

Anti-Access/Area Denial: The Evolution of Modern Warfare

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Abstract

Throughout the history of warfare, adversaries have regularly attempted to deny one another freedom of movement on the battlefield. Past forms of *anti-access* served to both protect friendly forces and prevent enemies from gaining positions of advantage. As expeditionary warfighters, American forces have come to depend on safe deployment into theater and the ability to gain and maintain air, space and maritime superiority. China, however, has emerged as a regional power with robust anti-access/area denial (A2/AD) capabilities designed to disrupt U.S. power projection into the western Pacific. In order to conduct successful military operations in the A2/AD environment, U.S. leadership must address A2/AD as a new way of war, comprehend the associated operational implications, and eliminate any imbalances between military objectives and the means by which to achieve them.

Throughout the history of warfare, adversaries have regularly attempted to deny one another freedom of movement on the battlefield. While past forms of anti-movement efforts included barriers such as the Great Wall of China and the Maginot Line, by the early 1990s, U.S. researchers identified the combination of information, space, sea, and air denial as the emerging threat to American military power projection.¹ Subsequent studies postulated that future adversaries would likely be able to use these new capabilities to disrupt U.S. force deployment and deny access to contested regions.² In 2003, the Center for Strategic and Budgetary Assessments (CSBA) defined *anti-access* as enemy actions which inhibit military movement into a theater of operations, and *area-denial* operations as activities that seek to deny freedom of action within areas under the enemy's control.³

Today, China has emerged as a regional power with robust *Anti-Access/Area Denial* (A2/AD) capabilities and unclear political and military intentions. For this reason, while the U.S. and China strive for military and political cooperation, a close examination of emerging Chinese capabilities reveals several potential challenges to U.S. forces. Chinese anti-access capacity includes a large ballistic missile force designed to attack key point targets, such as air bases and naval facilities. Chinese area denial capabilities consist of advanced counter-maritime and counter-air systems designed to destroy critical mobile assets, such as surface ships and aircraft. A2/AD also extends into the space and cyber domains that support U.S. operations, and is specifically designed to disrupt U.S. power projection.⁴ Furthermore, Chinese A2/AD is particularly well suited for use against U.S. forces in the event of a confrontation over the defense of Taiwan.

As expeditionary warfighters, American forces have come to depend on safe deployment into theater and the ability to gain and maintain air, space and maritime superiority, and have not been significantly challenged in any of these domains since the Vietnam War. Modern A2/AD, however, has changed the character of modern warfare, and presents significant challenges to U.S. military freedom of action wherever these advanced systems are employed. In order to conduct successful military operations in the A2/AD environment, U.S. military leadership must acknowledge A2/AD as a new way of war, comprehend the associated operational implications, and eliminate any imbalances between military objectives and the means by which to achieve them.

OPERATIONAL IMPLICATIONS OF CHINESE A2/AD

*"The success of any major operation or campaign depends on the free movement of one's forces in the theater. Without the ability to conduct large-scale movements on land, at sea, and in the air, operational warfare is essentially an empty concept."*⁵

-Dr. Milan Vego

Chinese analysis of Operation DESERT STORM observed that one of the key elements of U.S. success was its ability to deploy forces into theater with little risk of hostile interference.⁶ Chinese

¹ Andrew F. Krepinevich, *The Military-Technical Revolution: A Preliminary Assessment*. (CSBA, 2002), 1.

² U.S. Department of Defense, *Report of the Defense Science Board Task Force on Strategic Mobility*. (Washington, DC: DoD, August 1996), 3, and U.S. Department of Defense, *Report of the National Defense Panel*, (Washington DC: DoD, December 1997), 1.

³ Andrew F. Krepinevich et al., *Meeting the Anti-Access and Area Denial Challenge*, (CSBA, 2003), ii.

⁴ Andrew F. Krepinevich, *Why Air-Sea Battle?*, (CSBA, 2010), 13.

