

STUDY

HYPERSONIC MISSILES IN THE UKRAINIAN WAR: WILL THEY CHANGE THE RULES OF THE GLOBAL STRATEGIC GAME?

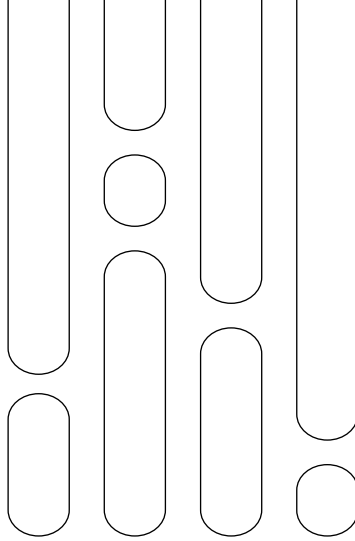
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Introduction

In its war on Ukraine, the Russian army has used different categories of ground, aerial and maritime weapons, and conducted intensive artillery and missile bombardments of cities and towns. However, ballistic, cruise and hypersonic missiles have played the biggest role and represent the most prominent weapons in this war — given that Russia possesses the biggest and most diverse stockpile of cruise and ballistic missiles in the world. The initial Russian attacks included a hybrid of ship-fired cruise missiles and the short-range but relatively precise Iskander missiles. These ballistic attacks are traditionally used in the first wave when war breaks out to strike air defenses, close air bases and other targets. Since the beginning of Moscow's invasion until the end of July 2022, Russian forces had launched over 2,503 missiles at Ukraine. Russia, on the other hand, has yet to demonstrate its full air and missile capabilities. It is likely that the number of strikes will increase in the coming days to weaken the remaining Ukrainian defenses.

This study will shed light on the most important ballistic missiles used in the Ukrainian war, their specifications, and how they have performed in combat situations. Furthermore, the study will discuss how supersonic missile technology represents a massive military quantum leap that all armies worldwide seek to acquire. A supersonic missile, which travels at six times the speed of sound, can reach the farthest point on the planet in less than an hour. The study will also forecast the impact of hypersonic technology on future wars and the global strategic game.

Ballistic Missiles in Russia's Military Strategy

The term “ballistic missile” is derived from the English word “ballistic,” which refers to the projection of a missile in flight, moving under the force of gravity only after being launched into space. Those who possess ballistic missiles can achieve two objectives simultaneously. The first is striking and destroying long-range hostile targets and the second is that they are a means of deterrence and exerting global political pressure. The major world powers have a variety of launch platforms, including land bases, submarines and ships, and aircraft powered by solid fuel or liquid fuel mixed with oxygen. Some missiles carry a single warhead, whereas others can carry multiple warheads, each of which can strike a different target. Of course, some of these are also capable of carrying nuclear warheads.

Missiles have proven once again that they are considered to be an important symbol of a country's strategic military capabilities, particularly those that strike distant targets which bombers cannot reach because of the remoteness of the target, flying risks or the deployment of counter air defenses. Furthermore, in light of sophisticated technologies and

superior firepower, some missiles are capable of precisely hitting targets, and increasing the danger they pose beyond prediction. Intercontinental missiles are among the world’s most dangerous ballistic missiles. Only a few countries possess such missiles, allowing them to strike anywhere on the planet from land or sea.

Russia is regarded as a leading country in the field of lethal ballistic missiles because its military doctrine is based on the principle of firepower and its intensification. As a result, Moscow has become a source of concern for the West. The Strategic Missile Troops or Strategic Rocket Forces of the Russian Federation or RVSN were modernized in the second and third decades of the 21st century to ensure their ability to deter and counter the deployment of NATO missile defense systems.

According to Missile Threat, a US website that specializes in gathering reliable information about ballistic missiles all over the world and the defense systems designed to counter them, the RVSN are an important part of Moscow’s military strategy. Russia’s major military modernization program is still producing new types of ballistic and cruise missiles with significant new military capabilities, such as precision guidance which have a greater capacity for causing vast destruction. Russia’s missile arsenal includes 24 types, making it the largest in the world and a major pillar of its strategic deterrence force (see Table 1).⁽¹⁾

