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14. ABSTRACT As the air arm of the Marine Air-Ground Task Force (MAGTF), Marine aviation today is not postured to operate in a contemporary near-peer environment with threat such as China due to antiquated Cold War and post-Cold War assumptions, concepts, and technologies. China's goal at limiting both the US Navy's and Marine Corps's freedom of maneuvering in the area while cementing China as the stabilizing force in the region through aggressive development and its employment of A2/AD, AI, and UAS capabilities. As it currently stance, Marine aviation is experiencing a crisis that requires a paradigm shift in terms of manning, training, equipping, organizing, and thinking to be relevant.						
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Executive Summary

Title: Marine aviation operating in a contemporary near-peer environment

Author: Major Kaho. Ng, United States Marine Corps

Thesis: As the air arm of the Marine Air–Ground Task Force (MAGTF), Marine aviation today is not postured to operate in a contemporary near-peer environment due to antiquated Cold War and post-Cold War assumptions, concepts, and technologies. As it currently stands, Marine aviation is experiencing a crisis that requires a paradigm shift in terms of manning, training, equipping, organizing, and thinking to be relevant.

Discussion: Economic development in Asia since the mid-1990s has transformed China from an underdeveloped nation that was militarily and technologically inferior to the US into a regional hegemon in the Indo-Pacific region. Based on this growth, a strong economy and an increase in military spending have enabled China to influence and threaten the sovereignty of neighboring states. It has been able to do this through the rapid development of sophisticated anti-access area denial (A2/AD), artificial intelligence (AI), and unmanned aerial system (UAS) capabilities that can effectively deter deployment of US military, air, and naval power projection in the Indo-Pacific region—traditionally controlled by the United States—and minimize the effect of naval and marine aviation power.

At the same time, the US military became absorbed in post-Cold War minor engagements of “Military Operations Other Than War” (“MOOTW”) that enabled the continued assumption of employing amphibious and expeditionary measures with little to no risk of long-range anti-air defenses. Much as the Soviets surpassed the US in military technology during the long hiatus of the Vietnam War, China exploited this long interval by developing highly precise, long-range, anti-air and anti-ship defensive missile systems, effectively undercutting what had been an asymmetric US advantage of air and naval supremacy.

Conclusion: The post-Vietnam Cold War era was a period full of tremendous challenges for the US military. Though the Soviet collapses in 1991 ended the Cold-War, the strategic environment of preparing a hypothetical nuclear capable, peer enemy has cemented the DoD antiquated conceptual and technological assumptions to this day against a contemporary, near-peer enemy. China's goal at limiting both the US Navy and the Marine Corps's freedom of maneuvering in the area while cementing China as the stabilizing force in the region through aggressive development and its employment of A2/AD, AI, and UAS capabilities. So, what are some of the possible solutions? This author suggests the following: 1) A different warfighting concept for the MAGTF, and the ACE within it, will be necessary for the future operating environment of a future war against the future threat; and 2) Different technology for the ACE is likely necessary to carry out that concept. *IN SUM: Marine aviation will need thorough-going reform.* Marine aviation is part of a more extensive system and without systemic change, and indeed system-thinking change – a change in how the Marine Corps thinks about the systemic character of future war in the future operating environment – the Marine Corps cannot understand how the MAGTF will fight and therefore how Marine aviation can best function within it.

DISCLAIMER

THE OPINIONS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE INDIVIDUAL STUDENT AUTHOR AND DO NOT NECESSARILY REPRESENT THE VIEWS OF EITHER THE MARINE CORPS COMMAND AND STAFF COLLEGE OR ANY OTHER GOVERNMENTAL AGENCY. REFERENCES TO THIS STUDY SHOULD INCLUDE THE FOREGOING STATEMENT.

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Introduction

*The Marine Corps is currently not organized, trained, and equipped to meet the demands of a future operating environment characterized by complex terrain, technology proliferation, information warfare, the need to shield and exploit signatures, and an increasingly nonpermissive maritime domain.*¹— Marine Corps Operating Concept

Marine aviation today is experiencing a crisis that requires a paradigm shift in terms of manning, training, equipping, organizing, and thinking. Unlike at the end of World War II, when the United States attained a strategic victory with the atomic bomb and established itself as a global superpower, or the 1980s, when US dominance in a military technology race led to the end of the Cold War, today no nation can dominate another player with a single capability, and newly enhanced air defense systems threaten the air arm of any amphibious unit. Despite significant investment in new capability, as the air combat element (ACE) of the Marine Air–Ground Task Force (MAGTF), Marine aviation today is not postured to operate in a contemporary near-peer environment due to antiquated Cold War and post-Cold War assumptions, concepts, and technologies. By examining both the Cold War legacy and the contemporary threat, one can appreciate more easily how and why Marine Aviation must change if it wishes to remain relevant. Ultimately, this analysis of how to save the ACE serves as a tracer to delineate some of the ways the MAGTF itself must change.

After World War II, the Cold War started between the United States, with its capitalist allies in Western Europe, and the Soviets Union, with its communist allies in Eastern Europe and Asia, based on geopolitical and ideological differences.² Initially, the US intended to capitalize on its monopoly on the atomic bomb as a deterrent to the Soviets’ overwhelming quantity of

1. Headquarter Marine Corps, Marine Corps Operating Concept (Washington, DC: US Government Printing Office, 2016), 8.

2. John Gaddis, *The Cold War: A New History* (New York, NY: Penguin Press, 2005), 35.

conventional weapons while avoiding a military buildup to match said capability and instead focusing on rebuilding Western Europe's economy.³ However, on August 29, 1949, the Soviet Union announced that it, too, had successfully tested and was in possession of an atomic bomb. To the US, this announcement came as a shock because the Soviets now had both an atomic capability and a disproportional conventional advantage, and because the US was spending almost 10 percent of its annual expenditure on the recovery of Europe, it simply could not afford a conventional military buildup to match that of the Soviets.⁴ Ultimately, President Truman approved the accelerated production of atomic bombs and the development of the hydrogen bomb to deter the Soviet threat to Western Europe because the US considered that a nuclear stockpile was still more cost-effective than a buildup of its conventional forces.⁵

The strategic pressure of operating under the Cold War umbrella profoundly influenced the Marine Corps's view on preparing for the next conflict, specifically under the assumption that any future US adversary would be similar to the Soviets as a conventional-force peer against whom the US could maintain air superiority, presumptive sea control, and assured communications.⁶ However, the Soviet Union collapsed in 1991 and China emerged as a near-peer contemporary threat that possesses capabilities that far exceed those of the Soviets, while the Marine Air-Ground Task Force (MAGTF) remains rigid in its roles, missions, organizations, and capabilities as an expeditionary amphibious force.

At the same time, the US military became absorbed in post-Cold War minor engagements of "Military Operations Other Than War" ("MOOTW") that enabled the continued assumption

3. Gaddis, *The Cold War*, 35.

4. Gaddis, *The Cold War*, 35–36.

5. Gaddis, *The Cold War*, 36.

6. EABO and Stand Forces (received on April 25, 2019), unpublished brief received as an email attachment from Colonel Arthur Corbett (retired), Microsoft PowerPoint file.

of employing amphibious and expeditionary measures with little to no risk of long-range anti-air defenses.⁷ The trend continued for over a decade with the post-2001 conflicts in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF.) Similar to the long hiatus the US took during the Vietnam War while the Soviets surpassed the US in military technology, this interval allowed China to exploit America's distraction by developing highly precise, long-range, anti-air and anti-ship defensive missile systems, effectively undercutting what had been an asymmetric US advantage of air and naval supremacy. The MAGTF is obsolescent, and Marines must develop an entirely new operating concept for the South China Sea problem, one centered on position defense as much as on maneuver.

Simply put, Marine aviation today is not postured to operate in a contemporary near-peer environment due to antiquated Cold War and post-Cold War assumptions, concepts, and technologies. Moreover, as the South China Sea tension intensifies, years of distraction on conflicts ashore are unraveling the blue-green relationship that is instrumental as a strong maritime force. General Neller, the 37th Commandant of the Marine Corps, communicated this problem in testimony to Congress:

Today, the Marine Corps faces many challenges; some as a consequence of rival adaptations, and some as a result of unpredictable funding. Years of sustained operations ashore in Iraq and Afghanistan have increased the divide between the Marine Corps and the Navy. For years, the Marine Corps and Navy have taken presumptive sea control for granted, despite warnings.⁸

7. Joint Staff, *Joint Doctrine for Military Operations Other Than War*, JP 3-07 (Washington, DC: Joint Staff, June 16, 1995), vii. The term MOOTW no longer used and JP 3-07 was later renamed to *Stability* to reflect the current issues the military face. Per the JP 3-07, the goal of MOOTW was to focus on war deterrence and promoting peace, and that unlike conventional conflict whereas the military is the primary effort, MOOTW put more emphasis on the political implications and military action was to support, and enable the political end.

8. Robert Neller, "Statement of General Robert B. Neller Commandant of the Marine Corps as Delivered to Congressional Defense Committees on The Posture of the United States Marine Corps" (statement, United State Congress, Washington, DC, April 20, 2018).

