16+
CSS-20 ICBM	3 + PBV	Multiple	Solid	Road-Mobile	UNK	16+
NORTH KOREA						
Taepo Dong 2 ICBM	3	1	Liquid	Fixed		Undetermined**
Hwasong-13 ICBM	3	1	Liquid	Road-Mobile	12,000	Undetermined
Hwasong-14 ICBM	2	Unknown	Liquid	Road-Mobile	10,000+	Undetermined
Hwasong-15 ICBM	2	Unknown	Liquid	Road-Mobile	12,000+	Undetermined
RUSSIA						
SS-18 Mod 5 ICBM	2 + PBV	10	Liquid	Silo	10,000+	About 50
SS-19 Mod 3 ICBM	2 + PBV	6	Liquid	Silo	9,000+	About 50
SS-19 Mod 4 ICBM/HGV	2	1	Liquid	Silo	10,000+	Less than 10
SS-25 ICBM	3 + PBV	1	Solid	Road-Mobile	11,000+	About 50
SS-27 Mod 1 ICBM	3 + PBV	1	Solid	Silo & Road-Mobile	11,000+	About 80
SS-27 Mod 2 ICBM	3 + PBV	Multiple	Solid	Silo & Road-Mobile	11,000+	More than 100
SS-28 ICBM***	At least 2	Multiple	Solid	Road-Mobile	5,500+	In Development
SARMAT	2 + PBV	Multiple	Liquid	Silo	10,000+	In Development

Note: All ranges are approximate.

***The missile inventory may be larger than the number of launchers; launchers can be reused to fire additional missiles.**

**** We have observed launches of the TD-2 space launch vehicle from both east (2006 and 2009) and west (2012) coast facilities.**

***** The Russian press indicated the missile was initially tested to ICBM range. Russian officials quoted in the press have claimed the missile is "lighter, and consequently has a shorter range" than the SS-27 Mod 2 ICBM on which it is based.**

SUBMARINE-LAUNCHED (SLBM) & SHIP-LAUNCHED BALLISTIC MISSILES (ShLBM)

China CSS-N-14 SLBM

Russia maintains a substantial force of nuclear-powered ballistic missile submarines (SSBNs) with intercontinental-range missiles. Upgraded SS-N-23s are intended to replace older SS-N-23s on DELTA IV Class SSBNs. The SS-N-32/BULAVA is a new solid propellant SLBM deployed on the new DOLGORUKIY class SSBNs. Russian SLBMs are capable of launch from surfaced and submerged SSBNs from a variety of launch locations.

China has deployed the CSS-N-14/JL-2 SLBM on the 12-tube JIN Class SSBNs. This missile allows Chinese SSBNs to target portions of the United States from operating areas in the Pacific Ocean. In late November 2018, China tested a new JL-3 SLBM in the Bohai Sea. According to media sources, the JL-3 has a greater range than the JL-2.

