On Unmanned Ships

The latest Ukrainian drone-boat attack signals a sea-change in sea-surface warfare.

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With this note, I am beginning an ongoing analysis on unmanned ships in naval warfare. After the latest Ukrainian drone-boat attack, I offer five points:

> Last month's attack on the Russian signals intelligence ship *Ivan Khurs*, 200 miles from the nearest Ukrainian shore, signals a sea-change in sea-surface warfare.
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> The Russian reaction may be to greatly scale back surface ship plans—and other navies may begin following suit.
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> American plans for surface drones are not yet displacing other programs, but they are growing in scope and size.
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> Industry can support change agents in the naval bureaucracy with two highly consequential technological development efforts: towards more sophisticated on-board decision-making, and much greater equipment reliability at sea.
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> Small, robotic ships will also be very helpful for wartime mobilization, as they offset China's huge advantage in shipbuilding capacity.

Companies mentioned in this report include IBM, Incat Crowther, L3 Harris, Leidos (including Gibbs & Cox), Saildrone, Swiftships, Vigor Industrial, United States Marine Inc.

I will update this analysis as events warrant.

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The latest Ukrainian drone-boat attack signals a sea-change in sea-surface warfare.

Writing about the future defense of Taiwan, in this weekend's *Wall Street Journal*, Seth Cropsey argues that "drones and antitank weapons haven't rendered tanks obsolete, and neither have anti-ship missiles done so for warships. Any weapon is useful in the right context." Perhaps, but the geographic scope for surface warships has been standing out progressively farther from shore ever since Lord Nelson's "ship's a fool to fight a fort" meant three miles of cannon

range. Operationally, in that context, last month's drone boat attack on the Russian signals intelligence ship *Ivan Khurs* remains inconclusive, as the extent of the damage remains unclear. Strategically, the signal itself was strong: several craft attempted to ram an enemy vessel 200 miles from the nearest Ukrainian-controlled shore. The presence overhead of long-range, American MQ-4C Triton drone was notable. However, as T. X. Hammes has observed, pervasive surveillance by commercial satellites and militarized drones is providing daily passes; with optical, radar, and infrared sensors; of most of the large military assets and concentrations across broad battle zones. Change detection software is partially automating the discovery process. As I asked in my research note on contested logistics last month, how does one maneuver and resupply under that sort of reconnaissance-strike regime?

The Russian reaction may be to greatly scale back surface ship plans.

The short answer is with great difficulty. While the status of the *Ivan Khurs* remains unclear, the Ukrainians have so far eliminated four other major ships of the Russian Black Sea Fleet. In March 2022, its landing ship *Saratov* was sunk in the port of Berdyansk by a Tochka ballistic missile of the Ukrainian Army. In the same attack, the Russian landing ships *Caesar Kunikov* and *Novocherkassk* were damaged beyond repair. This is because the whole class was built so long ago, and in Poland, which will not be supplying parts. Indeed, as Costas Paris reported recently, the Russian Navy is generally short of parts, and specifically of propellers and engines parts, which had largely been imported from Europe. And of course, in April 2022, its cruiser *Moskva* was sunk off Crimea by two shore-launched Neptune missiles of the Ukrainian Navy.

Russian reaction may turn to resignation. As Benjamin Brimelow wrote recently, the Russian Navy has been of limited utility in the war, and the low value of that inaction, combined with uncertain finances and supply, may curtail modernization plans. More specifically, as Maritime Executive reported in April, Russian hopes for rebuilding that cruiser fleet are foundering. Two of *Moskva's* sister-ships, *Marshal Ustinov* and *Varyag*, remain in service, but they are 34 and 37 years old. Of the four once-feared *Kirov*-class battlecruisers, only two remain, and only one is functioning. The *Admiral Ushakov* and *Admiral Lazarev* were sent for scrapping in 2021, with the realization that their reactor cores could not be safely replaced. The *Pyotr Veliky* may be retired if the *Admiral Nakhamov* ever emerges from the Sevmash yard on the White Sea, where she has been in refit since 2006. In the long run, Russian fleet architecture may return to its undeclared approach since the end of the Cold War. With the big money consumed by a few nuclear-powered, and nuclear-armed, ballistic missile submarines, the more effective part of the fleet had become a modest but clever combination of cruise missile corvettes and diesel submarines.

