

Revisiting Littoral Warfare: How Geographical Advantage Overrules Tech Superiority

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Introduction

The crisis of modern naval planners is not a technology shortage, but geographical constraints. The history of the world's marine order over the past century has been characterized by the pursuit of blue-water supremacy, a concept that emphasizes high-tonnage capital ships, exquisite sensor suites, and the projection of power across vast ocean expanses. Nonetheless, as the theater of

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maritime operations is moving towards the green and brown waters of the littoral, this technological advantage is more than ever facing a structural overmatch. The absolutes and facts of geography are counteracting the accuracy and weight of modern naval armies in the narrow, congested, and geographically complicated areas where the sea and the land meet. The paradigm that has been disrupted by asymmetrical players using geography as a force multiplier is the current paradigm, which equates high-cost assets with operational control.²

In this article, it is argued that those possessing the means to most effectively leverage the tactical benefits of the littoral battle space will be the determiners of the direction of maritime security in the future.

Theory

To comprehend why the modern navies are not performing very well in coastal waters, we must first realize the theoretical tension that exists between two schools of Naval thought (the Mahanian pursuit of what has since become known as Sea Control and the Corbettian reality of what has come to be known as Sea Denial).³

The proponent of 20th-century naval strategy, Alfred Thayer Mahan, believed that national greatness was determined by mastery of the sea.⁴ That is a condition that was met by destroying the fleet belonging to the enemy, and, in consequence, pushing the enemy out of the sea and compelling them to seek an exit on land. With Mahan, the fleet consisted of a single weapon of attack that must be concentrated as much as possible to heal a mortal wound of attack. Sir Julian Corbett, on the other hand, did not perceive the sea as an object to be conquered, but rather, as a means of communication.⁵ Corbett recognized that command of the sea is virtually always relative and that a weaker power can effectively challenge control without ever having to enter into a major conflict.

This clash is caused by the fact that modern blue-water navies are an array of Mahanian assumptions, and their contemporary opponent are working in a Corbettian reality. In general, the aim of the littoral is not to seize possession of that water or to turn it to personal use, but to deny

² Geoffrey Till, "Maritime Security: 'Good Navies' and Realism Re-Imagined," in *Routledge Handbook of Maritime Security* (Routledge, 2022).

³ Alfred Bergström and Charlotta Friedner Parrat, "Two Perspectives on Littoral Warfare," *Defence Studies* 22, no. 3 (2022): 433–47, <https://doi.org/10.1080/14702436.2022.2080659>.

⁴ Milan Vego, "On Littoral Warfare," *Naval War College Review* 68, no. 2 (2015): 30–68.

⁵ Glen Segell, "Revisiting Naval Conceptualism with Reference to Corbett and Mahan," *Bulletin of "Carol I" National Defence University (EN)* 12, no. 04 (2023): 63–89.

the use of the water to the enemy. It was described using the Jeanne École (Young School) theory, which appeared in France in the 19th century as a response to the British naval hegemony. The Jeune École held the belief that an inferior fleet of small and cheap, highly mobile, vessels armed with specialized weapons (such as the torpedo) could defeat a superior fleet of clumsy battle ships.⁶ But in the current day, what we are witnessing is a maturity of technology of this concept as uncrewed surface vehicles (USVs) and long-range missiles have now become the modern torpedo and allow even non-state actors to challenge the sovereignty of hundred-billion-dollar fleets.

Milan Vego goes on to improve on this structure by noting that geography is a geo-structural determinant of littoral warfare.⁷ The littoral to a blue-water navy is the backyard of somebody else, which is a very risky operational area where their mobility is limited by shallow water and can be easily detected in the background and along the coast. The littoral also provides natural shields, accessibility to logistical centres, and the opportunity of concealment in a clutter that plays havoc with the high technology of an attack force.

This geographic overmatch implies that in a battle between the exquisite and the geographic, the latter turns out to be the ultimate decider of success.