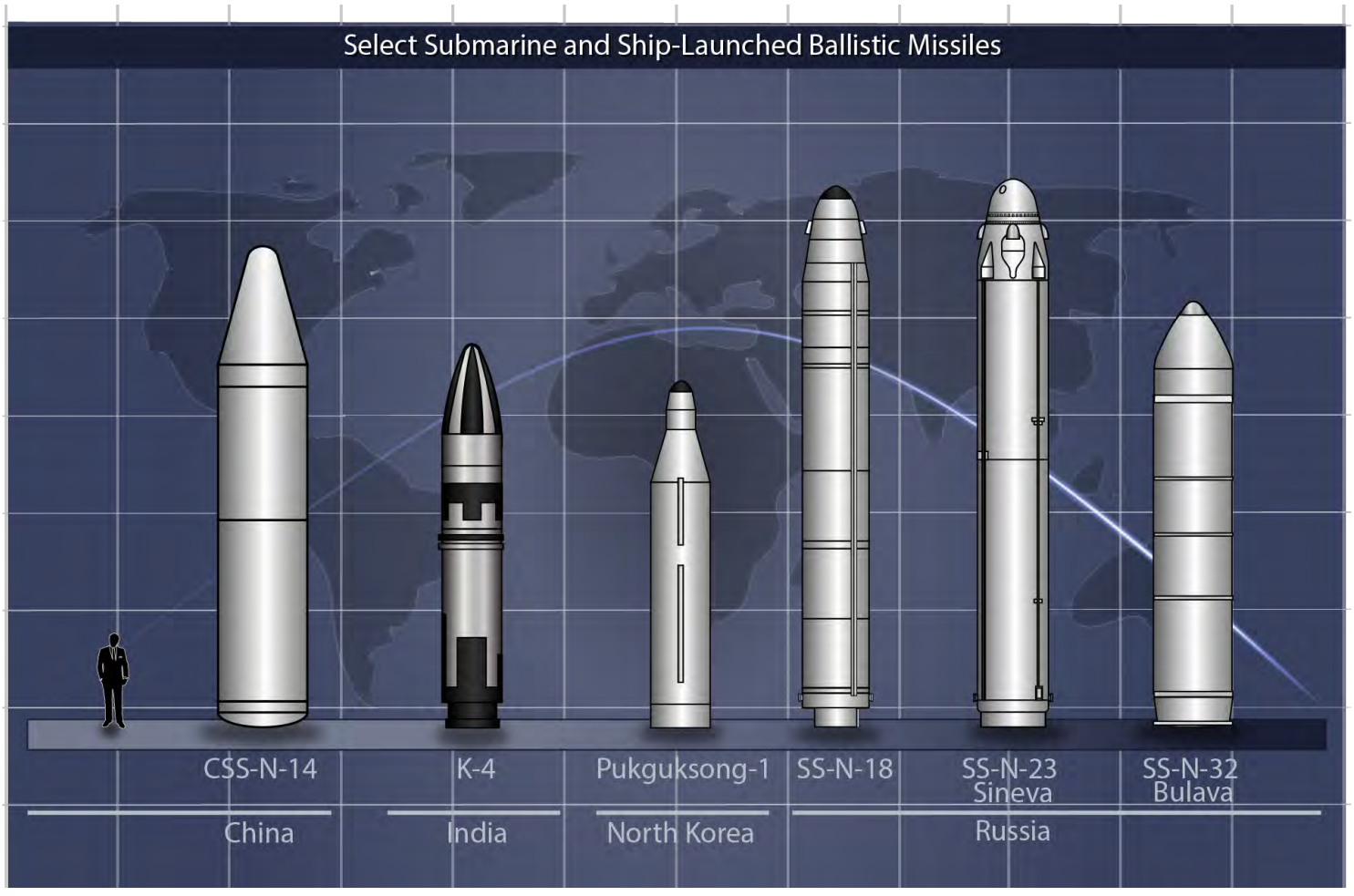
North Korea is developing an SLBM capability, and has flight tested two SLBM variants, possibly designated as the Pukguksong-1 and Pukguksong-3, in 2016 and 2019. According to North Korean press statements, the Pukguksong-1 will be cold-launched, solid-fueled, and will carry a nuclear warhead.

India has developed and commissioned a new ballistic missile-capable submarine, the INS ARIHANT. The INS ARIHANT can carry either 12 SRBM range K-15s or four IRBM range K-4 SLBMs, the later of which is still under development. The Dhanush, a liquid-fueled, ship-launched ballistic missile (ShLBM), is a naval variant of India's Prithvi II CRBM.

