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"Disputing Chinese Sea Control Through Offensive Sea Mining"

A paper submitted to the faculty of the NWC in partial satisfaction of the requirements of the curriculum. The contents of this paper reflect my own personal views and are not necessarily endorsed by the NWC or the Department of the Navy.

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14. ABSTRACT

This article focuses on the application of how mines can be useful for disputing sea control against China. It argues that the United States Indo-Pacific command should aggressively pursue offensive mining capabilities in the Yellow Sea and Pearl River Delta in order to enhance the commander's ability to dispute Chinese sea control. This paper expands on the current body of mine warfare academic work by demonstrating the applicability of sea mine use in peer competition conflicts and detailing the advantages the United States gains from mines as a tool for challenging sea control.

The use of mine warfare against China would provide three key effects. The mining of these two key waterways would strike at a known vulnerability in Chinese military capability. Mines are also an effective and inexpensive weapon that can provide INDOPACOM with the time and space to build forces for an effective counterattack. Finally, mining will allow the United States to disrupt the Chinese economy by interrupting the flow of Chinese trade goods and oil imports.

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Why Mine Warfare?

One cannot enter an academic discussion concerning the strategic direction of the United States without great power competition becoming a central topic. The philosophies of how the United States should deal with peer competition are extensive. For the commander of the United States Indo-Pacific Command (INDOPACOM), however, this is more than an academic exercise. It is a struggle against peer competitors and in this contest, none give INDOPACOM more pause than the People's Republic of China (PRC). In the foreseeable scenarios for conflict between the United States and China, the United States will be at a significant and immediate disadvantage. The commonalities in potential conflicts suggest China will be the aggressor and the conflict will include the maritime domain. By initiating the conflict through surprise and deception China may be able to "attack effectively first," thereby seizing on and exploiting one of Hughes's cornerstones of maritime warfare.[1] This would allow China to optimally position its military, incapacitate front-line United States forces, and establish sea control.

Knowing this devastating but feasible situation, the United States must find a means of disputing Chinese sea control while marshaling forces for a counterstroke. One highly effective means of disputing sea control is the use of mines. Since the end of World War II, the United States Navy has suffered a ratio of four ships crippled or sunk to mines for every ship lost to other means, demonstrating this weapon's remarkable lethality.[2] INDOPACOM should aggressively pursue offensive mining capabilities in the Yellow Sea and Pearl River Delta in

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1. Wayne P. Hughes Jr. and Robert P. Girrier, *Fleet Tactics and Naval Operations*, 3rd ed. (Annapolis, MD: Naval Institute Press, 2018), 29.

2. Scott C. Truver (2012) "Taking Mines Seriously: Mine Warfare in China's Near Seas," *Naval War College Review* 65: no. 2, Article 5. (Spring 2012): 32.

order to enhance the commander's ability to dispute Chinese sea control. The mining of these two key waterways would strike at a known vulnerability in Chinese military capability. Mines are also an effective and inexpensive weapon that can provide INDOPACOM with the time and space to build forces for an effective counterattack. Finally, mining will allow the United States to disrupt the Chinese economy by interrupting the flow of Chinese trade goods and oil imports.

Deterioration of United States Maritime Supremacy

China has spent the first part of the millennium expanding its capabilities. The RAND Corporation completed a study in 2015 comparing the efficacy of the United States and Chinese forces from 1996 through 2017 looking at several maritime warfare scenarios. The study was unequivocal that, in addition to the Chinese significantly closing their capability gap with the United States, China has gained superiority in several areas.[3] Lyle Goldstein makes this situation even grimmer by illuminating the RAND Corporation's omission of several key Chinese capabilities, particularly Chinese mine warfare targeting submarines.[4] The United States is heavily reliant on submarines for sea control. The targeting of submarine forces by Chinese mines places these once unchallenged platforms at great risk and disrupts INDOPACOM operations plans.[5] The task of defending United States interests in the Pacific only becomes more challenging as Chinese capabilities increase.

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3. "An Interactive Look at the U.S.-China Military Scorecard," Project Air Force, RAND Corporation, Accessed April 26, 2021, https://www.rand.org/paf/projects/us-china-scorecard.html.

4. Lyle Goldstein, "The US–China Naval Balance in the Asia-Pacific: An Overview." *The China quarterly (London)* 232 (2017): 921.

5. Lyle Goldstein, "China Is Using Sea Mines to Create an Underwater A2/AD Deathzone," *The National Interes*t, March 6, 2021, https://nationalinterest.org/blog/reboot/china-using-sea-mines-create-underwater-a2ad-deathzone-179459.