Table 1
Types of Russian Missiles

Missile Name	Class	Range	Status
Kalibr (SS-N-30A)	LACM	1,500 - 2,500 km	Operational
3M-54 Kalibr/Club (SS-N-27 “Sizzler”)	ASCM	220 - 300 km	Operational
Iskander (SS-26 “Stone”)	SRBM	500 km	Operational
9M729 (SSC-8)	GLCM	2,500 km	Operational
Avangard	HGV	6,000+ km	In development

Missile Name	Class	Range	Status
Kh-101 / Kh-102	ALCM	2,500 - 2,800 km	Operational
Kh-47M2 Kinzhal	ALBM	1,500 - 2,000 km	Operational
Kh-55 (AS-15 "Kent")	ALCM	2,500 km	Operational
OTR-21 Tochka (SS-21 "Scarab")	SRBM	70 - 120 km	Operational
P-800 Oniks/Yakhont/ Bastion (SS-N-26 "Strobile")	ASCM	300 km	Operational
Zyb (SS-N-6 "Serb")	SLBM	2,400 - 3,200 km	Obsolete
R-29 Vysota (SS-N-18 "Stingray")	SLBM	6,500 km	Operational
Shtil (SS-N-23 "Skiff")	SLBM	11,000 km	Operational
R-36 (SS-18 "Satan")	ICBM	10,200 - 16,000 km	Operational
Granat (SS-N-21 "Sampson")	Cruise Missile	2,400 - 3,000 km	Operational
RS-24 Yars (SS-27 Mod 2)	ICBM	10,500 km	Operational
RS-26 Rubezh	ICBM/ IRBM	2,000-5,800 km	In development
RS-28 Sarmat	ICBM	10,000+ km	In development
Pioneer (SS-20 "Saber")	IRBM	5,000 km	Obsolete

Missile Name	Class	Range	Status
Bulava (SS-N-32)	SLBM	8,300 km	Operational
Topol (SS-25 "Sickle")	ICBM	11,000+ km	Operational
Topol-M (SS-27 Mod 1)	ICBM	11,000 km	Operational
R-11 (SS-1 "Scud")	SRBM	190 - 550 km	Obsolete
UR-100 (SS-19 "Stiletto")	ICBM	10,000 km	Operational

Source: "Missiles of Russia," *Missile Threat*, CSIS, *Missile Defense Project*, <https://bit.ly/3O87uxV>

The current RVSN are comprised of the Strategic Rocket Forces Command, located on the outskirts of Moscow, and three missile armies made up of missile divisions. This is in addition to the rocket launch and development site Kapustin Yar in the Astrakhan region, the Kazakhstan test field, the Kamchatka Peninsula test site, the 4th Central Scientific Research Institute, and four educational institutions. These institutions include Peter the Great Strategic Rocket Forces Academy in Moscow and its branches in Serpukhov and Rostov, not to mention repair laboratories, warehouses, and bases.⁽²⁾

The Russians have a variety of rocket launchers, including the Grad, BM-30 Smerch (Tornado), BM-27 Uragan (Hurricane), RS-28 Sarmat, RS-24 Yars, and Avangard, all of which are extremely dangerous to a potential foe. The "Skiff" missile, which can stay underwater is also one of Russia's most prominent strategic missiles. When it is fired, it has the capability of destroying both sea and land targets. This missile replaces submarines in potentially dangerous areas where they can be detected and hit.

The Avangard, a hypersonic glide vehicle (HGV), remains Russia's crown jewel. It is capable of carrying a nuclear warhead and flying at the speed of Mach 20 (33,000 kilometers per hour) with a range of over 10,000 kilometers. The vehicle is capable of unexpectedly adjusting course and altitude.⁽³⁾ The Avangard system is connected to a ballistic

missile. The glide vehicle gets disconnected from the rocket at an altitude of 100 kilometers and then maneuvers toward the target. Thus, these Russian hypersonic intercontinental missiles merge high speed, swift maneuverability, and the ability to evade, making it hard for conventional anti-missile systems to shoot them down.⁽⁴⁾ Commander of Russia's Strategic Rocket Forces Colonel General Sergei Karakayev said on June 5, 2022, that the Avangard HGV entered into service in December 2019 and that Russia possesses two regiments of such missiles and they are on combat alert. He further asserted, "Incidentally, from the standpoint of the impact of the anti-ballistic missile defense on this weapon, there is no capability to counter it. They (the Western nations) cannot even imagine how they can counter this weapon today."⁽⁵⁾

Russia developed the Avangard missile in response to NATO's continuous upgrades to its missile defenses and the increasing deployment of them at sea, in the East, and in Europe. As a result, the Avangard missile is expected to remain in service in Russia for at least several decades to come.