Russia SS-N-18 SLBM

India K-15 SLBM

Russia Bulava Launch Canister



North Korea Pukguksong-1 Launch

India Dhanush ShLBM

Russia SS-N-18 Payload Section

SUBMARINE & SHIP-LAUNCHED BALLISTIC MISSILES

COUNTRY/SYSTEMS	NUMBER OF STAGES	WARHEADS PER MISSILE	PROPELLANT	DEPLOYMENT MODE	MAXIMUM RANGE (km)	NUMBER OF LAUNCHERS
CHINA						
CSS-N-14 (JL-2) SLBM	3	1	Solid	JIN Sub	7,000+	48
JL-3	3	Multiple	Solid	Type 096 Sub	10,000+	N/A
INDIA						
K-15 SLBM	2	1	Solid	ARIHANT Sub	700	12
K-4 SLBM	2	1	Solid	ARIHANT Sub	3,500	4; Not Yet Deployed
Dhanush ShLBM	1	1	Liquid	Sukyana-class Patrol Boat	400	2
NORTH KOREA						
Pukguksong-1 SLBM	2	1	Solid	SINPO Sub	1,000+	UNK; Not Yet Deployed
Pukguksong-3 SLBM	2	UNK	Solid	Sub	1,000+	UNK; Not Yet Deployed
RUSSIA						
SS-N-18 SLBM	2 + PBV	3	Liquid	DELTA III Sub	5,500+	16
SS-N-23 Sineva SLBM	3 + PBV	4	Liquid	DELTA IV Sub	8,000+	96
SS-N-32 Bulava SLBM	3 + PBV	6	Solid	DOLGORUKIY (BOREY) Sub	8,000+	48

Note: All ranges are approximate

North Korea Pukguksong-1 SLBM

LAND-ATTACK CRUISE MISSILES (LACM)

China CJ-10 LACM

Cruise missiles are typically categorized by their intended mission: either as a land attack cruise missile (LACM) or as an anti-ship cruise missile (ASCM). Cruise missiles can further be categorized by launch platform: aircraft, ship, submarine, or ground launcher.

A LACM is an armed unmanned aerial vehicle designed to attack a fixed or relocatable target. It spends the majority of its mission in level flight, as it follows a preprogrammed path to the predetermined target. LACMs typically use a small gas-turbine engine for propulsion.

LACM guidance usually occurs in three phases: launch, midcourse, and terminal. During the launch phase, a missile is guided using only the inertial navigation system (INS). During the midcourse phase, the missile's INS is updated by one or more of the following systems: a satellite navigation system (such as the US Global Positioning System (GPS) or the Russian Global Navigation Satellite System (GLONASS)); a terrain contour matching (TERCOM) system; or a radar or optical scene matching system. The terminal guidance phase begins when a missile enters the target area and uses either a more accurate scene matching system or a terminal seeker (usually an optical or radar-based sensor). Some advanced LACMs may have highly accurate guidance systems that can place the missile within a few feet of the intended target.

