POLICY MEMO

The Missing Pieces of a Kerch Bridge Strike

Give Ukraine What It Needs to Isolate Crimea and Gain the Initiative

BRYAN CLARK
Senior Fellow, Hudson Institute

CAN KASAPOĞLU
Senior Fellow (Non-Resident), Hudson Institute

October 2023

Introduction

The war in Ukraine is at a critical juncture both on the ground and in the capitals of Ukraine’s main supporters. Aid to Kyiv is now a point of contention in the United States Congress, which had to remove Ukraine support from a short-term funding package to avoid a government shutdown. Overseas, China’s intensified aggression toward its neighbors and Hamas’s terror campaign against Israel are beginning to stretch US attention and resources across multiple theaters.\(^1\) With half of Ukraine’s post-invasion military and humanitarian assistance coming from the United States, softening support in Washington could cause other North Atlantic Treaty Organization allies to pare back their contributions as well.\(^2\) To sustain US and NATO support and put Russia on the defensive going into winter, Ukraine’s military will need to change the dynamics of a counteroffensive that has been slow to retake Russian-held territory.

Cutting off Crimea from Russia and forcing Moscow’s troops to protect an isolated peninsula is the kind of change that would prove Ukraine is able to win the war, rather than merely fight to a draw. With the “land bridge” across southern Ukraine already under attack, the Kerch Strait bridge carries much of the ammunition and supplies going into Crimea.\(^3\) If the bridge were impassable, Russia would need to redouble its efforts to defend southern Ukraine, drawing troops away from the east and north and potentially enabling Kyiv to make more rapid gains along those fronts before winter.
Ukraine has already attacked the Kerch Bridge several times during the war, with air-launched missiles, drone boats, and semisubmersibles. The most successful strike, via a truck bomb, damaged the bridge but did not stop its use. Eliminating the 12-mile-long span as a factor in the war will require a sustained series of long-range strikes structured to defeat Russian defenses and supported by a few new pieces of Western military hardware.

**Strategic Benefits of Attacking the Kerch Bridge**

Ukraine's decisive move on the Kerch Bridge would serve more than one strategic purpose. First, there is its value in political warfare. The Kerch Bridge project was announced following the Russian invasion of Crimea in 2014 and completed in 2018. It is the most potent symbol of Russia's illegal annexation of the peninsula and a monument to the KGB-hailing Siloviki elite's geopolitical vision of a rejuvenated Soviet empire. It is not a coincidence that during the inauguration ceremony, Russian President Vladimir Putin, with textbook Stalinist theatrics, celebrated the bridge's completion by driving a truck across it and praising construction workers for the “miracle.”

Second is the logistical dimension. The Kerch Bridge is a vital rail and road artery for the Russian Federation that links the Crimean Peninsula with the mainland. A sustained blockade of the Kerch Bridge would severely disrupt Russian lines of communication and isolate Crimea when it is most vulnerable to Ukrainian counterattacks. Should Ukrainian troops deepen their southern push toward Tokmak in the coming months, loss of access to Crimea via the Kerch Bridge would stress the capacity of Russia's Southern Military District to defend the Kremlin's crown jewel.

**Tactical Benefits**

The long-range strike campaign against the Kerch Bridge proposed below is not an alternative to the Ukrainian Armed Forces’ ongoing ground combat. However, cutting off the bridge would benefit Kyiv's ongoing counteroffensive and harm Moscow's approach for sustaining the fight.

In the south, the Ukrainian counteroffensive has failed to breach deep into Russian lines. Still, the Ukrainian Armed Forces have inextricably cornered Russian combat formations along their first line of defense, resulting in a bulge at Robotyne extending to Verbove. The Russian General Staff had to dispatch the 7th and 76th VDV air assault divisions to stabilize the front, while combat deploying the 25th Combined Arms Army to cement the second line of defense in the rear. These moves by the Russian high command probably stemmed from the bitter experience of losing Kharkiv in the fall of 2022, which caused a collapse of Russian defensive lines and enabled Ukraine to push 70 km into rear areas within a week. At the time of writing, the Ukrainian military's two main assault axes in the south—Orikhiv and Velyka Novosylka—potentially threaten Russia's lines of communications across the land bridge. The key to tactical victory is reaching the Russian strategic node town of Tokmak.