The Russian-Ukrainian war is the first since World War II in which ballistic missiles have been used extensively on the battlefield. The Russian invasion of Ukraine has turned the country into the largest ballistic and cruise missile test site in modern warfare. Russia's missile strategy includes the use of ballistic missiles Iskander-M and OTR-M, as well as naval missiles Kalibr. This is in addition to the Kinzhal (Kinjal) hypersonic missile and coastal defense systems like Bastion and Bal, both of which attack ground targets.⁽⁶⁾

Iskander Short-range Ballistic Missiles

Among the major Russian missiles apparent in the Ukrainian war is the Iskander missile (see Figure 1), a mobile short-range (500 kilometers) missile. It entered into service in 2006. The missile is capable of carrying conventional and nuclear warheads. It is designed to destroy targets like missile systems, artillery, aircraft, and helicopter hangars at airports, command, and communication centers, as well as large buildings and fortified facilities. The missile carries an explosive warhead with tremendous destructive power.

These missiles have surprise munitions. They have decoys that can fool air defense radars and heat-seeking missiles. These missiles maneuver during flight to evade enemy radar. By releasing decoys while in flight, hostile air defense systems will find it nearly impossible to intercept the missiles. These decoys are tasked with cloning hostile radar signals and reproducing them with false information to mislead

enemy radar and radar-guided missiles. Furthermore, the missiles have stealth coating, which makes them nearly invisible to radar and allows them to maneuver while in flight.⁽⁷⁾

The Russian Iskander missile system has several versions, the most well-known being Iskander-M and Iskander-I. The Russian manufacturer offers the latter for export. Iskander-K, Iskander-MS, and other upgraded versions are also part of the system. Iskander-M is the only short-range ballistic missile that has been actually used by Russia during the war with Ukraine.⁽⁸⁾

During the Russian invasion of Georgia in 2008, Moscow used Iskander missiles for the first time. In relation to the Ukrainian war, Russia stationed these missiles 60 kilometers from the Ukrainian border in its region of Belgorod Oblast. These missiles were used to destroy the Ukrainian Buk air defense missiles, the OTR-21 Tochka missile system, and a sizable ammunition storage facility belonging to the Ukrainian forces in Kramatorsk, north of Donetsk. Along with other targets, these missiles were also used to target 10 locations where Ukrainian soldiers and armored vehicles were situated.⁽⁹⁾