Even so, note that all the destruction has been accomplished by the Ukrainian Army and an essentially shore-based Ukrainian Navy, bereft of large ships, and only hurriedly equipped with anti-ship missiles and drone boats. The Russia Black Sea Fleet is now demonstrably liable to attack anywhere on its waters, and in its harbors as well. Operations remain sharply curtailed. Watch next for what happens if Ukrainian Air Force begins firing Storm Shadows and other stealthy cruise missiles at the remaining ships.

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In effect, the Black Sea has become a lake, dominated from its shores. The Baltic Sea, only 200 miles at its widest, is now rather a "NATO lake." In that context, the point of the large surface ships of the Russian Baltic Fleet is unclear. Is the military geography of the East China Sea much the same? With his monograph on the "Mature Precision-Strike Regime" (2015), Andrew Krepinevich argued thus eight years ago, largely from the large and building inventory of Chinese missiles to the west. Around that time, a retired American admiral told me that in all their war games, the first move by the American player was to move the aircraft carriers at full speed to the east. Since then, the situation has arguably grown worse.

Apart from the Russian reaction, will we see other navies change their plans? On the one hand, one could just resolve, as I recently heard another American admiral, say, "the best way to deal with littoral areas is not to go there." So, build the same ships, but stay out of harm's way. On the other hand, we have the enthusiasm of the Marine Corps and its Force Structure 2030: "hold our beers; we've got this." That is, with this "stand in" approach, organize around landing ships and missile batteries presumably too small to attract attention, or at least long-range missiles. As I heard a third American admiral say last December, US Special Operations Command has shifted some of its attention to running "rubber boats in the First and Second Island Chains, trying to figure out how [it] can help the Navy and the Marine Corps."

That suggestion reminds me of a comment from a technologist at (oddly) the Next Generation Combat Vehicles conference in Arlington, Virginia this past March: "How does the US Navy get to 500 ships? With wave gliders and sail drones." Apart from extensive use of those types, most notable of the American activity in sea-surface drones seems to have been with submarine-chasers, like the two 150-ton ships *Sea Hunter* and *Sea Hawk*. The first was designed by Leidos and built in Oregon by Vigor Industrial; the second was re-designed by Leidos with the Navy's lessons learned, and built in Mississippi by United States Marine, Inc. In December 2019, *Sea Hunter* successfully motored from San Diego to Honolulu and back (see reporting by Edward Walsh). The duration is very valuable in the Pacific. As Bryan Clark of the Hudson Institute has noted, sending a 9,000-ton destroyer with a 200-person crew to chase a submarine is far less economical than sending a 150-ton robot. In short, he notes, the former approach to anti-submarine warfare "is expensive, does not scale, and is ripe for disruption." His long essay on the subject, with Seth Cropsey and Timothy Walton, recommends that future, offensive, anti-submarine efforts rely on a mix of aerial, sea-surface, and subsurface drones; and sea-floor sensors; with manned escort ships reserved for defending convoys and battlegroups.

More recently, as Walsh has reported, the Navy has hired L3 Harris to produce as many as nine 500-ton robotic ships, with flat decks for multiple containerized sensor, weapon, or cargo payloads. Detailed design of the vessels is being undertaken by Leidos subsidiary Gibbs & Cox and Incat Crowther. Actual construction will be accomplished by Swiftships, which had previously supplied the Navy with the unmanned ship *Nomad*, built to very similar plans.

What is less clear is whether all those smallish ships—landing and otherwise—will be survivable either. As Byron Callan of Capital Alpha Partners ventured in a recent research note, buying another 300 or so cruise missiles to clean up all the small targets would not be so expensive. After all, the Russian Black Sea Fleet could not keep Snake Island resupplied, whether with large surface ships or small boats. On the other hand, if the loss rates really will be that high, better to be losing unmanned vessels—as T. X. Hammes has similarly argued regarding resupply of marine forces "standing into" those weapons engagement zones.