In parallel with its counteroffensive, Ukraine’s burgeoning long-range strike capability is dismantling the command and support networks Russia depends on. Since June 2023, Ukrainian forces have been pounding Russian command centers and logistics hubs, including naval forces in and around the Crimean Peninsula. These efforts are gradually crippling Russia’s ability to use Crimea to sustain combat operations in Kherson and Zaporizhzhia, while keeping the Black Sea Fleet under constant pressure. As part of these attacks, Ukrainian forces struck the Kerch Bridge with bomb-loaded trucks and kamikaze unmanned surface vessels. However, neutralizing Crimea as a source of strategic depth and support to Russian troops will require that Ukraine intensify its efforts to cut off the peninsula.

**Tactical Limitations**

If severing the Kerch Bridge was easy, it would already have happened. Russian leaders and troops recognize the bridge's operational and strategic value and have taken measures to
defend it from multiple attack vectors. Before enumerating the opportunities for a successful attack, it is worth recounting the challenges involved.

In the past, Russian forces deployed target barges with radar reflectors next to the bridge to foil overhead targeting and seekers on missiles or drones. Following the October 2022 bomb truck attack, Russian security forces began checking every vehicle that crosses the bridge for explosives, causing hours-long backups. Along the surrounding shores, the Russian Black Sea Fleet has reportedly deployed trained dolphins to hunt down hostile divers and the Rosgvardya, or Russian National Guard, has fielded additional patrols. Although nothing is impossible in the realm of special forces, these countermeasures diminish the prospects of sending troops behind enemy lines to attack the bridge at sufficient scale.

We can also firmly rule out aerial bombing of the bridge or attacks by manned rotary-wing aircraft. As our previous research explained in detail, the Russian Aerospace Forces’ Su-35S and Su-30SM aircraft, equipped with long-range R-77-1 air-to-air missiles, L-175 “Khibiny” electronic warfare pods, and N035 Irbis-E and N110M Bars-M radars outperform the Ukrainian Mig-29 and Su-27 fleet carrying R-27R/ER missiles. Russian aircraft regularly conduct combat air patrols (CAPs) between altitudes of 20,000 and 26,000 feet and hunt for Ukrainian intrusions. To strike the Kerch Bridge from the air, Ukrainian pilots will need to fly short missions at low altitudes hundreds of kilometers away from the target and attack using standoff missiles.

Last, while Ukraine has a robust coastal defense, it does not have a navy. Thus, options requiring manned surface and submarine combatants are not feasible.

### Defeating Russia’s Defenses

The only feasible way the Ukrainian Armed Forces could cut off the Kerch Bridge is by creatively using a combination of air and naval capabilities in mixed strike packages to undermine Russian decision-making and defensive schemes. This involves checking three boxes.

The first box is ensuring the ability of the strike package to lower Russian defenses’ probability of intercept, or $P(i)$, against Ukrainian weapons. $P(i)$ is a function of multiple variables, including the quality of Russian targeting data, the ability of Ukrainian weapons to evade detection or engagements, the efficacy of Russian defensive systems, and the accuracy of Ukrainian battle damage assessment to reduce the number of attacks needed. To begin lowering Russia’s $P(i)$, the Ukrainian Armed Forces will need to continue attacking ship- and shore-based radar and surface-to-air missile (SAM) sites in the Crimea and Kherson regions.

To further reduce Russian $P(i)$, the second box for Ukrainian forces to check is structuring strike packages in ways that defeat Russian defenses. Mixed strike packages combining weapons and uncrewed vehicles with a variety of trajectories and flight profiles can create a complicated targeting picture that could overwhelm Russian sensors and fire control systems and certainly consume significant numbers of SAM interceptors. Russia has used this approach with some success against Ukrainian cities.

