8-4-2026

CMSI Translations #34: Research on Integrated Defense Against Precision Strikes by the Powerful Enemy at Sea

Zhang Debao

Sun Yunxing

Hu Xiaolong

CMSI

翻译

TRANSLATIONS

Research on Integrated Defense Against Precision Strikes by the Powerful Enemy at Sea

中国海事研究所
China Maritime Studies Institute

CHINA MARITIME STUDIES INSTITUTE
CENTER FOR NAVAL WARFARE STUDIES
U.S. NAVAL WAR COLLEGE
686 CUSHING ROAD (3C)
NEWPORT, RHODE ISLAND 02841

Research on Integrated Defense Against Precision Strikes by the Powerful Enemy at Sea[1]

By Zhang Debao, Sun Yunxing, and Hu Xiaolong[2]

Abstract: The United States has initiated substantive preparations for high-end warfare and continues to exert coercive pressure on China. Drawing on insights from over a dozen localized conflicts, this article analyzes the US military's strike capabilities, operational patterns, and systemic ground vulnerabilities. Grounded in the concepts of resilience and survivability, systems-based confrontation, and tiered defense, it proposes targeted operational principles, countermeasures, and strategic recommendations for countering precision strikes by the powerful enemy.

To maintain its global hegemony, the United States has long viewed China as its primary opponent, pursuing a strategy of "comprehensive containment" and preparing for high-end warfare. Given the potential for full-scale military intervention by the powerful enemy in the maritime domain, China must plan ahead and prepare to proactively respond.

1. Typical Strike Patterns Employed by the Powerful Enemy at Sea

A review of more than a dozen localized conflicts over the past two decades reveals that the U.S. and its allies have leveraged their technological superiority to pursue non-contact strikes and asymmetric warfare, demonstrating a highly sophisticated command of tactics and combat operations.

(1) Penetrating Missile Strikes: During Operation "Desert Storm," U.S. and allied naval and air forces employed cruise missiles such as the BGM-109 "Tomahawk" and AGM-86C. The initial wave focused on suppressing and destroying key targets—including Iraqi command and control systems, early warning and air defense networks, missile sites, and political centers—with over 280 missiles launched throughout the conflict, pioneering the operational model of long-range surprise strikes. During Operation "Desert Fox," long-range missiles once again spearheaded the surprise attack. They not only opened safe corridors through which follow-on forces could penetrate defenses, but also exerted immense pressure on the enemy's psychological defenses and will to fight. Subsequently, these precision strike capabilities have been a constant

[1] 张德宝 [Zhang Debao], 孙云星 [Sun Yunxing], and 胡晓龙 [Hu Xiaolong],海上方向应对强敌对面精确打击综合防抗问题研究 ["Research on Integrated Defense Against Precision Strikes by the Powerful Enemy at Sea"], 空军军事学术 [*Air Force Military Studies*], no. 5 (2023), pp. 13-15.

[2] Zhang Debao, Senior Engineer (Senior Colonel), Unit 93110; Sun Yunxing, Director (Lieutenant Colonel) of the Support Office at a center under the Air Force Staff Department; Hu Xiaolong, Assistant Engineer (Major), Unit 93110.

presence in operations such as "Iraqi Freedom," "Allied Force," and "Odyssey Dawn," serving as the "first choice" and a potent "left hook" for U.S.-led coalitions, thereby posing a significant threat.

(2) Stealth Penetrating Strikes: The U.S. military believes that stealth strikes can play a "rapid" and "decisive" role in warfare. Leveraging advanced stealth technology, such strikes habitually secure battlefield advantages through simple, direct means. During the Gulf War, the F-117 carried out 40 percent of all air strike missions; in the Kosovo War, the B-2 flew only 50 sorties, accounting for only one percent of the total, yet it delivered 33 percent of the ordnance; and during the War in Afghanistan, the U.S. military deployed B-2s for three consecutive nights without advance detection by opposing forces. The U.S. military plans to begin fielding the B-21 around 2025, driving an upgrade in stealth penetrating strike capabilities and further reinforcing its "stealth" advantage. Overall, the U.S. military's "stealth hegemony" remains unshakeable in the near term. Stealthy penetration strikes will continue to be a key operational method and a powerful "right hook" for the U.S. military in future combat operations against China.