Not only have the Chinese reduced their capability gaps with the United States but China possesses multiple advantages. China has an edge due to its geography, mature strike warfare forces, and sophisticated anti-surface warfare capabilities.[6] Due to conflicts with China centering on their near seas, China would have the advantage of short interior lines of communication and operation. Despite the totality of their capabilities being less than those of the United States, China would initially be able to exert near-total dominance.[7] The Chinese Second Artillery Corps also brings the weaponry and expertise to damage and temporarily incapacitate American forward operating bases and can even threaten capital ships through the development of the first anti-ship ballistic missile.[8] Chinese proliferation of numerous lethal subsonic and supersonic missiles could prove devastating to United States warships.[9] The threat posed by these weapons makes it likely that the United States would suffer catastrophic casualties among its naval vessels if the ships maneuver within effective missile range, necessitating a further standoff distance for ships.[10] Combined with Chinese advances in air and subsurface warfare, the totality of Chinese defenses poses a formidable bulwark for any force attempting to penetrate China's near seas.

The goal of any conflict with China will be to force them to enter negotiations to end the conflict. The United States would have to exploit Chinese weaknesses to initiate favorable

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6. "An Interactive Look at the U.S.-China Military Scorecard," RAND Corporation.

7. Eric Heginbotham and thirteen others, *The U.S.-China Military Scorecard: Forces, Geography, and the Evolving Balance of Power, 1996-2017*. (Santa Monica, CA: RAND Corporation, 2015), XXX.

8. Goldstein, "The US–China Naval Balance in the Asia-Pacific," 910.

9. Heginbotham, *The U.S.-China Military Scorecard,* 174.

10. Ibid., 175.

discussions. Advancements in the aforementioned capabilities, particularly missile technology, make it increasingly difficult for INDOPACOM to form adequate countermeasures. China has made itself a particularly difficult target to attack due to its sheer size, base hardening, and skill in force concealment.[11] In a conflict with China, legacy aircraft are increasingly at risk and the United States lacks sufficient stealth and long-range standoff strike weapons for sustained operations.[12] Instead, INDOPACOM should be prepared to conduct offensive sea mining to exploit Chinese vulnerabilities and help set the conditions for conflict termination on terms more favorable to the United States.

The United States has operated under a global force structure and consistent doctrine following the Goldwater-Nichols Act of 1986. During this same time, Chinese forces have developed a strategy and complimentary weapon systems centered on countering the United States in a conflict taking place in their near seas.[13] For the United States to regain its advantage over the Chinese, the United States needs a force multiplier. By using offensive mine warfare, the United States can utilize an asymmetric threat that can substantially disrupt Chinese military operations, allow the United States to contest sea control, and upset the Chinese economy.

The Chinese Dilemma – Vulnerability to Mine Warfare

INDOPACOM should aggressively pursue mine warfare to strike at a known vulnerability in Chinese military capability. If the Peoples Liberation Army Navy (PLAN) has free and unhindered use of their naval facilities during a conflict with the United States, China

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11. Goldstein, "The US–China Naval Balance in the Asia-Pacific," 912.

12. Heginbotham, *The U.S.-China Military Scorecard*, 114.

13. Ibid., XX.

would be able to better attain and sustain sea control. Mining of these two vital areas, depicted in Appendix A, would exploit China's relative weakness in mine countermeasures, challenge and deter PLAN naval activity, and disrupt logistics and support for PLAN operations.

Offensive mine warfare has been used effectively in war since its inception and could be employed successfully against China. The PLAN is aware of United States mine warfare capabilities and has acknowledged mining must be taken into account during a maritime conflict.[14] Chinese media coverage of PLAN mine countermeasures exercises on China Central Television Channel 7 (CCTV-7) shows that China considers mines a serious threat.[15] Goldstein highlights that the Chinese have concerns that mines could be used against them but adds that the offensive mining capabilities of the United States have never been robust.[16] Because the United States does not maintain a significant mine inventory, China has not had to invest heavily in mine countermeasures. Although the PLAN maintains mine countermeasures platforms, their equipment is mostly outdated except for a small number of newer vessels and unproven experimental unmanned underwater vehicles.[17] Truver classifies their capabilities as "limited"

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14. Lyle Goldstein, "Chinese Mine Warfare: Insights from Chinese Writings," Lecture, London, April 2013, 74.