⁵ Milan Vego, "The Factor of Space," *Joint Operational Warfare*. (Newport, RI: Naval War College, reprint, 2009), III-7.

⁶ Stuart E Johnson and Duncan Long (eds.), *Coping with the Dragon: Essays on PLA Transformation and the U.S. Military*, (Washington DC: Center for Technology and National Security Policy, December 2007), 73.

military leaders concluded that in the event of a war with the United States, the U.S. military deployment process must be disrupted or neutralized, and have successfully developed and fielded military capabilities designed to fulfill this need. Modern A2/AD differs from historical iterations of anti-access due to the combination of increased range, accuracy and lethality of China's advanced, networked weapons systems.⁷ Chinese A2/AD not only deters U.S. military deployment into the western Pacific, but also promises to disrupt combat forces operating in and around locations such as Taiwan or the South China Sea.

In the event of war, Chinese anti-access capabilities consist of land-attack ballistic and cruise missiles which threaten critical U.S. air and naval facilities on the islands of Okinawa and Guam.⁸ While China already possesses the short- and medium-range ballistic missile (SRBM/MRBM) forces required to disrupt operations on Okinawa, Japan, recent studies also indicate USAF and USN facilities on Guam are within Chinese ballistic missile range.⁹ Without the use of Okinawa facilities in a conflict against China, U.S. operations from Guam may be problematic due to long lines of operation and limited number of support facilities on the island. Without Guam, operations become incredibly difficult, and may not be possible due to the distance to Taiwan and logistics limitations of contemporary U.S. military forces.

In addition to land-attack forces, China's counter-maritime capabilities also constitute a major A2/AD threat to U.S. sea control in the region. Many of the weapons are strikingly modern, and include a variety of anti-ship ballistic and cruise missiles (ASBM/ASCM) that can also be launched from the air, land or sea. With an estimated range exceeding 800nm, the new DF-21D ASBM may force aircraft carriers to remain beyond distances suitable for efficient air operations, drastically reducing the effectiveness of a Carrier Strike Group (CSG).¹⁰

The Chinese submarine fleet has also emerged as a credible A2/AD threat, as demonstrated by the 2006 incident in which a Chinese diesel submarine surfaced undetected within lethal firing range of a U.S. aircraft carrier near the southern coast of Japan.¹¹ With multiple submarine types employing a variety of anti-ship and land-attack weapons, the Chinese undersea force also threatens U.S. access to basing facilities within reach of Taiwan and U.S. freedom of action throughout the western Pacific.

Land-attack and counter-maritime forces, while robust, may not even be the most lethal Chinese A2/AD threat to successful U.S. military operations. The Chinese surface-to-air missile (SAM) network consists of several Russian built S-300s and similar indigenously produced variants, many of which can lethally engage aircraft beyond 100 nautical miles (nm).¹² In the event U.S. forces successfully penetrate the anti-access shield, Chinese area denial assets like the S-300 will prevent U.S. airpower from attaining air superiority to a degree which U.S. forces have become accustomed during recent conflicts. In practically every military operation since 1991, and specifically during Operations IRAQI FREEDOM and ENDURING FREEDOM (OIF/OEF), American air forces have operated largely unmolested in essentially uncontested airspace. Such unchallenged air superiority would not be the case in a conflict with China. The quality and quantity of the Chinese advanced integrated air defense system (IADS) and their modern fighter aircraft present a level of defensive capability not experienced by any military in the history of warfare, including that of the United States.

⁷ Christopher Claus (CSAF Strategic Studies Group), telephone call with author, 17 February 2010.

⁸ Krepinevich, *Why Air-Sea Battle?*, 13, 17.

⁹ *Ibid*, 13.

¹⁰ Andrew S. Erickson, "Ballistic Trajectory – China Develops New Anti-ship Missile," *Jane's Intelligence Review*, 4 January 2010.

¹¹ Washington Times, "China Sub Stalked U.S. Fleet," 13 November 2006.