The goal of this essay is therefore to seek possible solutions on how Marine aviation should be optimized for a “fight tomorrow” conflict with a near-peer threat by: 1) challenging the current assumptions on future operating conditions; 2) anticipating forthcoming requirements and the reality of functioning in these future operating conditions; and 3) reevaluating Marine aviation roles, functions, and technology under the future operating conditions.

The Rise of China

Overwhelming US military success in the Gulf War and the dissolution of the Soviet Union in 1991 established the United States as the sole world superpower. During the same period, a sleeping dragon awakened that eventually became a near-peer competitor confronting America in the 21st Century. The mid-1990s economic development in Asia transformed China from an underdeveloped nation that was militarily and technologically inferior to the US into a regional hegemon in the Indo-Pacific region. Based on this growth, a strong economy and an increase in military spending have enabled China to influence and threaten the sovereignty of neighboring states.⁹ In 2016, the Joint Staff published *The Joint Operating Environment 2035*, which predicted that adversarial competitors would work to minimize US significance on the world stage.¹⁰ Currently, such a competitor already confronts the United States: China.

The best way to appreciate China’s significance to the US is to take a look at the 2017 *National Security Strategy (NSS)* and note that the word “China” is mentioned thirty-two times, even more than “Russia” (twenty-five times).¹¹ According to the *NSS*, China is a near-peer power that wants to clash with US values by shaping a world in conformity with China’s interests, and

9. Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Development Involving the People’s Republic of China 2018* (Washington, DC: US Government Printing Office, 2018), I.

10. The Pentagon, *Joint Operating Environment 2035* (Washington, D: US Government Printing Office, 2016), II.

11. The White House, *The National Security Strategy of the United States of America* (Washington, DC: US Government Printing Office, 2017), 25.

“seeks to displace the United States in the Indo-Pacific region, expand the reaches of its state-driven economic model, and reorder the region in its favor.”¹² It has been able to do this through the rapid development and integration of sophisticated anti-access area denial (A2/AD), artificial intelligence (AI), and unmanned aerial systems (UAS) capabilities that can deter the deployment of US military, air, and maritime power projection in the Indo-Pacific region—traditionally controlled by the United States—and thereby minimize the effect of naval and Marine aviation power. China’s rising military and technological complexity and capability raise a crucial question: What would a hypothetical conflict with China look like and what would Marine aviation’s role be in this conflict?

A Hypothetical War with China Today

According to a 2016 research report by RAND, China’s increasing military capability will make it progressively challenging for the US to maintain military–operational superiority.¹³ The authors suggest that a conflict today would favor the US and that “US losses could be a relatively small fraction of forces committed, but still significant; Chinese losses could be much heavier than US losses and a substantial fraction of forces committed.”¹⁴ Although the initial phase of the conflict would still be favorable to the US, the authors argue that in the near future, China’s increasing military capacity would shrink the gap in losses and that “US losses could range from significant to heavy; Chinese losses, while still very heavy, could be somewhat less than in 2015, owing to increased degradation of US strike capabilities.”¹⁵

12. The White House, *NSS 2017*, 25.

13. David C., Gompert et al., *War with China: Thinking Through the Unthinkable* (Santa Monica, CA: RAND Corporation, 2016), IX.

14. Gompert et al., 67.

15. Gompert et al., 67.

For Marine aviation, the evolving Chinese A2/AD capability packs a double punch: China will possess not only anti-ship missiles that could target the naval platforms on which Marine aviation (and ground forces) would arrive in the theater but also anti-air defenses that could outrange the longest-range Marine aviation assets. Stephen Biddle and Ivan Oelrich, the authors of the essay “Future Warfare in the Western Pacific: Chinese Antiaccess/Area Denial, U.S. Air, Sea Battle, and Command of the Commons in East Asia,” have posited that through its increasingly complex capability, China will ultimately be able to extend its A2/AD reach to a distance that covers an area that links Guam, Papua New Guinea, and Japan, well outside the tactical range of any ship-based Marine aviation asset without refueling. Although there will be an in-depth explanation of the operating range of Marine aviation shipboard capable aircraft in later sections of this paper, the key takeaway is that the furthest a Marine shipboard aircraft can travel today without refueling is around 645 nautical miles (equated to 1,200 kilometers.) This limitation means that all air-capable naval platforms that Marine aviation stations as part of a forward deployed force will be well within China’s ground-based A2/AD striking capabilities, which can extend up to 4,000 kilometers (Figure 1).¹⁶

16. Stephen Biddle and Ivan Oelrich, “Future Warfare in the Western Pacific: Chinese Antiaccess/Area Denial, U.S. Air, Sea Battle, and Command of the Commons in East Asia,” *International Security* 41, no. 1 (2016): 7. doi:10.1162/ISEC_a_00249. https://doi.org/10.1162/ISEC_a_00249.

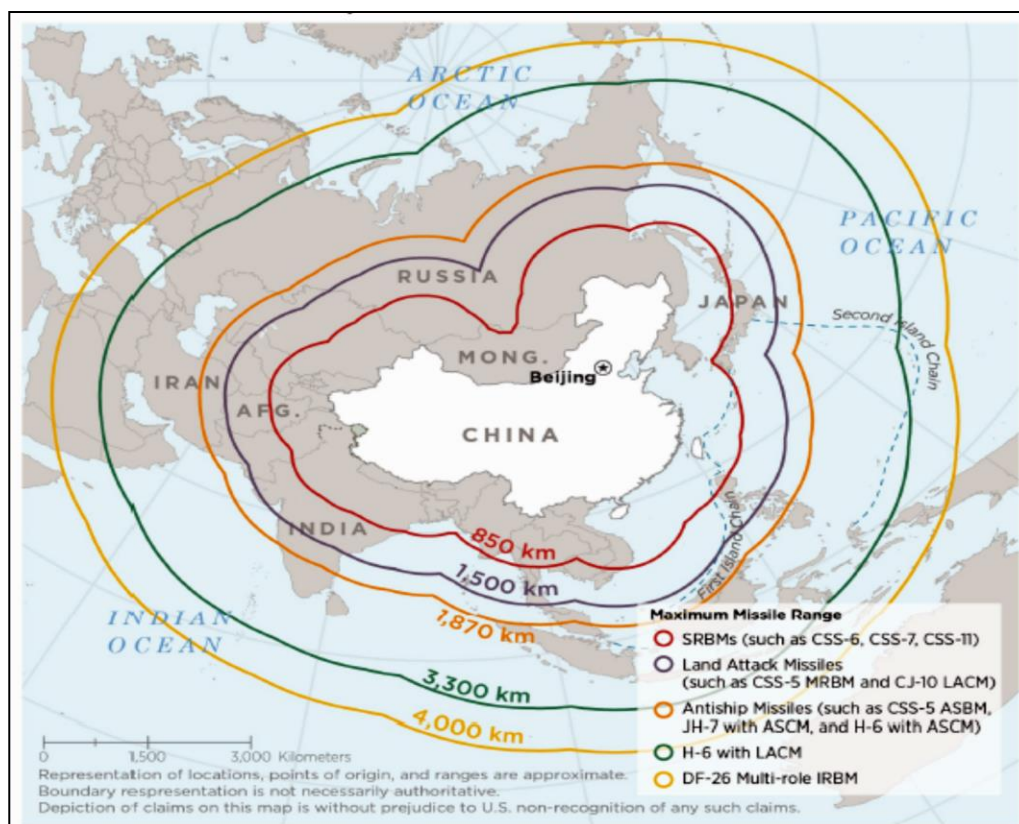


Figure 1: A map of China's strike capabilities. Source: Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Development Involving the People's Republic of China* 2018, 37.

The threat, moreover, is not limited to land-based ranges. Undeniably, the People's Liberation Army Navy (PLAN) already possess sea-based, nuclear deterrent capability with nuclear submarines equipped with the JL-2 submarine-launched ballistic missile (SLBM) that have the range of 8,500 kilometers; a logical assumption is that China will soon enjoy the technology to equip and deploy the DF-26 IRBM on PLAN vessels that have the range of up to 4,000 kilometers (Figure 2).¹⁷ Once the PLAN can make this prospect a reality, then the

17. Office of the Secretary of Defense, *Annual Report to Congress* 2018, 29; CSIS Missile Defense Project, "Missiles of China," accessed Apr 24, 2019, <https://missilethreat.csis.org/country/china/>.

combination of these capabilities would enable China to threaten everything from the West Coast outward effectively.



Figure 2: A figure of China's ballistic missile capabilities. *Source:* "China's Ballistic Missiles," accessed Apr 24, 2019, <https://missilethreat.csis.org/country/china/>.

Sophisticated sensing and targeting systems, including UAS and space-borne platforms, will make every friendly platform and vehicle vulnerable. As a crisis response force in the Indo-Pacific region that operates within China's A2/AD umbrella, Marine aviation in its current posture cannot cope with such a threat.