(3) Coordinated Cyber-Firepower Penetration: The coordinated employment of cyber-electronic warfare and kinetic firepower is a defining characteristic of information age warfare. During the Gulf War, the U.S. military began deploying electronic warfare aircraft—such as the EA-6B, EF-111, and EC-130—on a significant scale, assigning electronic warfare assets to every wave of forces tasked with suppression of enemy air defenses and air superiority strikes. Subsequently, guided by the principles of integration, cross-domain operations, and standardization, the U.S. military has continued to explore and implement operational concepts in which standard combat formations incorporate electronic warfare units alongside strike, escort, and unmanned combat modules. These formations feature on-demand configuration and "plug-and-play" capabilities, effectively fostering the integrated development of engineering domains—such as the electromagnetic and cyber spheres—with traditional combat domains. In recent years, U.S. military operational concepts such as "multi-domain operations" and "all-domain operations" have designated electronic warfare as a critical domain, maximizing its role as a "force multiplier" to enhance and optimize capabilities within "kill chain" engagements.

(4) Large-Scale Battlefield Sweeps: Sustained, high-volume strikes following long-range raids and stealth attacks that have already fractured the enemy's combat system represent the U.S. military's true "knockout blow." In terms of combat history and precedents, during the Iraq War, the U.S. and allied forces deployed nearly 20,000 precision-guided munitions and over 800 long-range munitions, such as the "Tomahawk" and AGM-86C,

---p. 14 begins---

with the latter accounting for approximately four percent of the total. During the Kosovo War, NATO deployed a total of approximately 23,000 munitions, including only 329 cruise missiles of various types. Low-cost, short- to medium-range munitions with ranges of 100 kilometers or less accounted for roughly 95 percent of the total. In terms of delivery platforms, the U.S. military possesses a stockpile of hundreds of thousands of short- and medium-range precision-guided munitions. These can be widely deployed across various fixed-wing aircraft, helicopters, and unmanned aerial vehicles and used to conduct diverse kinds of sustained missions, such as battlefield reconnaissance-strike operations and fire support, thereby establishing a high-intensity, multi-echelon, large-scale, and highly mobile strike capability. Entering this phase signifies that the battlefield dominance already established by the U.S. military constitutes the "critical line of survival" for defensive operations.

2. Challenges Faced

The U.S. military has declared its intent to wage a war that leaves adversaries unable to comprehend its nature. Guided by concepts such as "all-domain operations," "mosaic warfare," and "distributed operations," it is continuously enhancing its capabilities and optimizing force employment, thereby posing immense challenges for integrated defense and countermeasures.

(1) Emphasizing "Rapid Strikes" to Catch Adversaries Off Guard and Leave Them Unable to Keep Pace: U.S. military operations prioritize speed. First, rapid operational planning: flight plans for 2,000 to 3,000 sorties can be generated daily on a rolling basis. Second, a rapid operational tempo: leveraging the vast expanse of the First and Second Island Chains, the U.S. military employs "mosaic" force compositions—mixing combat and support assets—to execute rapid strikes and withdrawals, completing missions in just two to three hours. Third, rapid air-and-space strikes: the U.S. military pioneered the concept of hypersonic weapons and simultaneously initiated the development of various types of hypersonic systems, such as boost-glide and air-breathing cruise vehicles. Although the AGM-183A "Air-Launched Rapid Response Weapon" faced setbacks, with four out of five tests failing and its development proving difficult, more than ten other hypersonic weapon projects are proceeding. The U.S. remains steadfast in its determination to establish a "ten-minute" rapid strike capability and to strengthen its capacity for swift aerospace strikes. By leveraging these combined advantages, the U.S. military aims to seize the initiative through rapid, preemptive strikes that penetrate enemy systems. Seizing the initiative early would allow the U.S. to maintain a continuous lead, leaving the opponent unable to discern its intentions or keep pace, and forcing them into a state of exhaustion and constant reactive disadvantage.

(2) Enhancing "Long-Range Stealth" Capabilities to Render the Weapon Invisible and Invulnerable to the Enemy: U.S. BGM-109 and AGM-86C cruise missiles boast long ranges and strong penetration capabilities, having achieved impressive results in over a dozen localized conflicts. However, they suffer from poor anti-jamming performance and challenging maintenance issues. In 2004, the U.S. military initiated the development of the AGM-158B, emphasizing four core requirements: a range exceeding 900km, with the range of its successor the AGM-158D exceeding 1,800km, specifically targeting China's "anti-access/area denial" system; stealth capabilities with an RCS of 0.01 square meters; anti-jamming capabilities via mid-course and terminal composite guidance; and a maximum payload of 24 AGM-158Bs per B-52 aircraft, significantly enhancing long-range, precision, and mass-strike capabilities. Countering stealthy, ultra-low-altitude penetrating cruise missiles poses a global challenge. Theoretically, early-warning detection ranges are limited; opportunities for ground-based engagement are scarce; and airborne systems are susceptible to radar clutter, making stable tracking and the establishment of firing conditions extremely difficult. In particular, maintaining the fundamental stability of the combat system would be challenging when facing scenarios involving U.S. military tactics that combine high- and low-altitude assets to employ saturation attacks.