15. "Military Report" [军事报道], CCTV 7 [China Central Television Channel 7], 24 April 2021, https://tv.cctv.com/live/cctv7/index.shtml?spm=C28340.P2qo7O8Q1Led.S87602.102&stime=1619263980&etime=1619265780&type=lbacks, accessed 26 Apr 2021. This source was brought to my attention by Prof. Lyle Goldstein of the China Maritime Studies Institute (CMSI) at U.S. Naval War College.

16. Goldstein, "The US–China Naval Balance in the Asia-Pacific," 921.

17. Lyle Goldstein, "Chinese Development of Unmanned Undersea Vehicles (UUVs)," Lecture, January 24, 2019, 74.

and primarily focused on mine countermeasures in the nearshore and port environments.[18] Mines are easy to lay, but even for sophisticated mine countermeasures equipment removal is a time-consuming and challenging evolution.[19] Chinese weakness in mine countermeasures leaves them vulnerable to mining from the United States.

An offensive mining campaign could hold at risk and blockade in port the PLAN's ships and submarines. Although the PLAN could direct their vessels to challenge a minefield, that would be a risky maneuver costing valuable time, ships, and men.[20] Just the threat of mining of sea lanes can have a detrimental impact on the psyche of a navy forced to deal with the potential consequences.[21] The psychological impact on a mariner traversing a minefield cannot be understated and, although the influence can have variances between cultures, finding sailors willing to risk a proven minefield would be challenging.[22] Improvements in PLAN ships and anti-ship cruise missile technology are essential to helping the Chinese maintain sea control.[23] By offensively mining the Pearl River Delta and Yellow Sea, the United States can hold a

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18. Truver, "Taking Mines Seriously," 60.

19. Andrew S. Erickson, William S. Murray, and Lyle J. Goldstein, "Chinese Mine Warfare: A PLA Navy 'Assassin's Mace' Capability" (2009), CMSI Red Books, Study No. 3, 41.

20. Joshua Edwards, "Preparing Today for the Mines of Tomorrow," *Naval War College review* 72, no. 3 (2019), 59.

21. Edwards. "Preparing Today for the Mines of Tomorrow," 41.

22. Chief of Naval Operations and Commandant of the Marine Corps, "Mine Warfare," *Naval Warfare Publication 3-15 and Marine Corps Warfare Publication 3-3.1.2*, (Washington, DC: Office of the Chief of Naval Operations, August 1996), 2.1.

23. Goldstein, "The US–China Naval Balance in the Asia-Pacific," 913.

significant portion of PLAN ships at risk or confine them to port, thereby reducing the range at which China can threaten American and allied forces.

Although the Chinese would immediately attempt to clear any minefields laid by the United States, the PLAN logistics system would be stressed due to a reduction in available port facilities. One of the advantages of mining is that supplies must be funneled through the smaller number of available locations, overburdening those facilities.[24] This disruption in supplies would wreak havoc across the PLAN, as ships must compete for limited berthing locations. Supplies supporting all aspects of the Chinese operation would likewise have to move through these facilities, causing large stockpiles to build-up away from their normal locations. The concentration of supplies and other logistics elements in the few open ports would make the Chinese military supply chain vulnerable to further attack, allowing the United States to further disrupt Chinese operations and sustainment of combat capabilities.

Disputing Chinese Sea Control

The use of offensive mining by the United States would allow it to deploy an asymmetric means of disputing Chinese sea control. For the United States to surmount the growing challenge of contesting Chinese sea control, mining can be a force multiplier. The use of offensive mines can provide INDOPACOM with an effective and inexpensive weapon that enables the ability to asymmetrically dispute sea control while providing the United States with time and space to build forces for an effective counterattack.

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24. Chief of Naval Operations and Commandant of the Marine Corps, "Mine Warfare," 2.1.

The addition of a robust mining capability would be an economical method of building INDOPACOM's sea control arsenal. The only organic method of deploying an effective minefield is through the use of the Quickstrike family of aircraft deployed mines.[25] Through the fiscal year 2020, Quickstrike mines and the submarine-launched mobile mine cost $84.136 million for their entire lifecycle.[26] For the fiscal year 2020, the United States Navy weapons procurement budget was $4.134 billion.[27] Of that amount, the Navy spent only $5.183 million on mines, making offensive mine procurement 0.125 percent of the Navy's annual weapons budget and .0034 percent of the total Navy budget.[28] Building the required stockpile of Quickstrike or even more modern mines would be inexpensive and insignificant in comparison to other Navy weapons purchases, even with the addition of the extended range guidance module at a cost of roughly $20,000.[29] Despite the low cost of mines, platforms capable of mine deployment will be in high demand in a conflict with China. However, with constrained budgets and the increasing capabilities of China, providing INDOPACOM with mines and appropriate delivery platforms provides a very effective weapon for a bargain price.