Further underpinning Chinese military capabilities is their rapid development of AI. Experts believe that while the United States still possesses an early edge in AI technology, China is rapidly advancing its AI programs in military applications and will overtake the US in this

arena.¹⁸ For example, China currently possesses drones with AI that only target specific US weapons such as high-value aircraft and ships, which would further deter the US naval projection capability.¹⁹

Finally, China has realized that an unmanned system designed for military application is instrumental in naval combat and has developed a variety of such systems to include aerial, surface, and underwater equipment.²⁰ The country has recently developed UASs comparable to those of the US, which are autonomous and range from hand-launched models for surveillance purposes to models capable of conducting aerial combat, electronic warfare, and command, control, communications, computers, information/intelligence, surveillance, target acquisition, and reconnaissance (C4ISR) missions. What China's C4ISR as part of integrated A2/AD systems can almost achieve today is what the Soviets were trying to accomplish back in the 1970s-1980s as comprehensive, automated, long-range precision systems with integrated C2 such as the reconnaissance-strike complex (*razvedyvatel'no-udarnyy kompleks* or RUK).²¹ Given China's increasingly sophisticated offensive and defensive capabilities that provide a greater standoff distance between China's shore and the United States' military reach, the role for Marine aviation within this new strategic environment is in question.

Can Marine aviation be saved? The answer depends in part on the purpose or character of any future war with China, which will, in turn, shape the military objectives and therefore the operational planning and tactical requirements. In the hypothetical war with China depicted by RAND, the researchers make the implicit assumption that a US-China conflict would involve

18. Elsa Kania, *Battlefield Singularity: Artificial Intelligence, Military Revolution, and China's Future Military Power* (Washington, DC: Center for a New American Security, 2017), 4–5.

19. Kania, 23.

20. Lyle Goldstein, "The US-China Naval Balance in the Asia-Pacific: An Overview," *The China Quarterly* 232, no. 12 (2017): 909. doi:<http://dx.doi.org.lomc.idm.oclc.org/10.1017/S030574101700131X>.

21. Milan Vego, "Recce-Strike Complexes in Soviets Theory and Practice" (Soviets Army Studies Office, U.S. Combined Arms Center, 1990), 1.

forcible-entry type warfare, where the US would fight its way against China's robust A2/AD from the sea to shore. For such a conflict, Marine aviation *as currently postured* is irrelevant.²²

This author, however, argues that a military engagement with China will not unfold as a war of attrition or a fight for the occupation of China's shore. Instead, the cause of any conflict would be the same as when the US was planning to face the Soviets Union with AirLand Battle during the Cold War: the United States would use the military to contain China within politically acceptable territorial bounds and to create an opportunity for future political or diplomatic negotiation.²³ It would not be necessary or desirable to project power against the mainland Chinese territory; indeed, the objective would be to avoid such escalatory developments. The United States, however, must find a way to achieve a stable outcome without resorting to such measures; deterrence would depend on a credible degree of unacceptable cost imposition.

This author proposes the following assumptions during the problem framing process when facing China in the South China Sea: 1) the US military posture against China would be defensive in nature to protect itself and its allies; 2) the US goal in an armed conflict would be containment of China within the first island chain to protect itself and allies; 3) simply due to proximity and access of forces, the MAGTF would be the first responder to any conflicts that occurred in the South China Sea; and 4) the technologies and capabilities of Marine aviation today would likely remain the same in a near future conflict. The critical point of these assumptions is that while China's robust A2/AD systems have the ability to create a significant stand-off distance that makes US conventional power projection capacity irrelevant (China

22. Thank you to Dr. Antonoff for expanding my understanding of the critical issues with A2/AD, and the historical parallel between the Soviets Union and China in modern times.

23. John B Hattendorf D Phil, *The Evolution of the U.S. Navy's Maritime Strategy, 1977-1986* (Rhode Island: Naval War College, 2004), 70.

aggression or territorial expansion would probably remain under the US threshold to deploy a nuclear asset), the purpose of US power projection force would also be to deter China's access within the region, and that the defensive approach taken by both the US and China would ultimately create an equilibrium with both sides mutually denying access to both the South China Sea and the Philippine Sea.

While it seems hopeless for Marine aviation to operate under such a future strategic operating environment, there are still conduits for Marine aviation to survive, and even thrive in future conflicts. However, drastic measures must take place such that the US military must come up with a feasible operating concept relevant to these conditions. The future viability of Marine aviation under such circumstances will depend in part on envisioning, developing, and employing new capabilities that expand the range and survivability of platforms designed against manned and unmanned fires launched from all available domains – space, air, ground, surface, subsurface, and cyber. Because Marine aviation serves as an integral part of a greater complex combat system, however, one must first understand that larger system before considering how aviation might change.

Marine Aviation's Current Role in the Pacific

It is vital to understand that the role of Marine aviation in the Indo-Pacific area is to serve as an essential instrument that helps to enforce US national interests in the region, despite being the smallest air component of the smallest military service under the Department of Defense. Under the Marine Corps Marine Air-Ground Task Force (MAGTF) construct, the purpose of Marine aviation is to serve as an air extension of the MAGTF in the form of the aviation combat element (ACE). The MAGTF is the Marine Corps's organizational template constructed as a scalable, adaptable, amphibious expeditionary force that provides combatant commanders with a

wide range of military capabilities.²⁴ More specifically, the heart of the MAGTF as a readiness force is the Marine Expeditionary Unit (MEU) that serves as a task-organized, self-contained readiness rotational MAGTF force at sea that is capable of conducting various contingency operations on short notice and for short duration."²⁵ Per Marine Corps policy, the MEU's mission is to provide:

A forward-deployed, flexible sea-based MAGTF capable of conducting amphibious operations, crisis response, and limited contingency operations, to include enabling the introduction of follow-on forces and designated special operations, in order to support the theater requirements of the Ground Combat Commander (GCC).²⁶

An essential note of the MEU's mission statement is the ability to conduct amphibious operations, which has once again become the staple of the Marine Corps existence after spending decades ashore in the Vietnam War.²⁷

More importantly, there are three MEUs stationed in Camp Pendleton, California (the 11th, 13th, and the 15th MEUs), three stationed in Camp Lejeune, North Carolina (the 22nd, 24th, and the 26th MEUs), and one MEU stationed overseas in Okinawa, Japan (the 31st MEU). At any moment, there is always one MEU from each coast deployed on naval vessels around the globe as part of a power projection force that responds to any crisis (the 31st MEU is the only continuously forward-deployed MAGTF overseas while the other MEUs are on six-months rotations).

24. Marine Corps Concepts & Programs, "Marine Air Ground Task Force," accessed Apr 7, 2019, <https://www.candp.marines.mil/Organization/MAGTF/>.

25. Headquarters, United State Marine Corps, *Organization of the United States Marine Corps*, MCRP 1-10.1 (Washington, DC, 2015), 1-8, 1-9.

26. Headquarters, United State Marine Corps, *Policy for Marine Expeditionary Unit (MEU)*, MCO 3120.13 (Washington, DC, 2015), 5.

27. Rebecca W Jensen and Keil Gentry, "Identity Crisis between the Wars: How Doctrine Shaped the Marine Corps after World War I and Vietnam." *MCU Journal* 8, no. 1 (Spring 2017), 73.

The role of Marine aviation, in the form of the ACE that serves as the air component of the MEU, is to provide all or a portion of six functions of Marine aviation to accomplish the MEU commander's mission. The ACE consists of a Marine Medium Tiltrotor Squadron (VMM) which employs the MV-22B reinforced with additional aircraft and various other aviation detachments (Figure 3).²⁸

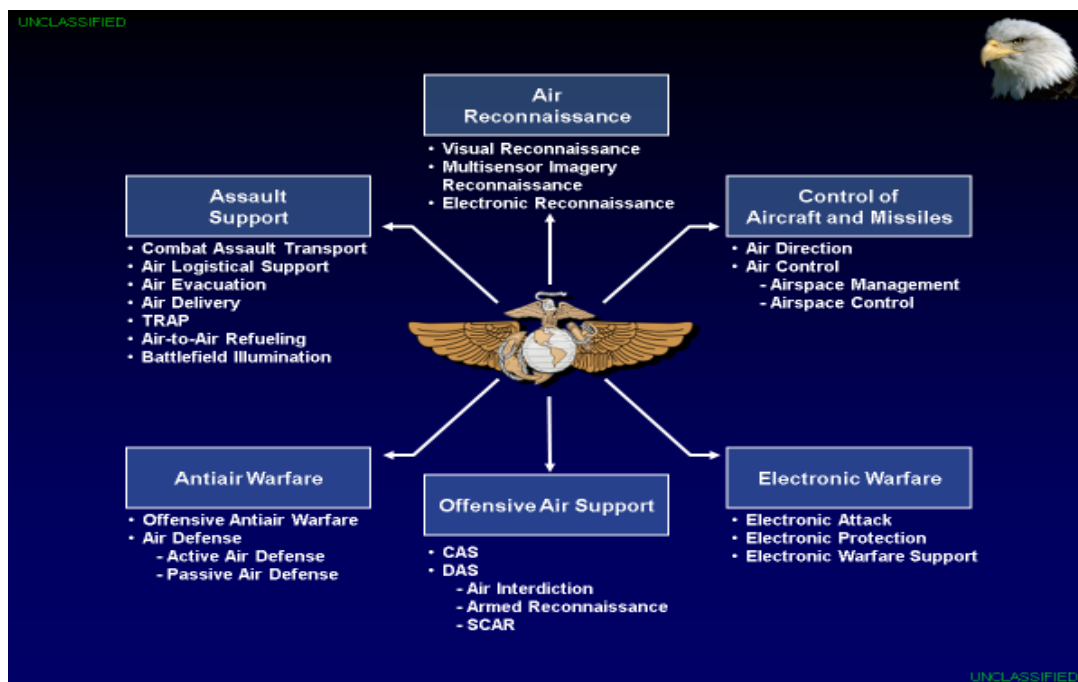


Figure 3: The six functions of Marine aviation. *Source:* Academic Department, *Six Functions Integration* (MAWTS-1, Yuma, AZ, February 27, 2019), PowerPoint presentation.