¹² Krepinevich, *Why Air-Sea Battle?*, 23.

While U.S. 5th generation low observable aircraft such as the F-22A fighter and B-2A bomber are expected to have inherent advantages against these systems, they are not immune to the threat, and only exist in limited numbers.¹³ The majority of U.S. fighters, bombers and cruise missiles remain extremely vulnerable to these advanced SAMs, and some experts postulate that strike packages of 4th generation aircraft such as F-15's, F-16's and F/A-18's could experience attrition rates of 20-30% when operating in areas defended by these threats.¹⁴ The combination of the advanced SAMs and fighter aircraft fleet make the Chinese IADS virtually impossible for U.S. forces to consistently penetrate with 4th generation aircraft.¹⁵ Furthermore, recent reports indicate China is expected to either soon acquire or develop S-400 SAMs that will double Chinese air defense coverage out to over 200nm.¹⁶ This is significant because these weapons will be able to deny flight over the entire island of Formosa, and is an unprecedented example of how traditionally defensive anti-access weapons could be used in an offensive capacity.

In addition to its significant counter-air and counter-maritime forces, Chinese A2/AD now extends well beyond the traditional domains of air, sea and land. While Chinese cyber-attack activities have been well publicized in world-wide news reports over the last several years, anti-satellite weapons now pose a legitimate threat, as demonstrated by China's 2007 shooting down of one of its own inoperative satellites.¹⁷ Attacks on U.S. cyber and space targets threaten to disrupt or even completely deny multiple enablers of U.S. power projection, including but not limited to satellite communications and Global Positioning System (GPS) based navigation systems.¹⁸ One of the most significant implications of A2/AD, however, is China's increased advantage over the U.S in terms of the operational warfare factor of time. While China's proximity to Taiwan is already favorable, A2/AD increases the Chinese advantage by interfering with U.S. military movement into the region and within any given theater of operations.

¹³ Ibid, 42,66, Krepinevich, *Why Air-Sea Battle?*, 23, and Geoffrey Church (USAF Air Combat Command), e-mail message to author, 25 November 2009. USAF Air Combat Command reports that current plans are to limited F-22A production to 140 combat capable aircraft.

¹⁴ Abdulla Toukan and Anthony H. Cordesman, Study on a Possible Israeli Strike on Iran's Nuclear Development Facilities (Washington, DC: CSIS), 14 March 2009.

¹⁵ Eric Talmadge, *USA Today*. "US Official Notes China's Military Gains," 29 September 2007.

http://www.usatoday.com/news/world/2007-09-29-3112601973_x.htm (accessed 27 April 2010).

¹⁶ James C. O'Halloran and Christopher F. Foss (eds.), *Jane's Land Based Air Defence 2008-2009*, 187.

¹⁷ Krepinevich, *Why Air-Sea Battle?*, 15.

¹⁸ Ibid, 16.