By using offensive mining to dispute Chinese sea control, US forces can project power within the Chinese sphere of influence. One of the greatest items of concern for INDOPACOM

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25 Truver, "Taking Mines Seriously," 54-55.

26. Department of the Navy, "Justification Book Volume 1 of 1: Weapons Procurement, Navy," *Department of Defense Fiscal Year (FY) 2021 Budget Estimates*, (Washington DC: Department of the Navy, February 2020), 368.

27. Department of the Navy, "Justification Book," vii.

28. Department of the Navy, "Justification Book," 365.

29. Scott C. Truver, "Naval Mines and Mining: Innovating in the Face of Benign Neglect," Center for International Maritime Security, December 20, 2016, https://cimsec.org/naval-mines-mining-innovating-face-benign-neglect/.

is how to contest the seas while minimizing casualties. Mines provide INDOPACOM with the ability to place PLAN vessels at risk without committing the men, ships, and material needed for traditional sea control tactics.[30] Unlike personnel that operate our ships and aircraft, mines are on watch 24 hours a day and never take breaks. This continuous on-station time, as well as concealment underwater, provide for an asymmetric sea control weapon whose removal is time-consuming, requires specialized training, and is expensive.

INDOPACOM can take back control of water space and the timing of operations from the Chinese through mine warfare. Although mines cannot win battles on their own, they can be a force multiplier by taking away the advantage of initial Chinese surprise and momentum.[31] With the PLAN's movement and resupply disrupted, the United States can utilize the time created by Chinese uncertainty and confusion to build up sufficient forces in theater for follow-on operations. INDOPACOM can keep more vulnerable conventional forces outside of Chinese weapons range until ready to strike. The denial of water space from the Chinese would shrink the area that they can control, allowing the United States to force entry into less contested waters. Offensive mining can provide INDOPACOM with a means of contesting sea control, removing initial Chinese momentum, and allowing the United States to regulate the pace and location of operations.

Economics of Mine Warfare

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30. Joshua J. Edwards and Captain Dennis M. Gallagher, "Mine and Undersea Warfare for the Future," *U.S. Naval Institute Proceedings* 140, no. 8 (August 2014): 70–75. http://usnwc.idm.oclc.org/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=mth&AN=97387754&site=ehost-live.

31. Edwards. "Preparing Today for the Mines of Tomorrow," 41.

Mining of the Pearl River Delta and Yellow Sea would also disrupt the Chinese economy by interrupting the flow of Chinese trade goods and oil imports. Although the primary purpose of mines is focused on deterring and disrupting Chinese military forces, the economic impact would be crippling. China is heavily committed to maritime trade and mining would cause significant disruption to the Chinese economy. Depriving China of these vital areas would limit Chinese maritime access to trade and essential supplies of oil.

By the United States removing China's ability to move trade through ports in the Pearl River Delta and Yellow Sea China would suffer immediate economic hardships. In 2019, 60 percent of Chinese trade by value traveled on the maritime commons.[32] The ports in the Pearl River Delta and Yellow Sea regions constitute 92 percent of Chinese maritime trade by volume and over 55 percent of all trade by value.[33] Although the Chinese have been willing to undergo extreme depravity in the past, the interruption of this sizeable portion of the Chinese economy would have immediate impacts.[34] The remaining Chinese ports cannot make up for the loss in capacity. If the United States can prolong the time that these areas are mined, China would face critical interruptions in supply chains and the ability to sustain combat operations. Such a severe economic impact could build pressure within China for a diplomatic resolution to the conflict.

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32. China Power Team, "How Much Trade Transits the South China Sea?" China Power, August 2, 2017, Updated January 25, 2021, Accessed April 26, 2021, https://chinapower.csis.org/much-trade-transits-south-china-sea/.

33. "One Hundred Ports 2020: The Definitive Ranking of the World's Largest Container Ports," Lloyd's List Intelligence, accessed April 26, 2021, https://lloydslist.maritimeintelligence.informa.com/one-hundred-container-ports-2020/port-data.

34. Lyle Goldstein, interview by author, Newport, RI, April 21, 2021.

Mines can provide the United States with the capability of disrupting China's economy and making diplomacy possible.