Figure 1
Iskander Tactical Missiles



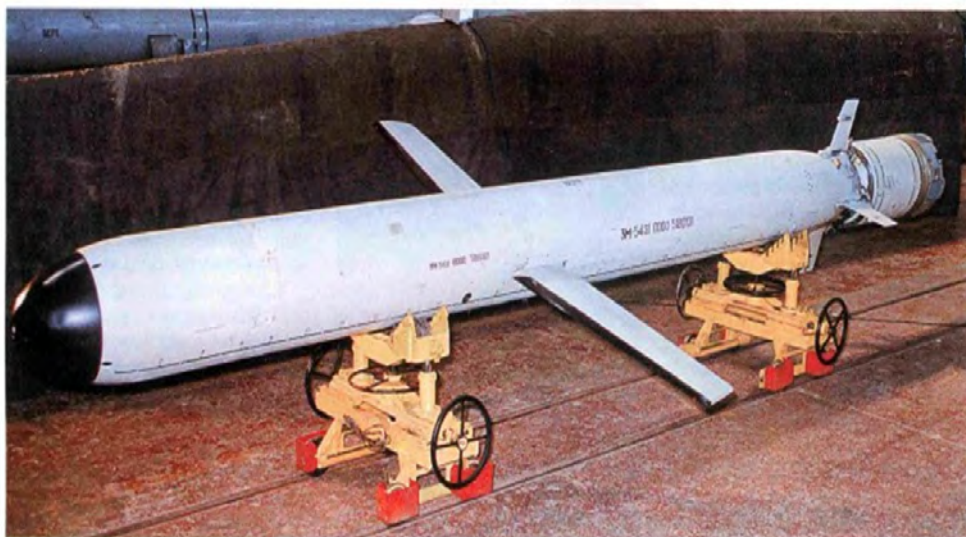
Source: SouthFront.⁽¹⁰⁾

Third: Kalibr Cruise Missiles

The year 2015 saw the launch of the 3M14- Kalibr (NATO: SS-N30-A) missile (see Figure 2). It has incredible destructive power and is a weapon of high precision. The missile measures 6.2 meters in length. Its warhead is 450 kilograms in weight and is highly explosive. The missile is possibly nuclear capable. Some models include a second propulsion stage that starts a supersonic sprint as the missile approaches the target, giving air defense systems less time to react and making it impossible for them to intercept. There are several variations of the Kalibr missile class, including those that launch from ships, submarines, and aircraft. It is capable of destroying targets up to 2,500 kilometers away.⁽¹¹⁾

Figure 2

Kalibr Cruise Missile



Source: Missile Threat.⁽¹²⁾

Russia fired 26 SS-N-30A missiles at Syrian opposition forces in October 2015. Three smaller Russian Buyen-M corvette-class ships and a frigate of the Geperd class were among the Russian naval ships in the Caspian Sea from which the missiles were fired. According to reports, the missiles traveled about 1,800 kilometers before hitting their targets.⁽¹³⁾

The Kalibr missile was used by the Russian army in Ukraine to attack military infrastructure, hit government buildings in Kyiv and Kharkiv, and bomb Ukrainian military facilities. According to the Russian Defense Ministry, on March 24, Russian ships from the Black Sea fired a barrage of

Kalibr munitions into Ukraine, destroying the largest remaining military fuel storage facility close to Kyiv.⁽¹⁴⁾

Russia's military launched another attack using highly accurate naval weapons against Ukrainian army military infrastructure facilities as part of its special military operation. Four Kalibr cruise missiles were fired by the Russian Black Sea Fleet frigate's crew. According to Lieutenant General Igor Yevgenyevich Konashenkov, spokesman for the Russian Defense Ministry, high-precision Russian Kalibr missiles struck a Ukrainian force command post close to the village of Shirokaya Dacha in the Dnipropetrovsk region on June 19. As a result, more than 50 Ukrainian army officers were killed. Ten M777 155-millimeter howitzers and possibly 20 armored vehicles that the West recently provided to Ukraine were also destroyed by Kalibr missiles in the city of Nikolaev.⁽¹⁵⁾

General Director of the Russian Almaz-Antey Corporation Novikov Yan Valentinovich said that the organization is working to develop an improved version of the Kalibr cruise missile and to enhance its flight performance so that it improves its combat effectiveness and outperforms the current class of Kalibr missiles.⁽¹⁶⁾ This improvement will help the missile to reach the coast of the United States (see Figure 3).

Figure 3

The Kalibr Cruise Missile Could Threaten the Eastern Coast of the United States



Source: Missile Threat: CSIS Defense Project.⁽¹⁷⁾

Hypersonic Missiles: Kinzhal as an Example

The war in Ukraine has shown how hypersonic ballistic missiles might alter the course of future wars. The development of ultrasonic missile technology is a significant military advancement that all armies want to have. Within an hour, a hypersonic missile can travel to any point on the planet.

These missiles rely heavily on powerful intercontinental ballistic missiles or fighter aircraft. It was thought that China and the United States had advanced significantly in this area before Russia. However, it was discovered after Russia's hypersonic Kinzhal (see Figure 4) missile was used in Ukraine. This Russian missile, most likely the first hypersonic missile used in a conflict, struck different areas in Ukraine.

Hypersonic weapons have a maximum speed of 1.6 kilometers per second, or five to six times the speed of sound. A hyperacoustic missile is distinguishable from a missile that is solely ballistic and flies primarily outside of the atmosphere. Moscow continues to be one step ahead of its rivals in terms of high speed.

There are two primary categories of hypersonic missiles:

- Hypersonic cruise missiles that are powered by high-speed, air-breathing engines, or scramjets, after hitting their target.
- HGVs that are launched from a rocket before gliding to a target.