Per the Marine Corps reference publication, Marine aviation's mission is to:

Support the MAGTF during the assault landing phase and subsequent operations ashore. Air support is furnished by Marine aircraft squadrons operating from forward operating bases (FOBs), amphibious shipping, or by aircraft operating from aircraft carriers that are within striking distance of the amphibious objective area.²⁹

28. Headquarters, United States Marine Corps, *Organization of the United States Marine Corps*, MCRP 1-10.1 (Washington, DC, 2015), Glossary 6.

29. Headquarters, United States Marine Corps, *Organization of the United States Marine Corps*, MCRP 1-10.1 (Washington, DC, 2015), 6-1.

Under current operating conditions in the Indo-Pacific theater, the ability of the MAGTF to achieve such a “striking distance” is doubtful.

One fundamental commonality among the missions of the MAGTF, the MEU, and Marine aviation is to provide amphibious expeditionary capabilities to the geographic combatant commander. While the Army, Navy, and Air Force all have Title 10 responsibilities specific to their respective domains, the Marine Corps is the only branch within the Joint Force that is set forth by the 82nd and 114th Congress to "provide maritime expeditionary combined arms air-ground task forces that are most ready, when the Nation is least ready."³⁰ As an expeditionary force that postures itself to be the first responder for whatever emergency arises, the MAGTF depends on Marine aviation's abilities to provide the six functionalities of aviation support. Arriving in the theater on short notice, even if in a limited capacity, the MAGTF would be a significant force multiplier to any geographic combatant commander; timely response to any crisis would pay a considerable dividend in terms of support for US political interests in the region.

While Marine aviation was able to operate without many constraints during the Cold-War and post-Cold War eras, the current question is whether Marine aviation is still able to operate under any circumstances in today's contemporary near-peer environment. In conditions short of open hostilities, it may be possible for the MAGTF to get within “striking distance” of its territorial objective. In the event of a transition from crisis to war, however, the force would become highly vulnerable to Chinese A2/AD systems.

30. General Robert B. Neller, *Statement of General Robert B Neller Commandant of the Marine Corps as Delivered to Congressional Defense Committees on The Posture of the United States Marine Corps* (Washington, DC, 2019), 1.

Moreover, the role and the significance of Marine aviation in the Indo-Pacific would make logical sense once the reader understands the complexity and scope of the area of responsibility (AOR) in the region (Figure 4).



Figure 4: A map of USINDOPACOM AOR. *Source:* U.S. Indo-Pacific Command, “USINDOPACOM Map,” accessed Apr 7, 2019, https://www.pacom.mil/Portals/55/Images/USINDOPACOM-MAP-H1_Oct-2018.jpg.

As China continues to expand and exert its geopolitical, economic, and technological influences to affect US national interests and US partnerships with foreign allies within the region, the United States Indo-Pacific Command (USINDOPACOM) becomes one of the most strategically significant commands that enforces US political aims and interests abroad. Given its sheer mass – with an AOR that comprises over 50% of the world's population, several of the largest militaries in the world, and more territorial expanse than any other of the nation’s six

geographic combatant commands – USINDOPACOM requires the use and integration of the Army, Navy, Air Force, and the Marine Corps to achieve US national interests and objectives.³¹ Nevertheless, although USINDOPACOM possesses joint capabilities across all four US military services, the MAGTF is the only expeditionary, on-call, mobile, combat-ready, task-organized, and vital contingency force that delivers timely responses to distant crises for the president and secretary of defense. It contains a combined arms contingent capability that integrates the ACE, ground combat element (GCE), and logistics combat element under a single commander capable of responding to a wide range of military operations.³²

It is essential to understand that while an enduring conflict with China will likely be an all-out US effort and Marine aviation will only be one part of the joint force that integrates the capabilities of all US services. As globalization continues to promote peoples around the globe access to global commons, it also creates instability, volatility, and conflicts in the Indo-Pacific region that can trigger a fast-breaking crisis. The MAGTF will be the first response force on the scene and relies on Marine aviation to provide airlift capabilities from naval vessels, an expeditionary airfield, or austere environment to face any contingency or conflicts, including some that might engage China's interest in the region. Thus, without aiming for hostilities with China, the MAGTF may find itself under circumstances where it comes well within the range of Chinese A2/AD systems, and it must, therefore, find ways to minimize its vulnerability to them.

In sum, the MEU is a readily available mobile force that provides combined arms capability to the geographical combatant commander at a moment's notice, and Marine aviation is the particular instrument that provides the commander with the speed and flexibility that no

31. U.S. Indo-Pacific Command, "USINDOPACOM Area of Responsibility," accessed Apr 7, 2019, <https://www.pacom.mil/About-USINDOPACOM/USPACOM-Area-of-Responsibility/>.

32. Headquarters, United States Marine Corps, *Organization of the United States Marine Corps, MCRP 1-10.1* (Washington, DC: US Government Printing Office 2015), 1-1, 1-3.

other joint services can deliver. There is a vital need today for viable ways of using these forces in the vicinity of, even in combat with, a near-peer competitor such as China.

However, antiquated Cold-War and post-Cold War era assumptions no longer valid in today's contemporary environment continue to influence Marine aviation's current capabilities to this day, constraining its future utility. Building on those capabilities and assumptions while failing to account for their limitations would produce an unrealistic operating concept of highly limited value both to the Corp and to the COCOM. To get beyond such conceptual bounds and regain relevancy in the future battlespace, the Marine Corps must recognize what they are and where they came from.

The Concepts that Influenced Modern Marine Aviation Assumptions

Though the Marine Corps never officially adopted the AirLand Battle concept, the studies that led to its conception ignited the intellectual reforms of the Marine Corps in the late 1970s that gave rise to the maneuver warfare concept, which continues to influence Marine Corps modern assumptions today. AirLand Battle, a US Army concept developed in coordination with the United States Air Force (USAF), emerged from lessons learned during the October War of 1973 by General DePuy, then the commander of the US Army's Training and Doctrine Command (TRADOC). His reflections on the new lethality of armored warfare against Soviets-trained and -equipped forces led to the release of FM 100-5 in 1976, which in turn paved the way for the AirLand Battle concept as the official Army doctrine with the release of the updated FM 100-5 in 1982.³³ The October War of 1973 was a rude awakening for the US military because it served as a model for what a future conflict between the US and the Soviet Union might look like; the tempo and lethality of the conflict were very different from the counterinsurgency to

33. Richard Swain, ed., *Selected Papers of General William E DePuy*, 76–111; Robert H Scales, *Certain Victory: The US Army in the Gulf War* (Kansas: US Army Command and General Staff College Press, 1994), 25

which the Americans were accustomed in Vietnam. While based in similar conceptual fashion on the notion that one must find and create gaps and seams through which to flow forces, AirLand Battle also had a further, institutional influence on the Marine Corps's conception of maneuver warfare. In conceptualizing a path to victory deep within the Continent of Europe, it challenged the need for amphibious operations in future conflicts, and thus forced the Marine Corps to reinvent an operating concept of its own to justify its existence as an expeditionary, amphibious force in the fight against the Soviet Union.

First, after analyzing the lessons learned from the 1973 war in terms of the US military's capability against the Soviets, General DePuy's drew on assessments from other services, including the Marine Corps. He concluded that to survive and win modern conflicts characterized by a large quantity of lethal weapons, the United States must emphasize the economy of force and the need to strike a penetrating enemy force with surprise and with carefully husbanded combat power at the critical place and time."³⁴ TRADOC created the term "active defense" for this military philosophy. To gather sufficient striking power against the Soviets, who had the numerical advantage, the US military had to procure a large volume of advanced weapons systems, with a focus on high-tech weapons and systems employment.³⁵ Specifically, the TRADOC studies discussed the requirements of a mechanized Army suited for NATO land-based battles against the Soviets. This effort called into question the need for the Marine Corps which in some capacity was serving the role of a second Army, as it had done just a few years earlier ashore in Southeast Asia fighting land battles.³⁶

34. Scales, 13; Sean T. Lawson, *Nonlinear Science and Warfare* (New York: Routledge, 2014), 68; Richard Swain, ed., *Selected Papers of General William E DePuy*, VII

35. Swain, ed., 76–111

36. Scales, 25; Fideleon Damian, "The Road to FMFM 1: The United States Marine Corps and Maneuver Warfare Doctrine, 1979-1989" (Master's thesis, Kansas State University, 2008), 39.