As this article subsequently details, to create the complexity needed to outwit and overwhelm Russian defenses, the Ukrainian military will have to dispatch a combination of ballistic missiles, cruise missiles, loitering munitions, combat drones, and even modified air defense interceptors for land-attack roles. Each of these vehicles or weapons has a different radar cross section, thermal signature, trajectory, and homing angle. And while some of these systems lack the payload or precision to substantially damage the Kerch Bridge, their impact on the Russian air picture and command and control (C2) would afford the Ukrainian military a decision-centric warfare advantage.
The last box to check is the kill chain. Like any example of complex drone and missile warfare, severing the Kerch Bridge will demand a variety of sensors for target acquisition and battle damage assessment. Some segments of the Ukrainian military, in particular the defense intelligence (GUR) units, have developed a widely connected, high-speed C2 network. This C2 architecture is married to the country’s near-persistent surveillance over the battle-space thanks to round-the-clock satellite imagery. Even at the outset of the Russian invasion campaign, five commercial firms shared satellite intelligence with Ukraine. By the end of the war’s first year, Kyiv could tap into about 40 commercial satellites on a given day. This satellite data is augmented by Ukraine’s commercially available and military-grade drones, hundreds of which are flying every day to support artillery fires and monitor Russian troop movements.

Ukraine’s Options

A single strike will not be sufficient to render the Kerch Bridge impassable. Ukraine will need a series of diverse attacks, executed with a high operational tempo, to overcome the protective measures Russian forces have established. While Ukraine’s military and defense industry have made impressive strides in fielding domestically produced drones and weapons, a few key allied systems will be needed for successful strikes against the heavily defended span, as highlighted below.

• Army Tactical Missile Systems (ATACMS): While Ukraine does not have ATACMS short-range ballistic missiles at the time of writing, the Biden administration seems to be moving toward approving a transfer of these late Cold War-era weapons. ATACMS possess pinpoint accuracy and a state-of-the-art guidance kit, and use a quasi-ballistic trajectory to lower Russian air defenses’ probability of intercept. With an operational range of up to 300 km, ATACMS would enable the Ukrainian military to launch missiles from its current position in the south against Crimea or the Kerch Bridge. Ukraine could employ ATACMS in burst mode to inflict modest damage over a wide area, or fire a barrage of unitary, high-explosive warheads to severely damage a smaller area of the bridge.

• Air-Launched Cruise Missiles (SCALP-EG/Storm Shadow, Taurus): The Ukrainian Air Force has used British-supplied Storm Shadow air-launched cruise missiles on high-priority targets in Crimea, demonstrating their effectiveness against Russian air defenses. In addition to recent attacks on the Russian Black Sea Fleet’s Sevastopol headquarters, Storm Shadows have previously hit the Russian Black Sea Fleet's dry docks in Sevastopol, damaging the Improved Kilo-class submarine Rostov-on-Don beyond repair.

The Storm Shadow, which is interchangeable with its French counterpart the SCALP-EG, affords Ukraine several advantages compared to indigenous or Soviet-derived weapons. Both missiles fly low using guidance from GPS as well as terrain-matching and infrared imaging to reduce their vulnerability to the GPS jamming that is now commonplace across the Ukrainian front lines. And when it reaches its target, the missile’s small shaped-charge warhead blasts a hole in the target’s outermost shell or hull to enable a second, larger warhead to penetrate and explode inside.

In combination with ATACMS, Storm Shadows would form a lethal strike package. For example, Storm Shadows could be used to destroy or occupy local air defenses before an ATACMS salvo strikes the bridge. Previously, the Ukrainian Air Force used Storm Shadow missiles to target S-300 and S-400 strategic SAM systems and critical radar systems, such as the Podlet, to degrade the Russian protective umbrella over Crimea.

However, Storm Shadows face two main constraints. First, the Ukrainian Air Force has a limited supply. Second, the principal Ukrainian aircraft able to deploy Storm Shadows is the Su-24M bomber, which remains relatively easy prey for Russian fighters.
F-16 fighters, which are currently being prepared for deployment with the Ukrainian Air Force, could help alleviate these limitations. Although F-16s are not easily integrated with Storm Shadows, they can carry German Taurus KEPD-350 missiles, which were approved for transfer to Ukraine months ago. If the Scholz government can overcome its qualms about technicians supporting the already approved transfer, Taurus missiles could be integrated on F-16s to give Ukraine a more survivable aircraft with which to launch standoff missiles against the Kerch Bridge.