The Yu-71 Avangard supersonic glide vehicles and the Kinzhal air-launched missile are two examples of Russia's hypersonic arsenal. Germany, Australia, India, Japan and France are developing hypersonic missiles, while Iran, Israel, and South Korea have done basic research on the subject, according to a recent report by the US Congressional Research Service. According to a US research service report, China is also working hard to develop this technology, which it sees as necessary to defend itself against advancements made by the United States in the field of hypersonic missiles and other technologies.⁽¹⁸⁾

Similar to conventional ballistic missiles that are capable of carrying nuclear weapons, hypersonic missiles are capable of traveling at speeds greater than six times the speed of sound. Hypersonic missiles, on the other hand, fly in a low trajectory through the air, whereas ballistic missiles fly at a high altitude and curve to reach their target. This means that hypersonic missiles reach their target faster. Hypersonic missiles can be fired from a variety of platforms, including from missile launchers on land, and from submarines, and ships in the sea, as well as from strategic bombers in the air.⁽¹⁹⁾ The ability of this class of missiles to maneuver makes tracking and intercepting them more challenging, which is one of their most significant characteristics. The threat posed by these missiles also stems from the

inability to determine whether they are armed with a conventional or nuclear warhead.

After the Kinzhal missile, also known as the Dagger, was used in Ukraine, it sparked outrage in the West and much concern. The capabilities of these missiles and the threat they pose to the security of Europe have continued to be highlighted in Western newspapers and by NATO experts. It can be inferred from Russia's deployment of this missile that it is was not merely intended to destroy Ukraine's military but to also act as a form of deterrence against the West's encroachment. In actuality, the use of the Kinzhal missile was aimed to advance psychological warfare on Russia's part and boost its national confidence rather than to give it direct strategic leverage in Ukraine. This is what led Russia to use one of its most powerfully destructive missiles, which is one of its flagship models in combat. To put it another way, the missile has a psychological warfare impact as it scares Russia's foes, especially when Europe and the United States know that the missile is capable of evading air defense systems like Washington's anti-missile shield in Europe.

In mid-March, a sizable underground weapons depot in western Ukraine was destroyed by a hypersonic ballistic missile launched by the Russian army, according to the Russian Defense Ministry. The first known use of an air-launched Kinzhal missile, most likely by a MiG-31 fighter aircraft, was later confirmed by US officials to CNN. Russian officials claim that this missile has a range of up to 2,000 kilometers and a top speed of over 6,000 kilometers per hour.⁽²⁰⁾

Figure 4
Kinzhal Missile



Source: The Aviationist.⁽²¹⁾ <https://bit.ly/3yNLbZF>

In March, US President Joe Biden confirmed Russia's use of the Kinzhal missile, describing it as "a consequential weapon ... it's almost impossible to stop it. There's a reason they're using it." According to Ukrainian officials, a Russian bomber fired three hypersonic missiles at the southern Ukrainian port city of Odesa on Monday night, May 9, 2022.⁽²²⁾

Russia used the MiG-31, a hypersonic and high-altitude aircraft. The missile was launched by a plane after it ascended to a high altitude where there was little to no resistance and the propulsion engines turned on shortly thereafter. The missile travels at a speed 10 times that of sound, or 1,235 kilometers per hour.

The Kinzhal is a ballistic missile, a variant of the SS-26 ground-to-ground missile. The missile is air-launched. After being launched, it either follows a ballistic trajectory that causes it to leave the atmosphere or a semi-ballistic trajectory that keeps it in the atmosphere. The semi-ballistic missile reaches the highest point in the atmosphere and then begins slowly moving downwards toward its target.

In the late 1990s and early 2000s, a study on the Kinzhal's initial design got underway. After that, it underwent its development stage between 2012 and 2020. The Russian company KBM, which is based in Kolomna, is the primary manufacturer of the missile. Currently, the missile is mounted on MiG-31K aircraft. However, there are efforts to modify it so that it can also be installed on the Tu-160 strategic bomber and the Tu-22M3 bomber. According to reports, the MiG-31K flight tests started in December 2017, but Vladimir Putin first made the Kinzhal missile public on March 1. He unveiled six brand-new weapons systems, among them the Kinzhal.⁽²³⁾

Many observers have referred to the use of the Kinzhal missile by Russian forces in March 2022 against Ukrainian land targets as the first actual use of a so-called hypersonic missile. The Kinzhal is thought to weigh between 500 kilograms and 700 kilograms, with a diameter of 0.92 meters, and a total length of between 7.70 meters and 8 meters. The missile remains whole until impact because the warhead and propulsion system are not separated. It is equipped with a satellite-based global positioning system (GLONASS). Additionally, it has a guidance system that uses electro-optics and/or radar to give the missile a precise sight of a few tens of meters.⁽²⁴⁾