Moreover, General DePuy's findings challenged the future practicality of amphibious operations. At that time, the Soviet Union possessed large armies and massive territories that offered limited opportunities for decisive amphibious operations.³⁷ The development, employment, and capability of precision-guided munition (PGM) during the October War in both the US-backed Israel military and the Soviet-backed Arab forces further highlighted the vulnerability of amphibious operations. The use of PGMs by the Soviets had the potential to decimate both the Navy vessels and the MAGTF aboard with lethality and precision.³⁸ The only capable Marine aviation platform at the time that could be operating on L-Class, amphibious assault ships consisted of slow-flying helicopters that were vulnerable to PGM and man-portable surface to air missiles. It was not until late 1984 that there were full-scale development programs of the AV-8 vertical takeoff and landing (VTOL) light attack aircraft in testing that can be operating from an amphibious assault ship and can also defend against the enemy's PGM strike with a responsive close air support capability.³⁹ In essence, the Marine Corps would need a new operating concept, in conjunction with new capabilities to remain relevant, and to reclaim its root and tradition as the nation's premier expeditionary amphibious force in readiness.

Second, after the studies of the October War that questioned the validity of amphibious operations, the DoD shifted toward a mechanized military that emphasized exquisite, expensive systems. A report *Where the Does the Marine Corps Go From Here?* in 1976 by the Brookings Institution challenge the need of the Marine Corps as an amphibious force.⁴⁰ The report advised that the Marine Corps must shift away from being a seaborne force and that amphibious warfare

37. Nathan Packard, "Congress and the Marine Corps," *MCU Journal* 8, no. 2 (2017): 23.

38. C. Chester, *Arsenal of Democracy in the Face of Change: Precision Guided Munitions (PGMs) Their Evolution and Some Economic Considerations* (Washington, DC: Federal Emergency Management Agency, 1990), 12.

39. Headquarters, United States Marine Corps, *Concepts and Issues* (Washington, DC: US Government Printing Office 1984), I16–I17.

40. Fideleon, 39.

was a historical relic that was no longer relevant in today's battlefield.⁴¹ The Marine Corps had to pick a path, either to serve as a second land-based Army that would risk being dismantled and eventually absorbed as part of the Army, or to come up with a way to justify its existence as a premier, mobile, expeditionary amphibious force that no other US service can perform; the reformists within the Marine Corps chose the latter.

The fight for existence ignited the discussions for a new operating concept. The Marine Corps intellectual debates began in 1979 when Marine reformers began to study, discuss, and promote the operating concept of maneuver warfare. A retired Air Force colonel named John Boyd believed that the maneuver warfare style of warfighting was better suited for the Marine Corps because it stressed tempo and flexibility, which were the critical elements of an amphibious power projection force.⁴² As the Marine Corps experienced headwinds by critics questioning the validity of amphibious warfare, the Corps needed to show that it could shift its focus from Vietnam to Europe as part of a strategic force.⁴³

In 1980, the General Officers' Symposium released a point paper, which concluded that amphibious capability is vital in a NATO/global war because it provides airlift, deterrence, and flexibility that no other organizations can. Specifically, the point paper was referring to the use of Marine amphibious force flexibility and mobility for the defense of NATO's Northern Flank in Iceland, Norway, and Denmark against possible Soviet invasion (Figure 5).⁴⁴

41. Fideleon, 39.

42. Fideleon Damian, "*The Road to FMFM 1: The United States Marine Corps and Maneuver Warfare Doctrine, 1979-1989*" (Master's thesis, Kansas State University, 2008), III. The title of the thesis would not go in both quotation marks and italics. See Chapter 9 in the Style Guide for more information—we have a section about how to title a master's thesis or student paper both published and unpublished.

43. Ian T Brown, *A New Conception of War: John Boyd, The U.S. Marines, and Maneuver Warfare* (Virginia: MCUP, 2018), 62.

44. Brown, 65-66.



Figure 5: A map of NATO northern flank, the isolation from land routes made it a logical decision for the Marine amphibious forces to defend. Source: Ian T Brown, *A New Conception of War: John Boyd, The U.S. Marines, and Maneuver Warfare* (Virginia: MCUP, 2018), 65-67.

While some Marines questioned the rationale of assuming the northern flank amphibious mission, it nevertheless created breathing room for the Marine Corps to maintain its role as an amphibious force in readiness.

Yet, although there are many parallels between what the Marine Corps experienced in the 1980s in the Northern Flank and what it faces in the South China Sea today (the Marine Corps being deployed in both instances as an expeditionary, amphibious, power projection force), it is prudent to understand that while the Marine Corps was successful in deterring the Soviets in the Northern Flank, it was mainly because the Soviets of the 1980s lacked the kind of A2/AD systems China has today. If the Soviets of the past had possessed what the Chinese have today in terms of range and systems integrations, this capability would have made the Northern Flank impossible.

China's C4ISR integrated A2/AD precision systems of today are nothing new. In the late 1970s, the Soviets first thought of a unified, automated, long-range precision system with integrated C2 that provides conventional precision strike against air, ground, and sea targets support systems in the concept known as the reconnaissance-strike complex or RUK.⁴⁵ Similar to modern China's integration of various sensors and systems to ensure it can overwhelm the enemy, the Soviet RUK consisted of a combination of "new artillery systems, including new remotely piloted vehicles (RPV), advanced counterbattery radars...new command and control systems to coordinate target acquisition, designation, and engagement, and new weapons subsystems."⁴⁶ Nevertheless, while the RUK was similar in principle to China's A2/AD systems, the capabilities between the two are very dissimilar. The reality was that the RUK concept exceeded Soviet abilities to apply the principles in practice; the Soviets' systems were created mostly for a conventional land-based conflict of the 1980s and lacked the range and depth of the modern Chinese system today.⁴⁷ For example, the Soviets' surface-to-surface and surface-to-air missiles have operating ranges between three to 900 kilometers (with most of the systems consisting of operating ranges of less than 100 kilometers), while China's systems have operating ranges from 850 to 4,000 kilometers (Table 1).⁴⁸

The critical point is that the operating environment that shaped the requirements for the current combat capabilities of the Marine Corps, especially Marine aviation as a deterrence force in the 1980s against the Soviets, was very different from the operating environment today against China. While the RUK concepts were similar, the former was explicitly designed for a

45. Vego, 1.

46. Vego, 2.

47. Vego, 38.

48. Biddle, 7.

conventional, air-defense against a land-based force using 1980s-era capabilities, while the latter was created for long-range precision strike to prevent an amphibious force from pushing ashore. Countering the modern Chinese version would require different Marine aviation capabilities from those required in countering Soviet RUK.

Soviet Union Surface-to-Surface (SSM) & Surface-to-Air Missiles (SAM) versus Marine Corps Shipboard Capable Aircraft Operating Range				
Soviet Union SSM & SAM Systems		Marine Corps Aircraft		
Type/Model	Max Range (Distance in Kilometers)	Type/Model/Series	Eudurance (Time in Hour+Min)	Max Range without Refueling (Distance in Kilometers)
SSM/FROG-7	10 km	F-35	1+30*	972 km
SSM/SCUD	300 km	AV-8B	1+30*	639 km
SSM/SCALEBOARD	900 km	F/A-18	1+30	695 km
SSM/SCARAB	70 km	MV-22B	3+00	1195 km
SSM/SPIDER	500 kms	CH-53E	3+45	93 km
SAM/SA-2 GUIDELINE	35-50 km	AH-1Z	2+30	556 km
SAM/SA-3 GOA	25 km	UH-1Y	2+15	500 km
SAM/SA-4 GANEF	80-100 km	RQ-21	10+00	1111 km
SAM/SA-6 GAINFUL	24 km	* Not published, estimate only.		
SAM/SA-7 GRAIL	3.6-5.5 km			
SAM/SA-8 GECKO	12 km			
SAM/SA-9 GASKIN	6 km*			
SAM/SA-11 GADFLY	30 km*			
SAM/SA-12 GLADIATOR	90 km*			
SAM/SA-13 GOPHER	6-7 km*			
SAM/SA-14 GREMLIN	6 km*			
SAM/SA-17 GRIZZLY	8-10 km			
*estimate				

Table 1: Soviets' SSM and SAM operating range versus the ACE's shipboard capable aircraft operating range. *Source:* Headquarters, Department of the Army, *Source: The Soviets Army Troops, Organization, and Equipment* (Washington, DC: Government Printing Office, 1991), 5.88-121; Marine Aviation Weapons and Tactics Squadron One, *USMC Assault Support Tactical SOP*, Yuma, AZ, 2016, 42–57.