(3) Emphasizing a “Low-Cost, Large-Scale” Approach, Making It Difficult for Adversaries to Sustain the Intensity of Defensive Countermeasures: Data indicates that the average unit cost for the U.S. military’s long-range munitions such as the BGM-109 series and AGM-158A/B ranges from approximately $1 million to $1.3 million, while the AGM-158C anti-ship variant costs about $3.5 million per unit. The average unit price for medium- and short-range munitions is between $200,000 and $300,000; the AGM-169 costs around $300,000 per unit and small diameter bombs cost approximately $200,000, whereas JDAM guided bombs cost only $20,000 to $30,000 per unit. In recent years, while maintaining a relatively stable stockpile of 4,000 BGM-109 missiles, the U.S. military has aggressively procured the AGM-158 series. Its total inventory of ultra-long-range munitions has reached a new high, and the aggregate number of its short- and medium-range munitions could be in the hundreds of thousands. Based on past combat engagements, the expenditure of munitions and the operational costs associated with intercepting cruise missiles far exceed those incurred by the attacking force. Faced with the U.S. military’s arsenal of thousands of long-range munitions, relying solely on kinetic firepower to counter the threat would inevitably result in a massive drain on munitions, financial resources, and national strength, making it difficult to sustain such defensive operations or maintain the necessary intensity of resistance.

3. Suggestions for Integrated Prevention and Control Strategies

Targeting the full chain of U.S. military precision strikes, China can employ cost-effective and sustainable operational methods, leveraging systems-based confrontation and tiered engagement to effectively shield the core combat zone.

(1) Countering via an Offensive Operational System: Offense is the best defense. First, prioritize seizing the initiative by strengthening strategic early warning for key operational directions. Monitor the movement among U.S. military bases along the Second Island Chain, carrier strike groups, aerial refueling formations, and aircraft such as the B-2, B-1, B-52, F-15E, and F-35. Upon detecting signs of an attack, forces from the Navy, Air Force, and Rocket Force must be immediately organized to launch a resolute counterattack directly at the source of the threat. This action aims to delay the forward deployment and firepower projection of U.S. forces, disrupt their offensive tempo, prevent a descent into chaos or passive reaction, maintain the stability of the operational system, and firmly retain the operational initiative. Second, prioritize the contest for control: focusing on the maritime theater, target the potential launch zones—located 900 to 1,500 kilometers away—for U.S. missiles such as the AGM-158B/C/D and BGM-109 series. Employ coordinated sea-air combat patrols and hunter-killer operations to vigorously contest control and prevent the breaching of critical system nodes. Focus on the 300-kilometer shorter-range strike zones, targeting assets such as the AGM-158, AGM-88E/G, and SDB, and employ air-to-surface coordination to interdict U.S. forces attempting close-in, large-scale

---p. 15 begins---

strikes, thereby firmly holding the “critical line of survival.” Third, adopt a strategy of tiered engagement: to counter cruise missile attacks beyond the First Island Chain—where air combat formations are complex and defensive operations are difficult to sustain—aircraft carrier strike groups should serve as the primary force. Air assets should focus on distributed detection and situational awareness sharing in order to achieve early warning through coordinated action. In the area extending up to the First Island Chain, multi-layered interception zones should be established based on range and jointly manned by aviation and ground-based air defense units. This approach enables a tiered defense against strike platforms and incoming munitions, progressively thinning the density of the incoming threat while cumulatively enhancing interception and defensive effectiveness.