Despite this missile's superior capabilities, American sources have raised concerns about its accuracy and stockpile size. Russian officials have not acknowledged US estimates that some of their precision-guided missiles have a failure rate of up to 60 percent. Whatever the cause — Ukrainian electronic warfare, launch errors, poor manufacturing standards, adverse weather conditions, or maintenance issues — the high failure rate necessitates the use of more missiles to hit a single target. In this scenario,

maintaining the operation's pace and achieving the desired results depend heavily on the size of the overall missile stockpile. On April 24, the research group Bellingcat stated that it is likely that 70 percent of Russia's stockpile of precision missiles have already been used.⁽²⁵⁾

In fact, given their precise specifications and high price, many Western analysts think that Western sanctions will make it difficult for Russia to replace its stockpiles of precision missiles. In particular, the guidance systems for precision missiles require semiconductors and transistors that are neither manufactured in Russia nor available from China, according to defense analyst James Lewis. "So, unless the Russians have planned ahead and stockpiled munitions or Western microelectronics, or ramped up production pre-war, they're going to run out of gas when it comes to precision-guided munitions," Lewis said.⁽²⁶⁾

It is worth noting that the arms race in high precision weapons started years ago. The United States announced in February 2019 that it would withdraw from the Intermediate-Range Nuclear Forces (INF) Treaty signed with Russia, citing Russian violations of the treaty which lasted for three decades.⁽²⁷⁾ NATO expressed support for the United States' move at the time and Washington also established the United States Space Force, among whose tasks is tracking ballistic and cruise missiles.⁽²⁸⁾ Washington also allocated an annual budget to developing supersonic missiles.⁽²⁹⁾

Ukrainian Ballistic Missiles

For its part, Ukraine cannot be compared with Russia when it comes to missile capabilities. Ukraine's army relies primarily on the weaponry it inherited from the Soviet Union, including the missile launchers and multiple howitzers which the Russian army has. But the Ukrainian army's flagship missile is the Tochka-U, a -70kilometer short-range missile for version A, while version C's range reaches 185 kilometers. It was manufactured to replace Russia's Frog7- unguided missile.

A cluster missile called the Tochka launches into the air and disperses its payload over a sizable area. When the missile touches down, it detonates. The missile can be used to launch pinpoint attacks on strategic enemy targets like airfields, control towers, bridges, storage facilities, and troop concentrations. It also employs inertial navigation and digital guidance and is loaded onto a mobile TEL missile platform before launch. Military experts claim that the Tochka missile system is currently one of the most effective systems of its class, despite the fact that production started 45 years ago. The Russian Defense Ministry claims that Ukrainian forces bombarded civilian buildings and important infrastructure sites in Donetsk and Luhansk with this tactical missile (see Figure 5).⁽³⁰⁾

Figure 5

The Tochka-U Ballistic Missile



Source: Military Watch Magazine.⁽³¹⁾

Ukrainian security forces allegedly used the Tochka tactical missile system to attack the village of Svatove, according to the Luhansk Prosecutor's Office.⁽³²⁾

The United States has so far given Ukraine an M142 High Mobility Artillery Rocket System (HIMARS) in order to improve its missile capabilities to combat Russia. It is a missile system that is mounted on a truck and can carry one pod with six GMLRS. The US military has used HIMARS to attack ISIS in Afghanistan and Iraq. The system has the ability to launch a medium-range missile that can reach targets up to about 70 kilometers away, as well as a long-range missile that can travel up to about 300 kilometers (see Figure 6).⁽³³⁾

Figure 6

The US High Mobility Artillery Rocket System (HIMARS)



Source: The Guardian.⁽³⁴⁾

At least eight HIMARS have been deployed by the Ukrainian military to the frontlines of its conflict with Russian forces, and 200 Ukrainians have received HIMARS operation training from the US military. With the most recent US commitment, there will be 16 HIMARS in total. Six medium to long-range missile HIMARS from Germany and Britain have also been deployed on Ukrainian soil.⁽³⁵⁾

As there are currently no weapons that will enable Ukraine to precisely target critical Russian sites in the Russian depth, the US decision in relation to deploying more missile systems aims to strike a balance between its desire to assist Ukraine in confronting Russian artillery, to restore balance to the war, and to exhaust the Russians. In fact, according to US intelligence estimates, Ukrainian forces have destroyed more than 100 “high-value” Russian targets with HIMARS. The targets included ammunition depots, command and control centers, logistical networks, field artillery, and air defenses.⁽³⁶⁾ The Russians are attempting to mitigate losses through a number of means – camouflage, movement, and changing locations.