As the Marine Corps regained its niche through participation in planning for the Northern Flank, General Robert H. Barrow, the 27th Commandant from 1979 to 1983, continued to fight for the survival and the role of the Marine Corps. A strong advocate of a robust maritime strategy, General Barrow proposed that an effective method to contain the Soviets' expansion

was to leverage amphibious forces with naval vessels for power projection.⁴⁹ The US Navy heard General Barrow's voice loud and clear. On 28 October 1982, at the end of the Commander, Navy Installations Command conference hosted by the Chief of Naval Operations, Admiral James Watkins with Navy commanders in chief released a statement that "our naval forces can help stabilize the front by contributing *directly* to the land battle, *or do so indirectly*— and in conjunction with tac air, amphibious, allied forces—by exerting leverage against the enemy's flanks or rear or allies."⁵⁰ In addition, the Navy released the *Maritime Strategy CNO Program Analysis Memorandum: Observation from the Trenches* on 8 February 1983 that "Our *Maritime Strategy* should help ensure favorable war outcome terms by using our ideally suited (inherently flexible and mobile) battle group and amphibious forces in *maritime maneuver initiatives* to seize territory and strike Soviet vulnerabilities, with the result that we have some negotiating advantages of our own and can preclude the Soviets just "sitting on" their initial territorial gains."⁵¹ With the Navy's support and alignment of amphibious operations with the implementation of the concept of maneuver warfare as a strategic power projection force for diverting Soviet forces and isolating them from their allies, the Marine Corps was finally getting its niche back as the nation's amphibious force, one that could deter the Soviets through conventional warfighting capability.

The intent of this paper is not to list the full intellectual engagements on maneuver warfare between the reformists and those against it.⁵² Ultimately, the maneuver warfare concept

49. Edwin Howard Simmons, *The United States: A History* (Maryland: Naval Institute Press, 1998), 261-262.

50. Phil, 58.

51. Phil, 70.

52. There was a decade of history on the detail conception of the Marine Corps maneuver warfare concept that involved the John Boyd, William Lind, and General Gray, and much more. This author recommends the following publications for more in-depth details on the history of maneuver warfare: The book by Brown, T Ian. *A New Conception of War: John Boyd, The U.S. Marines, and Maneuver Warfare*. Virginia: MCUP, 2018; and the paper by Damian, Fideleon. "The Road to FMFM 1: The United States Marine Corps and Maneuver Warfare Doctrine, 1979-1989." Master's thesis, Kansas State University, 2008.

came to fruition in 1989 with the release of the Fleet Marine Force Manual (FMFM) 1, *Warfighting*; since it released, maneuver warfare has become the Marine Corps's philosophy and doctrine for conducting operations to this day.⁵³ For the next three decades, during a range of post-1989 events, the Marine Corps' role as the nation's amphibious, maneuver warfare specialist continued to solidify with the release of the 1992 Marine Corps strategy statement *From the Sea*, 1994 Navy strategy *Forward From the Sea*, 1998 Marine Corps doctrinal publication *Expeditionary Operations*, 2011 Marine Corps doctrinal publication *Operations*, and 2014 Marine Corps concept *Expeditionary Force 21: Forward and Ready Now and in the Future*; all these publications continued to broadcast the importance of having a credible, mobile, expeditionary, amphibious force in readiness that uses maneuver warfare to project power from the sea in a littoral environment, and can strike the enemy with speed, tempo, and surprise.⁵⁴ Operational maneuver from the sea (OMFTS), however, pertained not merely to the movement of Marine forces in conducting landing operations, but also to the larger purpose of the amphibious operation itself in the broader joint campaign.

Thus, the missions and role of the Marine Corps today were based on a few causal factors: the lessons learned from the October War in 1973, the identity of the Marine Corps after the Vietnam War, the questioning of the usefulness of amphibious operation, and the evolution of operational maneuver from land-based to sea-based applicability. The requirements of

53. Headquarters, United States Marine Corps, *Warfighting* (Washington, DC: US Government Printing Office, 1997), I; Sean T. Lawson, *Nonlinear Science and Warfare* (New York: Routledge, 2014), 68.

54. Headquarter, United State Navy, "From the Sea," *Navy News Service*, no. 46 (1992): 1; Headquarter, United State Navy, *Forward...From the Sea* (Washington: DC, Department of the Navy, 1995): 1-7; Headquarter, United State Marine Corps, *Expeditionary Operations* (Washington: DC, US Government Printing Office, 1998), 89-94; Headquarter, United State Marine Corps, *Marine Corps Operations* (Washington: DC, US Government Printing Office, 2011), 1-256; Headquarter, United State Marine Corps, *Expeditionary Force 21* (Washington: DC, US Government Printing Office, 2014), 1-47.

AirLand Battle played a crucial role in shaping Marine capabilities, particularly in the form of the Northern Flank. Maneuver warfare emerged in tandem with the anti-Soviet doctrine.

There is nothing fundamentally wrong with the AirLand Battle concept, as it was theoretically effective against the Soviets. The United States had technological, qualitative advantages that exceeded the Soviets' RUK ability to prohibit it from conducting deep battle strikes effectually. In principle, one might expect the US military today to seek comparable advantages against China's A2/AD systems.

However, the problem with the AirLand Battle concept as a model for a 21st century anti-A2/AD concept lies in the current underlying expectation of equivalent effectiveness against China as against the former Soviet Union. The technological capabilities available to the Marine Corps today stem from the challenge presented by the original RUK systems. China, however, presents a far different threat. China's current A2/AD systems resemble the *almost perfect*, fully integrated, autonomous RUK systems that the Soviets envisioned, and are efficacious in a few ways: 1) to funnel US maritime forces outside of the second island chain, and 2) to create sufficient horizontal and vertical depth to exclude any US maritime offensive action.

Understanding the significance of this problem requires a grasp of its technological implications.

Modern Tech versus Cold War Tech

From the peak of the Cold War in the early 1980s to the present, the US has experienced multiple conflicts such as the Gulf War in 1991 and the war against terrorism in Iraq and Afghanistan from 2001 to this day. Marine aviation has procured systems that are best suited to face a land-based enemy such as the Soviets from over forty years ago. *Concepts and Issues* (1981), where the Marine Corps discussed the Fleet Marine Force's capabilities, current commitments, future development, and organization, showed that the Marine Corps was

investing heavily in a few expensive, exquisite aviation systems such as the AV-8 vertical VTOL capable jump jets and the F/A-18 multi-roles mission jets. While these platforms significantly improved direct fire support to the GCE and delivered more rapid, responsive forward-deployed tactical air support, these systems possessed limited tactical operating range in today's environment against an enemy operating a sophisticated A2/AD system.⁵⁵

In the *2018 Marine Aviation Plan*, the Corps discussed Marine aviation's strategic and operational posture. While there are upgrades and modernizations to many of the existing platforms, the only new additions to the Marine Corps inventory are the MV-22 tiltrotor aircraft, the RQ-21 unmanned aerial system (UAS), and the F-35 stealth aircraft. Though these modernizations and new procurements bring incremental capabilities to Marine aviation, the estimated cost of satisfying the Marine Corps's procurement of these new generations of aviation is to be \$156.92 billion for 1,408 aircraft.⁵⁶ The Navy and the Marines consider the fifth-generation tactical multirole aircraft F-35 to be the future of naval aviation. The F-35 replaces the aging AV-8, F/A-18, and EA-6 with their missions to "attack and destroy surface targets, intercept and destroy enemy aircraft, provide electronic warfare support, and network-enabled reconnaissance support across the full spectrum of combat operations."⁵⁷ Two shortfalls, however, will cripple the F-35's usefulness as part of a Marine aviation asset in a South China Sea naval campaign.

First, the limited range of the F-35 without refueling makes it incompatible with today's A2/AD congested environment. With the unclassified mission range of 450 NMs for the F-35

55. Headquarters, United States Marine Corps, *Concepts and Issues* (Washington, DC: US Government Printing Office, 1981), V1–V16.

56. Headquarter, United State Marine Corps, *2018 Marine Aviation Plan* (Washington, DC: Government Printing Office, 2018), 18–103; James Hammond, "The ACE that Ate the Marine Corps," *Marine Corps Gazette* (Jan. 2014): 6-12, 7.

57. Headquarter, United State Marine Corps, *2018 Marine Aviation Plan* (Washington, DC: Government Printing Office, 2018), 18.

V/TOL variance and 600 NMs for the F-35 carrier variance, the F-35 lacks the tactical range to reach China's shore while China's A2/AD capabilities are well within 4,000 kilometers (equated to 2,160 NMs) without refueling when launched from naval vessels.⁵⁸ Furthermore, the assumptions that the F-35's stealth capability alone is adequate to penetrate the enemy's air defense system is dubious as is the assumption that the aircraft's limited tactical range is sufficient to deter Russia or China. The F-35 was developed with an assumption that allied partner naval vessels or aerial refueling capability would be in available during strike missions. Although the F-35 possesses stealth capability that may allow it to remain undetected by China's integrated air defense system, the technology for a stealth aerial tanker does not yet exist. However, the shoot-down of an F-117A in 1999 by Yugoslavian air defenses, using a forty-year-old SA-3 surface-air-missile system, demonstrated that even modern stealth technology is susceptible to detection under suboptimal conditions.⁵⁹

Second, the Marine Corps is planning to procure 420 F-35s and expects a full transition in 2031; however, as the acquisition ramp for the F-35 continues to be behind schedule, the Corps is being forced to extend the service life of its legacy platforms, such as the AV-8 and F/A-18, to cover the F-35 inventory challenge. That extension further degrades the aviation readiness and capability of the ACE due to lack of funding to properly maintain those platforms (Figure 6).⁶⁰

58. Headquarter, United State Marine Corps, *2018 Marine Aviation Plan*, 19.

59. John Venable, *Operational Assessment of the F-35A Argues for Full Program Procurement and Concurrent Development Process* (Washington, DC, The Heritage Foundation, 2016), 12.