Russia KH-55SM LACM

Iran Soumar LACM

Russia R-500 LACM

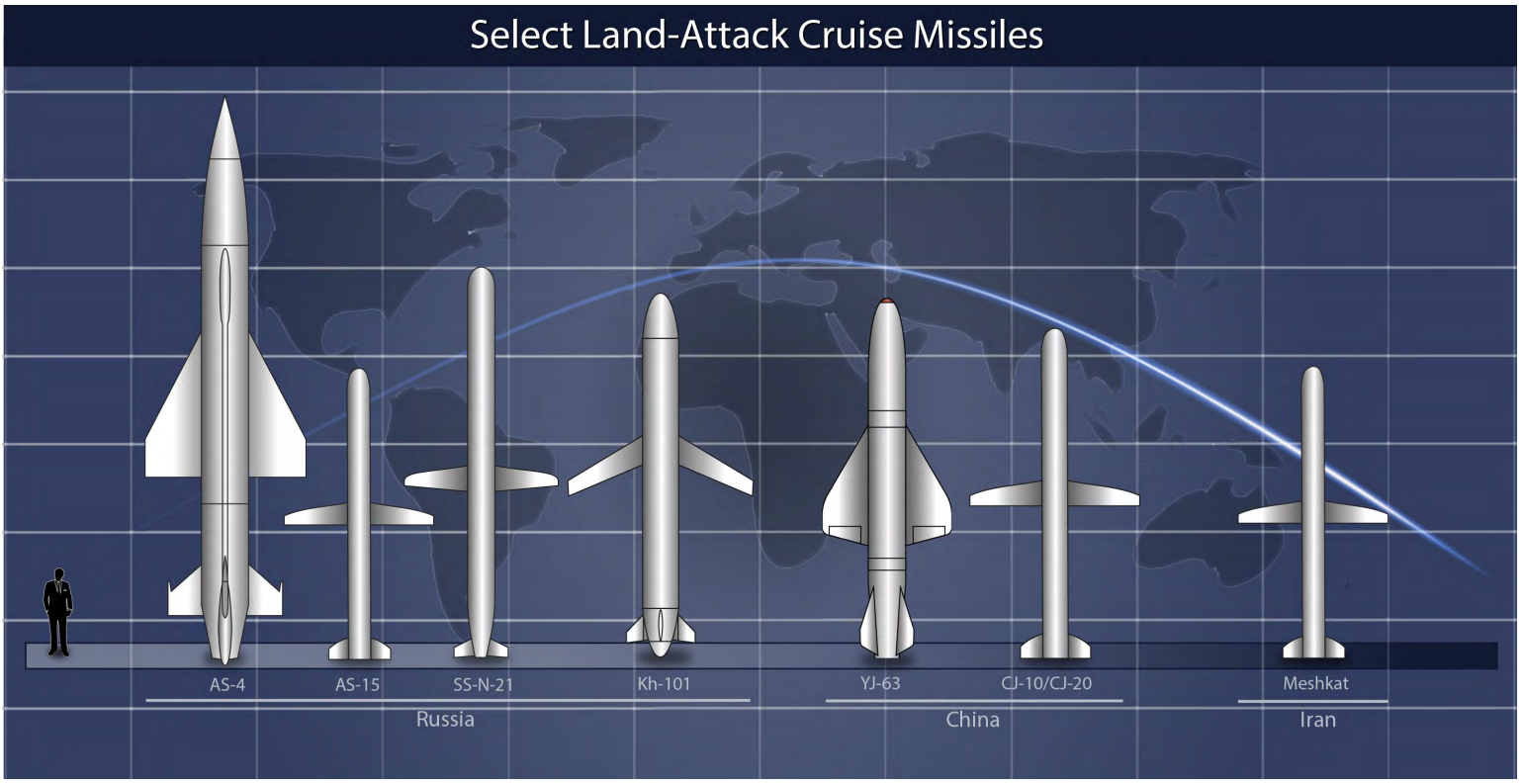
Russia Kh-101 LACM

LACMs can be challenging targets for air defense systems. Cruise missiles can fly at low altitudes to stay below a radar's line of sight. Depending on a country's ability to do mission planning, the missile can use terrain features such as mountains or valleys to hide from radars. Furthermore, LACMs may fly circuitous routes to the target, avoiding radar and air defense installations. A salvo of missiles can be launched to approach a target simultaneously from different directions, potentially overwhelming air defenses. Some missiles have incorporated stealth features to make them less visible to radars and infrared detectors. Some developmental systems may incorporate chaff or decoys as an added layer of protection, though concealment will remain a cruise missile's main defense. The cruise missile threat to US forces is increasing in terms of the number of countries possessing LACMs, the total number of LACMs, and the number of LACMs possessing advanced capabilities.

The CJ-10 is the first Chinese long-range cruise missile. It made its public debut during a military parade in 2009 and is currently deployed with the PLA Rocket Force. China has also developed a similar missile called CJ-20 that is carried on PLA Air Force bombers. China has also shown three hypersonic test vehicles that could help develop the technology to be able to field a hypersonic cruise missile in the future.

In February 2019, Iran discussed the Hoveizeh LACM at an arms show. As described by Iran, the Hoveizeh is a follow-on to the Soumar LACM that Iran displayed in 2015. Iran stated the Hoveizeh has a range of 1300 km. The Soumar and Hoveizeh are both ground-launched LACMs that appear to be based on the Russian air-launched AS-15. In 2012, Iran announced development of a similar missile called "Meshkat." The Soumar/Hoveizeh could be a new name for the Meshkat or a variant of the Meshkat. Iran could develop alternate launch modes, such as air– or ship-launched options, for the Meshkat/Soumar.

Russia has two operational ground-launched cruise missiles, the 9M728 and the 9M729. In July 2014, the United States declared the 9M729, an intermediate-range ground-launched cruise missile, a violation of the INF Treaty.