Conclusion

Ballistic missiles of all varieties are important as they allow for harming an enemy and destroying some of its strategic assets and infrastructure without being compelled to wage a large-scale ground operation that could result in massive losses or intensively using aircraft, and to avoid the losses that could result from their interception by air or ground defenses. This is one of the lessons learned from the Ukrainian war. Additionally, the war has demonstrated the importance of using missiles as a tool to deter foes, display force and increase the overall cost of war.

The conflict has also highlighted the drawbacks of relying solely on missile forces, despite the relative success the missiles have achieved in the Ukrainian war. The Russian experience demonstrates that the missile strikes by Russia or Ukraine did not significantly alter the course of the war. They were not sufficient to secure a resounding triumph, seize control of land, or maintain control leading to a favorable political outcome.

The distinctive outcome of this war is the first-ever use of the hypersonic Kinzhal missile in the annals of warfare. The countries with advanced military industries, such as Russia, China, the United States and North Korea, will increase their investments to develop HGVs, which are highly maneuverable and can fly at a speed faster than the speed of sound, despite being extremely expensive and difficult to produce in large quantities. They can also change their altitude and course to avoid radar. Anti-missile systems have a difficult time exposing and intercepting them.

Therefore, the next phase of the arms race between the major powers of the world will be characterized by a greater emphasis on the development of hypersonic missiles as well as air defense systems to counter them. The DF-26 is a multipurpose weapon with a range of 4,000 kilometers that China is currently working to produce, and the United States is developing weapons to counter this weapon. To address Chinese missile threats, Taiwan and Japan are also improving their missile capabilities and defense systems. To counter North Korea's expanding arsenal, South Korea has started to develop a variety of high-precision, high-power long-range ballistic missiles.

The stages of burning and sliding of the missile carrier during its flight line in space produces a powerful thermal force that can be tracked by early warning systems mounted on satellites owned by both the United States and Russia. Due to the speed, maneuverability, and flight path of hypersonic missiles, anti-missile defense systems do not support monitoring technology to counter them. The United States started working on a multilayered defense system against weapons whose velocity exceeds the speed of sound. This requires orbiting a variety of sensors and close cooperation with major allies, but the implementation of this system is likely to be very expensive and time-consuming.

Iran, meanwhile, is paying close attention to how well the Russian rocket forces succeeded in the invasion of Ukraine. The Russian performance gives Iran confidence that its recent decision to make missiles the centerpiece of its deterrence strategy is the right one. Given its weak air force, perhaps this war gives Iran more faith in the usefulness of its missiles. Iran has previously applied strategic pressure through using its missile force. This was apparent when Iran used its ballistic missiles to attack ISIS positions in eastern Syria in 2017, the strongholds of Kurdish groups in Iraq in 2018, the US air base in Ain al-Assad in 2020, and the alleged Mossad outpost in Erbil in 2022. This is in addition to the missiles it supplies to the Houthis to attack civilian targets in the UAE and Saudi Arabia.

All things considered; conventional ballistic missiles will still be dangerous. However, the greater threat comes from hypersonic technologies demonstrated during the Ukrainian crisis, which are likely to usher in a new era of quantum leaps that are likely to fundamentally alter the nature of wars and future conflicts. These unheard-of missiles not only zero in on targets with extreme precision, but, more importantly, there are currently no defenses in any part of the world that can stop them. Therefore, the deterrence theory that served as the safety valve during the Cold War has failed. This forces the major world powers' political and military decision-makers to launch initial preemptive strikes with hypersonic missiles to cripple the enemy's capabilities and ability to act.

There is no international agreement or convention on when and how to employ these hypersonic missiles or how to lessen the threat they pose. Additionally, there are no initiatives or plans to start a conversation about the matter. Likewise, there are no limitations on importing these technologies or preventing their proliferation. As a result, a race to acquire these weapons will break out among countries over the next 10 years. Our analysis indicates that this will have an impact on the current military equilibriums, the global strategic game, and the idea of conventional deterrence. Therefore, we are currently dealing with a fresh threat to stability and security on the global stage in the medium and long term.

Endnotes

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