Asymmetric Sea Denial in the Black Sea

The greatest contemporary expression of the claims of geography over technology has taken place in the Black Sea. By the start of the 2022 invasion, the Russian Black Sea Fleet (BSF) had been able to achieve qualitative and numerical superiority, leading to an absolute blockade of ports on Ukrainian territory⁸. Nonetheless, as early as 2024, Ukraine, one of the countries with virtually no conventional navy, managed to exert a state of sea denial that has driven the BSF towards even more distant ports such as Novorossiysk.

The approach used by Ukraine can be considered the Jeune École model, which combined the land-based use of the anti-ship cruise missiles (ASCMs) with the prevalent domestically-produced mustrel USV.⁹ Systems such as the Sea Baby and the interesting Magurava V5 have reinstated the

⁶ Tobias Kollakowski, “War in the Black Sea: The Revival of the Jeune École?,” *Journal of Strategic Studies* 48, no. 4 (2025): 898–930, <https://doi.org/10.1080/01402390.2025.2471067>.

⁷ Vego, “On Littoral Warfare.”

⁸ Borys Kormych and Tetyana Malyarenko, “From Gray Zone to Conventional Warfare: The Russia-Ukraine Conflict in the Black Sea,” *Small Wars & Insurgencies* 34, no. 7 (2023): 1235–70, <https://doi.org/10.1080/09592318.2022.2122278>.

⁹ Kevin Weller et al., “Liminal UAV Warfare: Categorising Littoral UAVs and Their Impact on the Colonisation of the Air Littoral,” *The RUSI Journal* 170, nos. 6–7 (2025): 54–64, <https://doi.org/10.1080/03071847.2025.2589829>.

strategic calculus of the region.¹⁰ Depending on their low profiles, these 5.5 to 6-meter vessels, with high-output motors, and carrying over 850 kg of explosives, use their low profiles to their advantage and evade being detected by radar in the choppy littoral waters.¹¹ The conflict has evolved into a battle lab where software and modularity are put into the forefront rather than conventional tonnage.

The strategic implication of the battle in the Black Sea is that a naval superiority situation alone is insufficient in a fought littoral situation. Using Western assets in terms of ISR (Intelligence, Surveillance, and Reconnaissance) and decentralized targeting, Ukraine established a multi-domain denial network that Russia could not overcome because of its centralized command infrastructure. The Moskva and the effective attacks on the Kerch Bridge show that even high-profile platforms are vulnerable when they are part of the kill chain of a geographically integrated defender. Even to hold a bare defensive position, Russia had to increase its rotary-wing patrols as well as install electronic warfare systems, just to be in a basic defensive position.

Red Sea Attrition

Although the tactics used by the Black Sea have revealed the issues of tactical viability of sea denial, the crisis in the Red Sea has brought to the fore the problems associated with economic and operational sustainability of blue-water navies.

This Houthi Model of asymmetric warfare combines the level of sensors on the state level with the quantity of mass and expendability on the part of the non-state operations. By effectively exploiting the Bab el-Mandeb Strait, which is only 21 miles wide at its most constricted point, the Houthis have been able to use the narrow geometry of the Bab el-Mandeb Strait as a means of threatening the narrow global maritime economy when using fairly limited resources.¹²

The Houthis' success is characterized by the Tyranny of the Cost-Exchange Ratio. The Western navies, including the Royal Navy and U.S. Navy, are the current spenders of millions of dollars to intercept the threats, which cost the adversary a few thousand dollars only.

¹⁰ Kormych and Malyarenko, "From Gray Zone to Conventional Warfare."

¹¹ Kollakowski, "War in the Black Sea."

¹² Andrew Maher, "Proxy Warfare in Yemen: An Enduring Strategic Challenge," *Australian Army Journal* 21, no. 2 (2025): 180–204, <https://doi.org/10.3316/informit.T2025093000008100572497686>.