(2) Disrupting Guidance to Degrade Lethality: For new U.S. munitions, mid-course guidance generally employs a hybrid system combining GPS, INS, mid-course command updates, and terrain-following capabilities, while terminal guidance is trending toward multi-mode systems to counter increasingly complex battlefield environments. However, regardless of how munition guidance technology evolves, fundamental physical principles dictate that no munition is immune to interference. Moreover, the long flight distances of long-range strike munitions create windows of time in which to implement technical countermeasures, disrupt guidance chains, and degrade the kill chain. During an enemy missile's mid-course guidance phase, integrated forces from the Strategic Support Force, Navy, and Air Force can be deployed against targets beyond the First Island Chain. By leveraging the open maritime battlespace—characterized by difficulties in terrain and scene-matching navigation as well as low risks of collateral damage—mobile jamming and countermeasure zones can be established. These zones allow for early-stage capture and diversion of missiles, causing them to crash into the sea, deviate from their planned flight paths, or launch erroneous attacks, thereby preventing the achievement of intended strike effects. For targets approaching the coastline, targeted GPS jamming can force enemy missiles to prematurely switch to pure inertial navigation, leading to an accumulation of terminal guidance errors. During the terminal guidance phase, by leveraging the multi-mode guidance characteristics of U.S. munitions—which utilize radar, laser, television, and infrared imaging—integrated countermeasures such as electronic interference, smoke, fire, light, fog, and decoys can be employed in concert to degrade the munitions' hit accuracy. An assessment of the Kosovo War by the U.S. military noted that "many decoy targets employed very primitive technology, yet still deceived NATO's advanced sensors; the AGM-86C had a launch success rate of only 75 percent and a target hit rate of less than 50 percent. On average, engaging each target required 1.5 sorties and the expenditure of 2.8 precision-guided munitions." The existence of these issues is the direct driver of the U.S. military's resolute pursuit of a multi-mode guidance technology path. It also suggests that implementing end-to-end countermeasures against munition guidance links and executing high-intensity operations to drive off or destroy delivery platforms will inevitably further degrade their strike effectiveness.

(3) Employing Tactical Countermeasures to Disrupt the Enemy's Operational Tempo: Adopt proactive and flexible tactics to break the U.S. military's "kill chain," thereby increasing their operational costs and enhancing the survivability of China's critical assets. This approach creates the necessary conditions for sustained operations and counterattacks. First, counter-reconnaissance: strengthen security and secrecy measures during major exercises and drills, and enhance responses to U.S. aerospace strategic reconnaissance. The goal is to prevent the precise detection of sensitive, critical information about key targets such as core nodes; strategic equipment deployments; and the locations, defensive measures, and electro-optical signatures that could otherwise enable the rapid formation of a kill chain. Focus on countering reconnaissance methods involving the electromagnetic spectrum, optical imaging, and synthetic aperture radar in order to disrupt the enemy's ability to rapidly and accurately obtain damage assessment data. Second, maintain a posture of frequent dispersal: airfields and operational sites

must establish dispersal areas and conduct regular drills to ensure rapid dispersal when the situation demands it, thereby effectively preserving combat capabilities. Third, employ dynamic, unpredictable maneuvering. Units grounded in realistic combat scenarios—especially key hubs and major airports along the coast—must dynamically adjust the mobile deployment of primary combat assets to prevent adversaries from discerning operational patterns and launching targeted strikes. Fourth, utilize realistic decoys: improve the construction of battlefield infrastructure by prioritizing camouflage and protective measures, such as concealing genuine targets to enhance survivability while simultaneously deploying low-cost, high-fidelity decoys. These decoys serve to dilute the enemy's surprise strike capabilities, thereby prolonging the U.S. military's OODA loop and disrupting its overall operational process.

(4) Enhancing Capabilities and Efficiency Through Synergistic Integration: Success in defending against long-range precision strikes by the U.S. military relies on a systems-based approach, with coordination as the decisive factor. First, collaborative sensor-based situational awareness: information links can be built by establishing a distributed, networked system that integrates ground-based radars; airborne radars on early warning aircraft, fighter jets and UAVs; and the surveillance and guidance radars of surface-to-air missile systems. This provides precise data for countering cruise missiles and overcomes the common challenges faced by individual assets—namely, "being unable to see, being unable to see far enough, and being unable to see accurately" when it comes to ultra-low-altitude stealth targets. Second, coordinated "information-fire" engagement: beyond traditional engagement methods such as surface-to-air missile systems and fighter jets armed with air-to-air missiles, efforts are underway to establish distributed, collaborative engagement chains. These are being rapidly integrated with electronic warfare systems to achieve scalable, cost-effective "soft" and "hard" kill capabilities. Third, coordinated control of operations: coordination is key to effectively countering air-to-surface strikes. Airborne early warning aircraft may be authorized to assume command and control in long-range, open-ocean interception operations. Terminal defense operations may be centrally managed by the air defense combat command center, and terminal defense control groups are to be established at target areas, airfields, and positions to ensure the coordinated and effective implementation of integrated defense and counter-strike measures.