The movement of oil through Chinese ports would also be compromised, further impacting China, and forcing them to use their strategic oil reserves. China domestically only produces one-third of the oil necessary to meet current demand.[35] As oil demand has grown in China, stagnant domestic output has formed an increasingly smaller portion of Chinese consumption. Eighty percent of the oil imported to China, constituting 55 percent of consumption, is delivered via tankers.[36] Mining of the Yellow Sea and Pearl River Delta areas would deprive China of over 50 percent of the oil it requires. Depriving the Chinese of oil supplies would impact the ability of the Chinese military to operate and would further weaken the Chinese economy.

Counterargument

Offensive mine operations have great potential benefit in a conflict against China, but some say that mines are restricted by legalities or their use is antiquated. Arguments persist that mine use is not condoned under international law. These arguments claim that mines should not be used because they pose an indiscriminate threat to neutral shipping and cannot be controlled after being deployed.[37] Further clouding the legal use of mines is the contention that a

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35. Jeff Barron, "China's Crude Oil Imports Surpassed 10 Million Barrels Per Day in 2019," U.S. Energy Information Administration, March 23, 2020, http://usnwc.idm.oclc.org/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=mth&AN=97387754&site=ehost-live.

36. Barron, "China's Crude Oil Imports."

37. David Letts, "Naval Mines: Legal Considerations in Armed Conflict and Peacetime," International Review of the Red Cross (2005) 98, no. 902 (2016), 558.

commander is limited in his ability to utilize mines due to restrictive rules of engagement.[38] Forming the assertion that mines have outlasted their usefulness are the arguments that a deployed minefield would restrict the freedom of movement of United States forces and modern technology is superior to mine warfare for sea control.[39] Modern weapon systems offer rapid and decisive effects on the enemy without establishing a hazard in the water that is as lethal to United States forces as it is to the enemy. Claims of the illegality and antiquity of mines often dissuade commanders and their staffs from considering mines in combat.

These arguments fail to hold up to thorough examination. The use of mines in an offensive fashion is not only legal but can also be a highly effective form of modern combat. The only legally binding document concerning sea mines is The Hague Convention VIII of 1907.[40] While this convention only covers automatic contact mines, customary law recognizes the convention as governing all mine types.[41] Rules of engagement concerning mines must be established well before the onset of hostilities to avoid delay and allow rapid deployment. Mine use operates within the boundaries of international law and, coordinated with rules of engagement, would clarify legal questions within INDOPACOM.

Mine warfare is not an antiquated form of combat relegated to the history books. The United States Navy has never favored mine warfare in its culture but instead has supported

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38. Edwards and Gallagher, "Mine and Undersea Warfare for the Future."

39. Edwards and Gallagher, "Mine and Undersea Warfare for the Future."

40. The Hague Convention VIII, "Convention Relative to the Laying of Automatic Submarine Contact Mines," (The Hague: October 18, 1907).

41. David Letts, "Naval Mines: Legal Considerations," 549.

systems with more immediate and "glamourous" effects. Although modern weapons offer immense capability for sea control, they place service members and their equipment at risk to achieve those effects. Mine warfare can provide sea control and has the advantages of being cost-effective while not risking lives or expensive weapons platforms once the minefield has been laid. While deploying mines can limit maneuverability, targeting the Pearl River Delta and Yellow Sea allows INDOPACOM to dispute sea control while maintaining mobility throughout most of China's near seas. The Arabian Gulf tanker war in 1988 demonstrated that even outdated mine technology is highly effective.[42] Since then, articles have been published describing the potential capabilities that more advanced mine systems and delivery platforms could provide. Mines remain relevant today and are essential for the United States to dispute Chinese sea control.

Conclusion

INDOPACOM should use mine warfare in the Pearl River and Yellow Sea areas during a conflict with China. Finding a way to bring China into diplomatic negotiations on favorable terms to the United States is the end state, and offensive mine warfare can help achieve this objective. Mines complicate China's military problem, placing PLAN forces at risk. The United States can also dispute Chinese sea control while buying space and time for a counteroffensive. Finally, China would suffer economically from the loss of trade and oil supplies. Mining would allow INDOPACOM to asymmetrically dispute Chinese sea control by exploiting a vulnerability in China's maritime defense.

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42. Truver, "Taking Mines Seriously," 31.

Recommendations

- Stockpile sufficient mines for use in the Yellow Sea and Pearl River Delta, with spares for reseeding the field.
- Incorporate mining of the Yellow Sea and Pearl River Delta into INDOPACOM operations plans.
- Ensure that mines use is incorporated into rules of engagement.
- Train joint forces in the deployment and maintenance of minefields.
- Ensure INDOPACOM staff and subordinate commanders recognize the importance of mine warfare and proliferate to lower echelons.

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Appendix A

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