More so, this model is aimed at achieving magazine depths. A Type 45-like contemporary destroyer is armed with a fixed number of vertical launch silos.¹³ During a saturation attack, a saturation attack had the potential to completely deplete the entire primary magazine of a single ship within just a few minutes.¹⁴ When these defensive missiles run out of the high-value assets on which they are deployed (e.g., aircraft carriers), they become susceptible to attack and are compelled to flee. The mission-kill element of this strategy accomplishes the mission of denying the enemy the use of its capital ships, yet the enemy does not need to sink even one capital ship. The Houthi battle has had the effect of pushing the carriers in the air wing range to a position of 50 per cent of the air wing range.

Archipelagic deterrent in the Indo-Pacific

A strategy of the littoral is now getting institutionalized in the defensive codes of the Southeast Asian states, especially Indonesia and the Philippines. These states are using their ‘archipelagic geography’ as a tool to develop effective deterrence against the bigger naval powers, such as China. The Philippines has transformed into one of the least equipped maritime states in the region through the purchase of the BrahMos supersonic missile system.¹⁵

The geography of the archipelagos forms natural chokepoints, like the Malacca, Sunda, and Lombok straits, that control the passage of international trade and military passage.¹⁶ As a blue-water navy, it is a very dangerous proposition to venture into these straits. With its size, a Nimitz-class aircraft carrier is subject to extreme constraints of maneuverability in such shallow and narrow waters.¹⁷ When flying through such ‘brown water’ areas, extreme maneuvers are required, and one has to be well aware of asymmetric threats.

Countries in the region are even considering sea denial as a viable strategy that can be adopted by the countries that cannot compete with great powers, one ship against another. Indonesia is developing an ‘archipelagic deterrence network’ which relies on the fact that each nation has a

¹³ Daniele Dionisio da Silva and Gilberto Carvalho Oliveira, “Ocean Governance, Maritime Security, and International Relations,” *Contexto Internacional* 47 (2025): e20230042, <https://doi.org/https://doi.org/10.1590/S0102-8529.20244603e20230042>; Maher, “Proxy Warfare in Yemen.”

¹⁴ Kevin J. Williams, *Characteristics of Successful Special Operations Integration in Contested Amphibious Operations*, June 12, 2020, <https://apps.dtic.mil/sti/html/trecms/AD1125026/>.

¹⁵ Shang-su Wu, “Military Modernisation in Southeast Asia in the Indo-Pacific Strategic Context,” *Defense & Security Analysis* 37, no. 2 (2021): 212–31, <https://doi.org/10.1080/14751798.2021.1919355>.

¹⁶ Dougherty and George M, *Control of the Atmospheric Littoral: A Future Doctrinal Framework for Unmanned Systems in Ground Combat*, January 7, 2021, <https://apps.dtic.mil/sti/html/trecms/AD1120302/>.

¹⁷ Biswayan Bhandari, “The Environmental Legacy of Warfare,” *Journal of the American Institute* 2, no. 1 (2025): 90–100, <https://doi.org/10.71364/hec8an23>.

long coastline that they can utilise to prevent foreign forces from conducting their business within its Exclusive Economic Zone (EEZ).¹⁸ With mobile missile-carrying packages scattered across scattered islands, these countries can form overlapping, denial arcs with each other, causing the cost of bossing out to a naval stronghold to be prohibitively high against an expeditionary fleet.

Environmental Overmatch

It is the deterioration of the information dominance that is the key mechanism of geography being overruled by technology. Blue-water navies make use of advanced radar and sonar devices that are optimal in the deep, 'quiet' ocean. The littoral is, however, a bandwidth medium, which adds noise, clutter, and physical interference that are difficult to process with high-cost systems.¹⁹

In maritime radar, when land is present, it generates a huge land cutter called backscatter. The operators need to alter such parameters as Sensitivity Time Control (STC) and Fast Time Constant (FTC) in order to reduce such noise.²⁰ Such adjustments, however, tend to cause the loss of desired targets where the gain is high to the point that the background noise is eliminated, but at the same time, the signal of a low-profile threat, such as a swarming boat or a sea-skimming missile, is removed.