Industry can support change agents in the naval bureaucracy with two highly consequential technological development efforts.

As the preceding discussion suggests, progress with unmanned vessels has been brisk over the past few years. For visuals, consider the last few Sea-Air-Space shows at Maryland's National Harbor. At the 2021 Sea-Air-Space, IBM talked up its plans to bring its autonomous *Mayflower* ship from England to Maryland and Virginia, but the fifteen-meter ship got just three days into the Atlantic before needing to turn back for repairs. Fairly, she did get as far as Nova Scotia the next year. At the 2022 show, Saildrone brought a 23-foot robotic sailboat into the hall at Maryland's National Harbor, and talked of how better that tricked-out surfboard tracked fish than the big manned ships of the US National Oceanographic and Atmospheric Administration. At Sea-Air-Space 2023, Leidos devoted a huge pad to a scale model of the *Sea Hunter*. The two actual ships were on the West Coast, as they remain far too valuable to divert to trade shows.

Yet despite known value, military bureaucracies are not often enthused about technological advances that interrupt intended careers. Oleksiy Neizhpapa may be content to command a Ukrainian Navy without cruisers, but the Navy Department in Washington is still arguing for more super-carriers with (mostly) Super Hornets. Such a force architecture cannot confidently contest the waters around Taiwan, and yet it persists. So why expect accelerating change? Take the comments of Michael Brasseur, the retired commodore for Task Force 59, the US Navy's robotic force in the Persian Gulf. In building his units, he told a crowd at the recent Nexus 23 conference, "We embraced failure. We wanted to break the robots." He spoke of employing software changes within days and hardware changes within weeks, at a "pace of change rivaled only in Ukraine." That is not the JCIDS, the PPBE, or the "5000"—the three sludgy processes of the Pentagon's "Defense Acquisition System". Rather, that fast pace of development is what become available, as I wrote with Mark Revor in 2014, when smart mid-grade leaders recognize the potential for today's digital technologies of democratized destruction to enable dispersion and concealment of highly capable machines.

Industry can yet make the case all the more plain. By my assessment, greater progress in two areas is important for making the case that such a "Ghost Fleet" can actually serve in the Western Pacific:

- More sophisticated on-board decision-making. To actually hide in plain sight, emissions control is essential. Not every task can afford a call home on a satellite link, so drone ships should eventually be capable of rudimentary decision-making on their own. Even today,

Ukraine's drone boats seem to run straight for their targets. Could they not stalk Russians through the day, comfortably out of cannon range, and then approach at night for an easier kill? If the navigation systems can handle the collision-at-sea regulations, they can handle tactical tasks more sophisticated than that.

- Much greater equipment reliability at sea. For some bundle of reasons, I can drive my car for 20,000 miles without servicing, but naval craft are reliably managing only a fraction of that. Sails and solar may be part of the solution to avoiding full failure from mechanical breakdowns, but more reliable combustion-based power trains for small ships should be within reach. Perhaps more important than eliminating the last few bridge watchstanders would be paring back the large force of marine and weapons engineers required aboard warships just to keep the equipment running. At that point, lightly-manned warships would become a much greater possibility, with huge savings in both ship design and labor.

Mobilization matters; with robotic ships, naval mobilization is far easier.

There is yet a further great value that small, robotic ships can deliver to any country with less shipbuilding capacity than China, which is to say, every country but China. The potential of robotics for mobilization is potentially war-winning, or just war-saving. Most serious US-China wargames involve losses of dozens of American ships in just a few weeks. Rebuilding from those battles would take years. To paraphrase an argument by Sorin Lungu and Aaron Friedberg, the right answer after losing an aircraft carrier in combat may not be to start building another aircraft carrier. That would take years. Instead, the better approach might be to build lots of little things that can be ready in months, with frequent software upgrades available to the entire fleet at once. Such ships, their systems, and their software could be built all around the United States. This sort of "MRAP" opportunity presents considerable opportunity for fast-moving industrialists after commencement of a major war.

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