Beginning in fall 2015, Russia fired LACMs from surface ships, submarines, and aircraft in support of ongoing military operations in Syria.

The Club-K cruise missile "container launcher" weapon system, produced and marketed by a Russian firm, looks like a standard shipping container. The company claims the system can launch cruise missiles from cargo ships, trains, or commercial trucks.

Russian President Putin first announced the nuclear-powered cruise missile program during his 1 March 2018 address to the Federal Assembly. The Russian Ministry of Defense announced the weapon would be called Burevestnik. A nuclear-powered cruise missile would give Russia a unique weapon with intercontinental range capability.

COUNTRY/SYSTEMS	LAUNCH MODE	WARHEAD TYPE	MAXIMUM RANGE (km)	IOC
CHINA				
YJ-63	Air	Conventional	Undetermined	Operational
CJ-10	Ground	Conventional	Undetermined	Operational
CJ-20	Air	Conventional	Undetermined	Operational
IRAN				
Meshkat/Soumar/Hoveizeh	Air, Ground, & Ship	Conventional	Undetermined	Operational
RUSSIA				
AS-4	Air	Conventional or Nuclear	300+	Operational
AS-15	Air	Nuclear	2,800+	Operational
SS-N-21	Submarine	Nuclear	2,400	Operational
Kh-555	Air	Conventional	Undetermined	Operational
R-500/9M728	Ground	Conventional, Nuclear Possible	<500	Operational
9M729	Ground	Conventional or Nuclear	>500 but <5,500	Operational
Kh-101	Air	Conventional	Undetermined	Operational
Kh-102	Air	Nuclear	Undetermined	Operational
3M-14	Ship & Sub	Conventional, Nuclear Possible	2,500	Operational
3M-55	Ground, Ship, & Sub	Nuclear Possible	400+	Operational
Burevestnik—Nuclear-powered Cruise Missile	Ground	Nuclear	Undetermined	Developmental

Note: All ranges are approximate and represent the range of the missile only. The effective system range may be greatly increased by the range of the launch platform.

China YJ-63 LACM

AIR-LAUNCHED BALLISTIC MISSILES (ALBM)

Russian President Putin announced a new hypersonic missile called "Kinzhal" in his 1 March 2018 address to the Federal Assembly. Launched from a MiG-31, President Putin claimed the Kinzhal would fly at hypersonic speed, maneuver during the missile's trajectory, and be able to overcome all existing and prospective missile defense systems. President Putin also claimed the missile had completed development and began "trial service" on 1 December 2017. Russian press reports have also claimed that the Tu-22M3 bomber will carry the Kinzhal after they complete integration on that aircraft.

China is also developing two air-launched ballistic missiles, one of which may have a nuclear warhead.

Russia Kinzhal ALBM

SUMMARY

Overall, the threats posed by ballistic missile delivery systems are likely to continue to increase and grow more complex. Adversary ballistic missile systems are becoming more mobile, survivable, reliable, and accurate while also achieving longer ranges. Hypersonic glide vehicles (HGVs) delivered by ballistic missile boosters are an emerging threat that will pose new challenges to missile defense systems. Prelaunch survivability is likely to increase as potential adversaries strengthen their denial and deception measures and increasingly base missiles on mobile platforms. Increasing technical and operational countermeasures continue to challenge defensive systems in ballistic missiles.

Russia is likely to retain the largest force of strategic ballistic missiles outside the United States. The development of new ballistic missile systems is a high priority for Russia. In 2019, Russia deployed the world's first ICBM-class HGV, designed to allow its strategic missiles to penetrate missile defense systems. Russia claims it will deploy the SS-28 (RS-26 Rubezh) for shorter-range targets, and has stated it will soon begin flight testing a new heavy liquid-propellant ICBM called the Sarmat to replace the aging SS-18. Russia is also offering the advanced Iskander-E SRBM for export.