The detection of the littoral using acoustic detection is even worse. Shallow water is a lossy, dynamic waveguide in which sound waves bounce off the surface and the seabed.²¹ The speed of sound in these areas is extremely changeable because of rivers flowing, tidal mixing which bends sonar, creating areas known as shadow zones where targets cannot be detected.

Moreover, the excellent concentration of commercial shipping in the coastal lanes produces acoustic noise in the air that covers the sub-sea acoustic signature. Even the geographical features, such as the continental shelves, can interact with the tides to generate the nonlinear internal waves and nulls in the acoustic field at different frequencies, resulting in even the most advanced sonar being rendered practically blind.

Spacepower and Deception

¹⁸ Taufik Dwicahyono et al., "Maritime Asymmetric Warfare in Archipelagic States; The Indonesian Phenomena," *Journal of Strategic and Global Studies* 4, no. 2 (2021), <https://doi.org/10.7454/jsgs.v4i2.1045>.

¹⁹ Bhandari, "The Environmental Legacy of Warfare."

²⁰ Dougherty and M, *Control of the Atmospheric Littoral*.

²¹ Dionisio da Silva and Oliveira, "Ocean Governance, Maritime Security, and International Relations."

As geographic deception is being used by the littoral defender in response to the modern navies turning to spacepower and Artificial Intelligence (AI) to regain their advantage. There has been an increase in the competition of the hider/finder; the hider still enjoys the advantage of being more at home as compared to the terrestrial environment.²²

Advocates of blue water space thinking emphasize extensive satellite constellations at high costs to offer persistent ISR at high cost in denied space. Nevertheless, space proponents of the brown water arguments contend that such systems are susceptible and do not take into account the space gaps in hot spots of remote sensing coverage. An astute defender can time the movement of the mobile missile launchers to occur either at times between the satellites flying overhead or at times when the satellites are sitting within one cell of their grid.

In addition to this, armies are exploring the use of AI to produce fog of war machines, sophisticated deception programs that emulate a deceiver using autonomous decoys to potentially harm the sensors of an enemy.²³ Though it can enhance the capability of finding the target to a certain degree by fusing the results of satellites and radar, it can also be used to conceal the target by arranging sophisticated camouflage and electronic masking. The outcome is a check and balance competition game between the side that can more effectively bring about the mass in either way, be it of sensors or decoys.

The capability to conceal in a tunnel or a mountain range in a rather rugged terrain is still a more economical approach compared to a multi-billion-dollar effort necessary to locate it at a distance.

Concluding Remarks

The geopolitical truth of the 21st century is that in this era, technology has ceased to be a surrogate for geography. The whirls in the Black Sea and the Red Sea, as well as the emerging postures in Southeast Asia, all gain courtesy of showing that the littoral environment is a natural overmatch to the traditional down-sea power.

The contemporary navies need to adopt a new approach towards the sea, known as New Maritime Realism. This needs a change of Mahanian Sea Control to a doctrine of permanent sea denial in the littoral. Disrupting the unsustainable cost-exchange ratio requires an investment in directed-energy weapons, including the ‘DragonFire’ laser. It also entails a shift towards bimodal force

²² Nicholas Kadlec, “Artificial Intelligence and Autonomous Systems in Warfighting at Sea,” *International Law Studies* 106, no. 1 (2025), <https://digital-commons.usnwc.edu/ils/vol106/iss1/14>.

²³ Maj Robert A. Coombs, *AI Integration for Scenario Development: Training the Whole-of-Force*, 2024.

structures that would integrate traditional capital ships for blue-water operations, as well as a large number of uncrewed and low-cost systems for littoral operations. The difference between immutable geography and capability as a choice is that the former is immutable, while the latter is changeable. Those who prefer to pretend the events of the searchlights and perhaps a tipi-tent or two of heavy canvas are somehow accidental and have nothing to do with the significant history of human civilization that remains beneath us all. In the race after the green water, it is only those people who are better off with a sea, and know how to utilize it correctly.