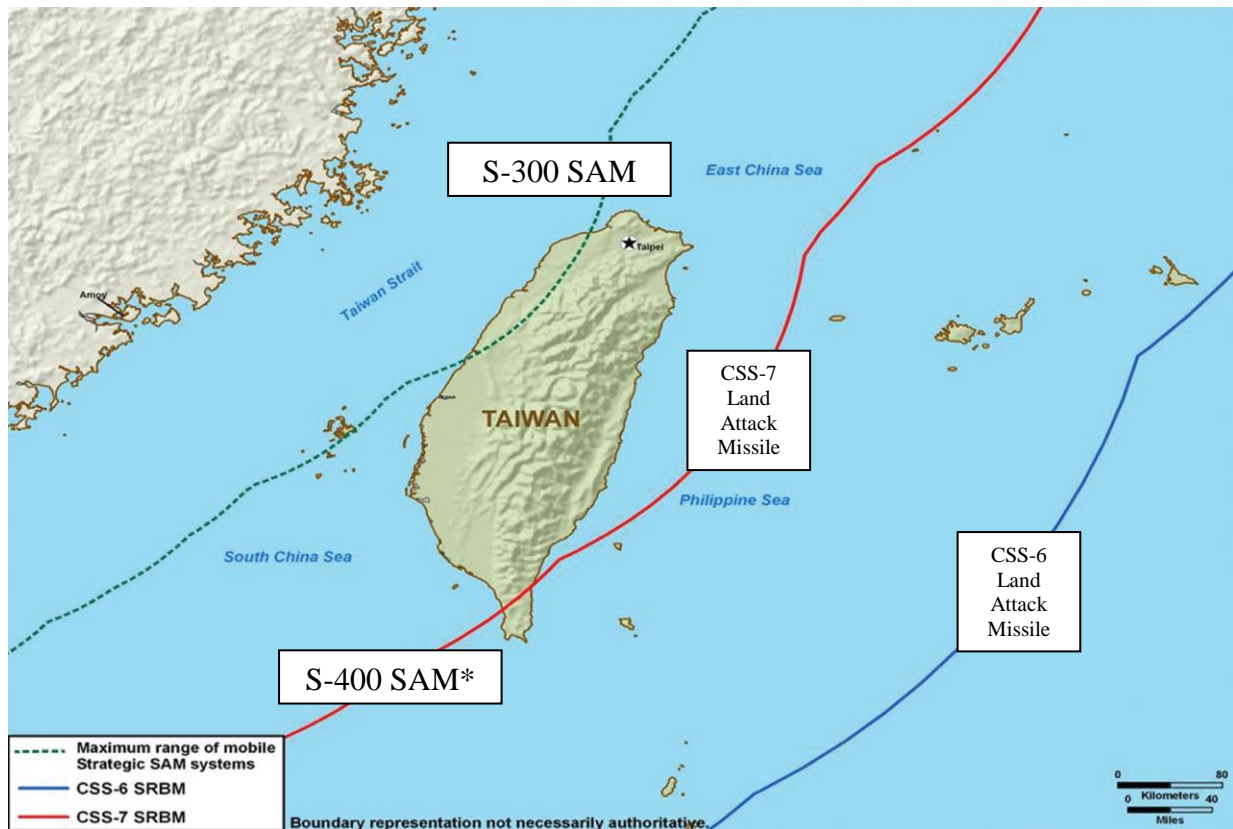


Figure 1. Chinese SAM & Ballistic Missile Coverage in the Vicinity of the Taiwan Strait. This map depicts notional maximum effective ranges of Chinese S-300/400 SAMs and land attack ballistic missiles. *The S-400 is not yet operational in China.¹⁹

BALANCING THE ENDS, WAYS AND MEANS

“Any mismatch or serious imbalance between the objective and the means assigned to accomplish it will invariably lead to failure.”²⁰

-Milan Vego

The 2010 Quadrennial Defense Review (QDR) states that U.S. forces must be able to project power into anti-access regions in order to “deter, defend against, and defeat aggression by potentially hostile nation states.”²¹ But in the event of a war with China, A2/AD could prevent the U.S. from deploying sufficient forces into theater, and would most certainly interfere with the accomplishment of critical objectives necessary for U.S. expeditionary warfare: air, space and maritime superiority. If the U.S. strategic objective is to defeat Chinese forces in order to “preserve Taiwan’s right of peaceful self-determination,” then U.S. success could be extremely limited due to the resulting mismatch between the desired end state and U.S. military capability to counter Chinese A2/AD.²² U.S. Combatant

¹⁹ U.S. Department of Defense, *Annual Report to Congress: Military Power of the People’s Republic of China*, (2009), 42.

²⁰ Milan Vego, “Military Objectives and the Levels of War,” *Joint Operational Warfare* (Newport, RI: Naval War College, reprint, 2009), II-10-12.

²¹ U.S. Department of Defense, *QDR Report*, (Washington, DC: DoD, February 2010), 31.