- Modified Neptune Anti-Ship Missiles for Land Attack: Ukraine has recently modified its Neptune missiles, known for sinking the Russian cruiser Moskva early in the war, to execute land-attack roles. The modified missile is believed to use the same launchers as the anti-ship variant, enjoying a range of 400 km and carrying a payload of 350 kg. Some open-source intelligence sources suggest that land-attack Neptune missiles have already struck S-400 air defense systems in Crimea, suggesting they are survivable in Crimea's airspace.

- Modified S-200 Strategic SAM for Land Attack: As the Russian military has modified its S-300s for land attack, operating like a quasi-ballistic missile, Ukraine has followed suit with its leftover Soviet-era S-200 strategic SAM systems. The radar-guided S-200 SAM was initially developed in the 1960s to defend cities, military bases, and other critical infrastructure. The giant system features a destructive warhead of approximately 200 kg and in an air-defense role, the system can effectively destroy targets up to 300 km away. In a surface-to-surface role its range would be longer, but its precision would suffer because it would lack guidance from its S-200 radar, which would be over the horizon. For course correction, one possible option is integration of a GPS guidance system. Albeit obsolete, with modification the S-200 could still prove an effective asset for the Ukrainian Armed Forces. And while the S-200 may not deliver a knockout punch to the Kerch Bridge, Ukrainian planners could exploit its high speed and suppressed trajectory to divert Russian air defenses from the main body of a mixed strike package.

- Uncrewed Naval Systems: Swarming attacks by naval robotic vehicles could be an effective complement to mixed missile attacks. By incorporating uncrewed surface vessels (USVs) and submersibles into strike packages, Ukrainian commanders would have more options to counter Russian defenses as a strike progresses, compel Russian forces to defend against a greater range of potential attack vectors, and control the tempo of an attack. US and NATO support has been important to enable the automation needed for uncrewed naval systems to circumvent Russian barrage boats and other defenses as well as navigate in GPS-denied environments around Crimea. The Ukraine military and defense industry have used this assistance and domestic innovation to field a growing variety of uncrewed naval systems, some of which have already made an impact in the war.

In July and August 2023, Ukraine’s new drone boat, dubbed Sea-Baby, conducted strikes on Russian Black Sea Fleet ships and the Kerch Bridge. Featuring a skiff-like bow design and an 860 kg warhead, the Sea-Baby USV hints at the start of a new era in Ukrainian asymmetric naval solutions that exploit commercially available parts. Ukraine’s new undersea drone, Marichka, is another prominent example of the country’s increasing prowess in uncrewed naval systems. Featuring a tubular shape, Marichka has four fins arrayed around its tail end, a pair of horizontal stabilizers at its front, and a six-bladed propeller. Produced by the crowd-funded war start-up AMMO Ukraine, the Marichka’s production cost is around $433,000 and it may be able to travel hundreds of kilometers to reach a target.
Another “war charity” dubbed Brave-1 is working on a similar project. The firm is producing a family of small kamikaze underwater drones dubbed the Toloka or Toloka-150. At a length of only 2.5 meters, the Toloka-150 is hard to detect. Thanks to its twin thrusters, small wing-like stabilizers, large keel, and forward-mounted dive planes, the system possesses impressive agility.31

**Loitering Munitions:** Loitering munitions’ small warheads cannot harm the Kerch Bridge. But Ukraine could use them to attack air defense systems as the leading edge of a strike salvo or include them in mixed strike packages to complicate the air picture or saturate air defenses.

Kyiv’s uncrewed aerial strike systems include a variety of domestically produced drones. The first is the Bober (or Beaver), developed for the Ukrainian Main Directorate of Intelligence. The Bober has an effective range of 600–1000 km and features a KZ-6 shaped-charge warhead. Open-source intelligence suggests that the system was also included in Ukraine’s drone strike packages targeting Moscow.32 Another important indigenous UAV in Ukraine’s arsenal is the UJ-22. Once a reconnaissance drone, the UJ-22 has evolved into a loitering munition with an approximate range of 800 km and a seven-hour endurance.33 The UJ-22 features a maximum payload capacity of 20 kg and can reach 160 km/hour. Advertised as a multipurpose system able to operate in challenging conditions such as electronic countermeasures and harsh weather, the UJ-22 will become an increasingly valuable element of Ukraine’s uncrewed aerial attack options.