60. Dakota Wood, ed., *2019 Index of U.S. Military Strength* (Washington, DC: The Heritage Foundation, 2019), 409.

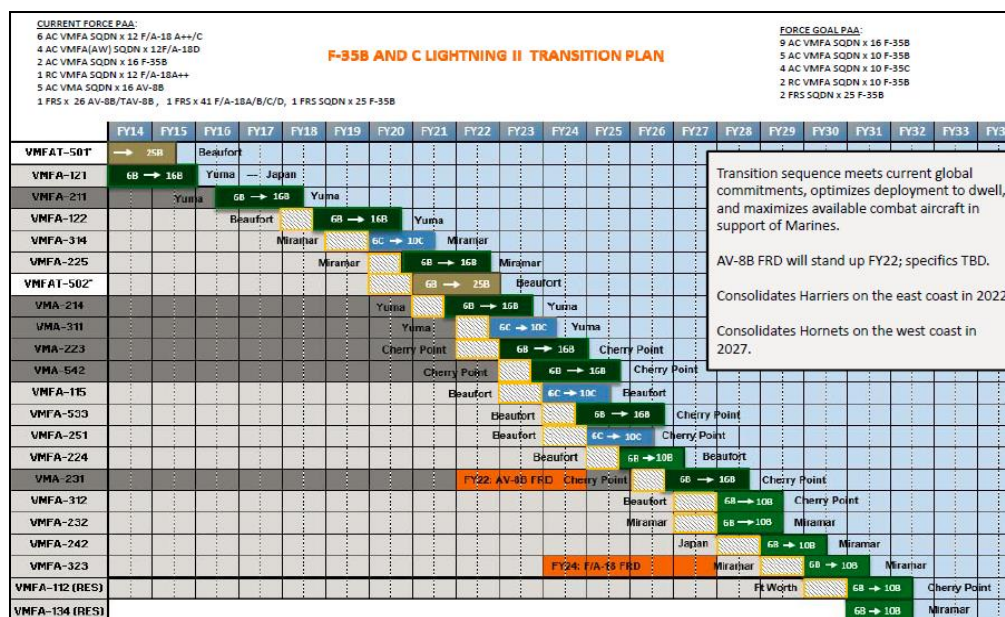


Figure 6: The USMC transition plan to purchase 420 F-35s. *Source:* The Pentagon, *2018 Marine Aviation Plan*, Washington DC: Government Printing Office, 2018, 23.

Moreover, the combat radius of Marine aviation's helicopters and tactical aircraft remains almost the same; although the tiltrotor provides almost three times the range of the CH-46E helicopter it replaced, it still lacks a greater combat radius without refueling to travel the standoff distance occupied by China's A2/AD system of posting naval vessels. Ultimately, the amphibious maneuver warfare concept optimized Marine aviation to fight a battle set thirty years ago at a time when the US dominated the sea lines of communication, and the A2/AD systems of the day did not impede naval vessels and Marine aviation assets from providing rapid buildup of the GCE from ship to shore. As depicted in table 1, when comparing the operating range of various Marine aviation platforms from the 1980s such as the AV-8, F/A-18, CH-53E, to those from the 2000s that served as a replacement of the above legacy platforms such as the F-35 and MV-22, the operating ranges without refueling are similar with the exception of the MV-22,

which is a tiltrotor, non-stealth platform that can take off and land like a helicopter, but fly like an airplane once at cruising speed.⁶¹

The Marine Corps dependence on expensive platforms on the sole basis of capability is astronomically expensive. When the final F-35 is delivered in 2031, with the average procurement price of an F-35 set at \$166 million, the total cost will be over \$69 billion. While the F-35 is one of the most innovative and advanced aviation platforms Marine aviation possesses today, its short, tactical range and inability to refuel aurally already limits its mission capability to conduct deep offensive strikes. It is certain that the F-35 will become obsolete when the last unit rolls off the assembly line in 2031.⁶²

Putting it Together

Now that the current operating conditions are clear, and the facts are laid out to explain why Marine aviation is not postured to operate in a contemporary near-peer environment against China's near-perfect form of RUK style A2/AD system, it is time to confront the fundamental problem of how Marine aviation either must change, or must find a new operating concept suited to contemporary circumstances. All Marines bear the responsibility of critical thinking. Three conceptual tasks accordingly arise in the present case: 1) challenge the current assumptions on future operating conditions; 2) anticipate forthcoming requirements and the reality of functioning in these future operating conditions; and 3) reevaluate Marine aviation roles, functions, and technology under the future operating conditions.

61. The MV-22 is the direct replacement of the CH-46 helicopter, which only has an operating range of around 300 nautical miles; however, while the MV-22 possess much greater range, there were specific limitation that was inferior to the CH-46E such as stability in hover, especially on a flight deck of an amphibious assault ship; the CH-53K will soon replace the CH-53E but still possess similar range; both the AH-1Z and UH-1Y are replacement of the AH-1W and UH-1N, it does possess higher payload capability and slightly longer range.

62. Department of Defense, *Program Acquisition Cost by Weapon System* (Washington, DC: US Government Printing Office, 2017), 1–7, 1–8, 1–15.

In the following sections, the term MAGTF and Marine aviation interchangeably. While many "ground" Marines may disagree with this statement, this author believes that the MAGTF is built, and relies on Marine aviation capabilities to provide the speed and mobility as an expeditionary force. Ultimately, the goal is to prevent Marine aviation and indeed the MAGTF from fixating on the past by initiating a new intellectual renaissance, akin to the launching of maneuver warfare, and embracing a new paradigm while challenging futile traditions and assumptions.

Several new assumptions must take the place of the old ones. First, while the Marine Operating Concept (MOC) recognizes that the Marine Corps is currently not postured to face tomorrow's operating environment. It also highlights the importance of a multi-domain approach toward warfare, and 3) the need= for better Joint integration; the MOC fails to distinguish one fundamental assumption that would alter how the future Marine Corps organizes, trains, and equips (OTE) – *is that maneuver warfare will be used for positional defense*, and not for offensive action:

The 21st century MAGTF avoids linear, sequential, and phased approaches to operations and blends maneuver warfare and combined arms to generate the combat power needed for the simultaneity of action in its full range of missions.⁶³

Bluntly, the MAGTF and the Navy together as a maritime power projection force do not have the technology, range, depth, and speed to degrade sufficiently to penetrate China's systems to conduct offensive actions. Intrinsicly, the US maritime fleet is a force that cannot project power because of the positional disadvantages dictated by China's A2/AD networks. While the Marine Corps is a highly adaptive, expeditionary force, making a wrong assumption for OTE would make the MAGTF reliant on the very assets it lacks: time and resources.

63. Marine Corps Operating Concept, 8.

Second, the MAGTF must be built on assumptions and capabilities to be a positional, deterring, defensive force in the future operating environment. One possible solution is the emergence of the Expeditionary Advanced Base Operations (EABO) concept:

EABO seek to further distribute lethality by providing land-based options for increasing the number of sensors and shooters beyond the upper limit imposed by the number of seagoing platforms available. The EABO concept espouses employing mobile, relatively low-cost capabilities in austere, temporary locations forward as integral elements of fleet/JFMCC operations.⁶⁴

More specifically, EABO is to provide an integrated survivable force that can posture forward within the enemy's weapons engagement zone (WEZ), with enough deterrence capabilities to coerce the enemy to operate with the same positional disadvantage they put upon US forces.⁶⁵ Thus, the MAGTF under the EABO concept will become expeditionary, high-risk, mobile "stand-in" forces that are specifically optimized to operate inside China's A2/AD coverage, while projecting A2/AD capability (on a localized scale) of its own.

While the stand-in forces operating in proximity of the enemy's systems, the "stand-off" forces such as the carrier strike group that consists of a more traditional, maritime structure will operate outside of the enemy's WEZ, and their role is to provide long-range, lethal, precision engagement capability to reinforce the deterrence effect.⁶⁶ In essence, imagine a map of the Indo-Pacific region with a small circle to represent each MAGTF stand-in force area of influence, and a big circle to represent each maritime stand-off force. While each small circle will not have much effect in an area as vast as the South China Sea, imagine now there are hundreds of these

64. U.S. Marine Corps Concepts & Programs, "EABO" accessed Apr 26, 2019, <https://www.candp.marines.mil/Concepts/Subordinate-Operating-Concepts/Expeditionary-Advanced-Base-Operations/>.

65. Art Corbett (EABO specialist at Marine Corps Warfighting Lab), discussion with the author, April 23, 2019. Mr. Corbett is an expert on future operating concepts, and his views will challenge and expand the intellectual horizon of any reader of his work, and listener of his presentation.