Iran Khorramshahr MRBM

Iran Fateh-110 SRBM

North Korea Pukguksong-1 SLBM

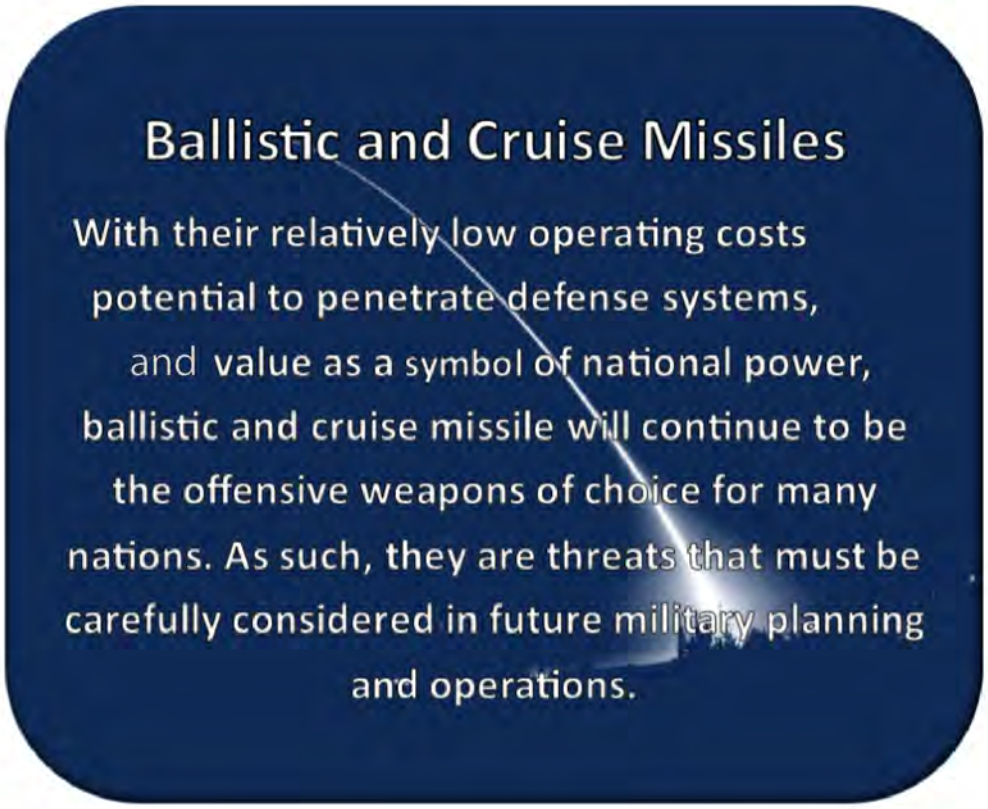
China CSS-22 (DF-17) MRBM

China is producing technologically-advanced ballistic missiles, has sold ballistic missile technology to other countries, has deployed a large force of ballistic missiles in the vicinity of Taiwan, and is expanding the reach of its ballistic missiles to attempt to deter foreign powers from becoming involved in any future regional conflict. China can already target the United States with a relatively small force of ICBMs, and its ICBM force is growing quantitatively and qualitatively.

North Korea has flight tested two road-mobile ICBMs and two different IRBMs; tested new solid-propellant SRBMs, an SLBM and an MRBM; and maintains a large SRBM inventory.

Iran has ambitious ballistic missile and space launch development programs, and continues to attempt to increase the lethality of its ballistic missile force. In retaliation for the death of Qasem Soleimani, Iran launched at least 15 highly accurate SRBMs at U.S. bases in Iraq on 7 January 2020. Iranian ballistic missile forces continue to train extensively in highly-publicized exercises. These exercises enable Iranian ballistic missile forces to hone wartime operational skills and evolve new tactics. Iran is fielding increased numbers of theater ballistic missiles, improving its existing inventory, and is developing technical capabilities to produce an ICBM through its ballistic missile and SLV programs.

The cruise missile threat to US forces is increasing. The majority of LACMs will still be subsonic, but supersonic and hypersonic missile will be deployed in the future. LACMs will also have increased survivability by minimizing radar signature and/or the use of counter-measures.



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DEFENSE INTELLIGENCE BALLISTIC MISSILE ANALYSIS COMMITTEE