**Akinci Strategic Drones:** Ukraine already operates the “flying Kalashnikov,” the TB-2 uncrewed combat system produced by Turkish drone maker Baykar. Following the Baykar CEO’s visit to Kyiv, the Ukrainian military began pursuing a more advanced solution, the Akinci (or Raider). The initial variant of the Akinci is powered by Ukrainian Ivecenko Progress/Motorsich engines under a coproduction deal, and news stories suggest that the Ukrainian Armed Forces could begin receiving deliveries very soon.34

The Akinci is significantly more sophisticated than the cost-effective TB-2, which was heralded for its role in defending Ukraine early in the war. The new drones, also recently purchased by Saudi Arabia, are certified to carry aeroballistic missiles (TRG-230 Kaplans) and air-launched cruise missiles (SOMs).35 Moreover, the Akinci has a flight ceiling of over 40,000 feet, keeping it out of range for short-to-mid-range Russian air defenses.

Cruise and ballistic missiles, naval uncrewed vehicles, loitering munitions, and strategic drones will have different flight profiles and speeds, and Ukraine will need to launch them from different locations. Although this diversity creates challenges in coordinating attacks, it also affords Ukraine advantages in terms of dispersal and survivability, varied threat axes, and diverse defeat mechanisms compared to more homogeneous strike packages.

For example, a Ukrainian attack on the Kerch Bridge could start with USVs deployed from the coast near Odessa hours before the strike, so they could be marshalled offshore several miles from the bridge. The USVs would begin their run toward the bridge’s foundation less than 10 minutes before fighters release cruise missiles and ground forces launch ATACMS at the bridge’s deck. To maximize the complication for Russian air defenses, USVs on their way to the bridge and strategic drones launched from shore would deploy loitering munitions, timed to arrive at the bridge just before cruise and ballistic missiles would strike.

And if this first structured attack fails to cut the bridge, Ukraine’s forces would follow within hours or days with a differently structured strike. By varying the composition and tactics of each strike package and maintaining a tempo that prevents Russian adaptation, Ukraine’s forces could soon succeed in cutting off this vital lifeline.
Conclusion

Ukraine’s defense and counterattack against the Russian invasion impressively halted Moscow’s advance within weeks and subsequently took back half of Russia’s illegally occupied territory. Now comes the hard work of dislodging Russian troops along hundreds of miles of reinforced battle lines and ejecting them from Ukraine entirely. Sustaining that effort will require continued and evolving support from the United States and NATO to upset Moscow’s political, strategic, logistical, and operational schemes. Cutting the Kerch Bridge is the best path to those objectives, and it could be achieved if the US and its allies step up to provide Kyiv with a few key missing pieces.

Endnotes


13 Bronk, “Russian Combat Air Strengths and Limitations.”


17 Hammes, “Game-Changers.”


About the Authors

Bryan Clark is a senior fellow and director of the Center for Defense Concepts and Technology at Hudson Institute. He is an expert in naval operations, electronic warfare, autonomous systems, military competitions, and wargaming.

Can Kasapoğlu is a non-resident senior fellow at Hudson Institute. His work at Hudson focuses on political-military affairs in the Middle East, North Africa, and former Soviet regions. He specializes in open-source defense intelligence, geopolitical assessments, international weapons market trends, as well as emerging defense technologies and related concepts of operations.

© 2023 Hudson Institute, Inc. All rights reserved.

About Hudson Institute

Hudson Institute is a research organization promoting American leadership for a secure, free, and prosperous future.

Founded in 1961 by strategist Herman Kahn, Hudson Institute challenges conventional thinking and helps manage strategic transitions to the future through interdisciplinary studies in defense, international relations, economics, energy, technology, culture, and law.

Hudson seeks to guide policymakers and global leaders in government and business through a robust program of publications, conferences, policy briefings, and recommendations.

Visit www.hudson.org for more information.