66. Art Corbett, "Stand-In Forces: Disrupting the current struggle for dominance," *Marine Corps Gazette*, February 2019, 27-29.

small circles strategically positioned surrounding China's SLOC, and with multiple big circles to provide overlapping coverage. In conjunction with partners and allies in the region, the numerical advantages of the stand-in forces would generate a safe-haven for the MAGTF, because the combined A2/AD capabilities of both the stand-in and stand-off forces will create a dilemma for the Chinese to determine if it is worth the cost to eliminate one small circle, but risk getting totally blockaded by the combined forces (Figure 7).



Figure 7: The employment of the stand-in/off forces proposed by the author.

The function of the MAGTF would thus be to ensure that, while China might deny US forces access to its own littoral waters, the United States might deny China access to the littoral waters of US partners and allies in the region, turning the South China Sea into a mutually denied space.

Third, to support the above assumptions of the MAGTF, the roles, functions, and technology of Marine aviation must change to reflect this new reality. The current role of Marine aviation is to serve as an air extension of the MAGTF by providing six functions in support of

the MAGTF commander's mission (Figure 3). This author envisions that the Marine aviation of the future would maintain the current, established capabilities while expanding technological advancement to serve as a stand-in force. Marine aviation is thus to be dual hatted as both a stand-in and a stand-off force with a more focused function. Specifically, to serve this proposed new role, Marine aviation must revamp its current functions, consolidating them from six to four to realign resources with new capabilities. For example, electronic warfare and air reconnaissance will be replaced by a more all-encompassing function of electromagnetic spectrum support; while antiair warfare will be replaced by A2/AD warfare as the central function of Marine aviation as the stand-in forces. Lastly, as the Corps transitions from an offensive to a defensive focus force, offensive air support will be eliminated, and close air support (defensive in nature) will become part of the A2/AD warfare function (Figure 8).

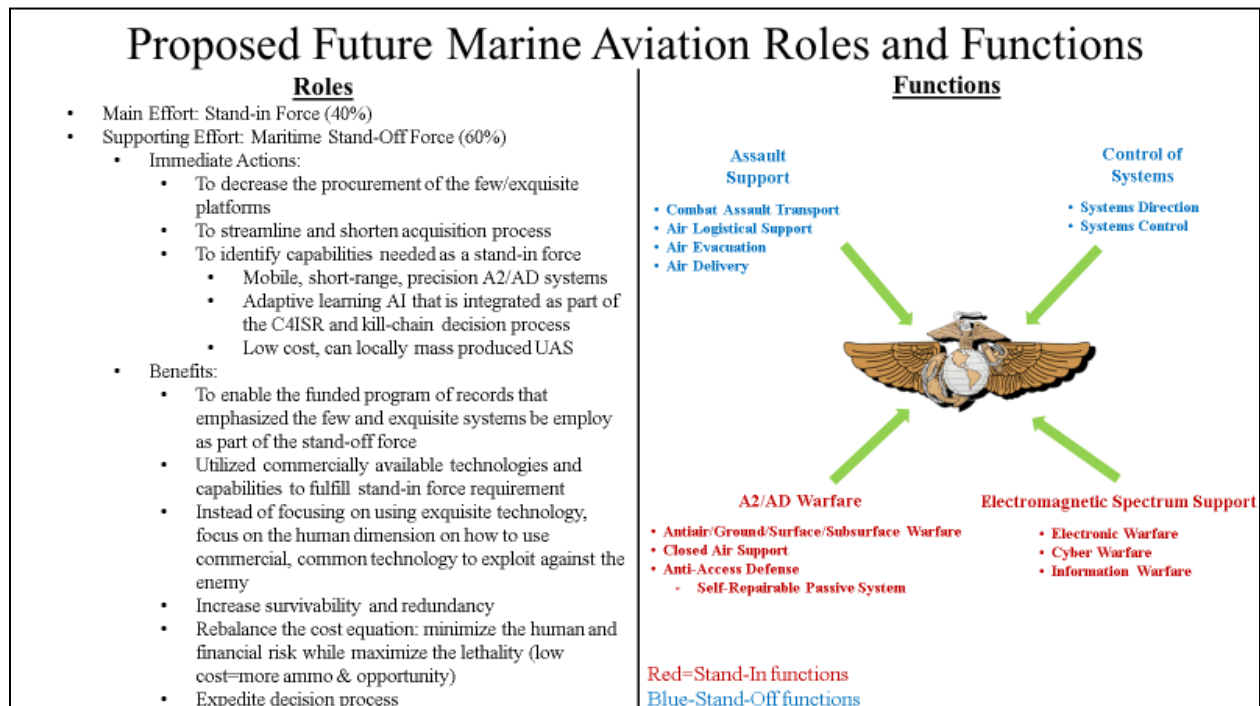


Figure 8: A chart of the roles and functions of Marine aviation proposed by the author.

Although no direct substitute can replace the F-35 missions as a fifth-generation multirole aircraft, there are many current UAS's that can partially satisfy the ISR and deep-strike mission capability at a much lower cost. For example, there are alternatives to the F-35 or close air support helicopters that are much more cost-effective and much less risky according to Dr. T.X. Hammes, who works for both the Institute for National Strategic Studies and the National Defense University and specializes in future strategic concepts. Additionally, a UAS named Kratos QX222, which has a range of over 1,500 nautical miles (NMs), vertical takeoff and landing (VTOL) capable, can serve as an ISR or suicide drone mission, and costs \$2.0 million per system; for the cost of one F-35 (\$166 million), 83 QX222 can be obtained that can outrange the F-35 and fulfill many of its roles at a fraction of the cost and risk.⁶⁷

In summary: *Marine aviation will need thorough-going reform.* Yet, even more important, Marine aviation is part of a more extensive system and without systemic change, and indeed system-thinking change – a change in how we think about the systemic character of future war in the future operating environment – the Marine Corps cannot understand how the MAGTF will fight and therefore how Marine aviation can best function within it.

Conclusion

For the last three decades, the MAGTF has been a readily available operational mobile force that enables the United States to become the symbol as a regional stabilizer in the Indo-Pacific region. As the air component of the MAGTF, Marine aviation was a force multiplier that extended the operational reach of any geographical combatant commander by providing speed and range as an expeditionary air force that is organic to the MAGTF. Despite China's claim of promoting harmony and stability within the Indo-Pacific region in its National Defense White

67. Thomas Hammes, *4IR Changes the Character of War* (National Defense University, Washington, DC, January 6, 2019), PowerPoint presentation.

Paper of 2010, it is determined to be the leading power in the region by challenging US leadership and interests while disrupting the geopolitical balance in the area.⁶⁸

As China continues to advance its military capabilities to compete with US security policy and the sovereignty of US allies in the Indo-Pacific region, the geographic combatant commander will continue to increase reliance on the MAGTF as a first responder contingency force. It is imperative to recognize that it is not China's A2/AD systems that cause Marine aviation or naval forces as a power projection force obsolescence; the culprit is the old paradigm thinking of the Cold-War era that focuses on a conventional "active defense."

The post-Vietnam Cold War era was a period full of tremendous challenges for the US military, and the concepts and technology developed at the time marked significant advances. Today, however, they no longer serve us as well. Yet, even though the Soviet Union's collapse in 1991 ended the Cold War, the strategic framework of preparing to fight a peer, nuclear-armed enemy with anti-air capabilities of limited range cemented in place the DoD's antiquated conceptual and technological assumptions that remain in place to this day, despite the new context of preparing to fight a contemporary, near-peer enemy. China's goal is to limit both the US Navy's and the Marine Corps's freedom of maneuvering in the area while establishing China itself as the stabilizing force in the region through aggressive development and employment of A2/AD, AI, and UAS capabilities.

For the Marine Corps, this situation presents both danger and opportunity. With sufficiently innovative concepts and technology, it can ward off the threat of irrelevance and regain its identity. In doing so, it must be willing to revise and rebrand its warfighting approach. It can gain a niche as a contemporary, expeditionary, amphibious MAGTF power deterrence

68, Charles Boustany and Ellings Richard, "China and the Strategic Imperative for the United States," *Asia Policy* 25, no. 1 (2018): 52. doi:10.1353/asp.2018.0008. <https://muse.jhu.edu/article/685400>, 48.

force specializing in positional defense. The MAGTF does not have to win any battle outright to be victorious, though a well-trained and rehearsed capability to win will reinforce its deterrent power. Its chief function should be in deterring enemy encroachments on U.S. partners and allies, and in interrupting the enemy's freedom of movement long enough to shift the balance of power back to the United States while eventually creating an opening for political solutions.

Instead of procuring new technology or discovering new ways to fight through China's A2/AD systems, the new paradigm thinking of today should take advantage of Marine aviation's strength as a mobile, expeditionary, short-range containment force, and exploit China's cultural vulnerability as a defensive nation. To be relevant for today's and tomorrow's conflicts, Marine aviation must endure a paradigm shift in terms of manning, training, equipping, organizing, and thinking. The winning ticket against China is not to infuriate the dragon but to create an opportunity for political discussions.

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