²² U.S. Naval War College, Joint Military Operations Department, *PRC-Taiwan Vignette*, 2010.

Commanders (COCOMs) must clearly articulate to civilian leadership these military challenges created by emerging Chinese A2/AD technology and doctrine.

Despite these challenges, the U.S. military must prepare for conflict with China, particularly with respect to the defense of Taiwan. One of the first considerations is that of clearly communicating ends, ways, means—as well as cost and risk—both up and down the U.S. military chain of command. While successful U.S. combat operations in the western Pacific are certainly possible, the risks to American forces posed by China’s A2/AD are significant. Attempts to deploy into theater and to gain air and maritime superiority likely will result in loss of life and materiel to levels not experienced since World War II.

U.S. war planners must thoroughly review U.S. joint doctrine and determine what concepts adequately address operations against an adversary employing A2/AD technologies. One doctrinal shortfall is that while air, maritime and space superiority are often assumed possible, U.S. forces do not have joint methods for organizing and deploying joint forces to achieve these objectives in areas protected by A2/AD systems.²³ The USAF and USN AirSea Battle concept provides some original insight into how best to plan for joint operations under these conditions. Published in May 2010, AirSea Battle aims to encourage joint planning, training and deployment to achieve unprecedented levels of integration that will ensure freedom of movement and freedom of action in areas protected by A2/AD.²⁴

In order to conduct a new style of U.S. expeditionary warfare that challenges A2/AD, AirSea Battle concepts must improve coordination between air, sea, land, space and cyber assets. One example, according to the USAF Chief of Staff, is that services need to “better integrate their operations centers.”²⁵ Counter-A2/AD planning must also effectively coordinate USAF and USN core competencies to ensure U.S. forces are both realize their maximum potential and identify any capability gaps between the services.²⁶ While AirSea Battle may focus on USAF and USN power projection, planners must consider the capabilities of all the U.S. armed services to determine how best to maximize U.S. force survivability against A2/AD systems.²⁷

AirSea Battle is important because finding enduring alternatives to conventional U.S. military power application is critical to defeating Chinese A2/AD. Traditional methods of deployment and employment incur unacceptable levels of risk and must be reconsidered. For example, U.S. forces cannot assume unmolested operations out of Kadena and Guam, as facilities on these islands are extremely vulnerable to Chinese attack in a Taiwan defense scenario. Similarly, USN surface combatants can no longer assume safe entry into the western Pacific, as China’s A2/AD forces threaten to neutralize or destroy these high-value assets. Furthermore, continuous air, space and maritime superiority, the critical conditions necessary for U.S. expeditionary warfare, simply will not exist to the level U.S. forces currently experience in OIF/OEF.

Despite these challenges, the successful defense of Taiwan requires U.S. forces to both operate from bases close enough to the operational area to sustain combat operations, and be adequately defended from the A2/AD threat. Past studies have considered air and maritime basing alternatives in

²³ Claus, telephone call with author, 17 February 2010.

²⁴ Jan Van Tol et al, *AirSea Battle: A Point-of-Departure Operational Concept*, (CSBA, 2010), 113.

²⁵ Christopher P. Cavas, “USAF, U.S. Navy to Expand Cooperation: Air-Sea Will Close Gaps, Boost Strengths,” *Defense News*, 9 November 2009. <http://integrator.hanscom.af.mil/2009/November/11122009/11122009-10.htm> (accessed 30 April 2009).

²⁶ Ibid.

²⁷ Claus, telephone call with author, 17 February 2010.

the region, but logistical limitations of multiple and austere operating bases may become too cumbersome to sustain.²⁸ In addition, any base within Chinese ballistic missile range is likely to be vulnerable, and will require joint BMD, counter-air and sea-control capabilities to ensure the protection of land facilities and forces.

These problems should prompt joint planners to examine the operational function of *protection*, which includes the activities required to maximize joint force fighting potential in the A2/AD environment.²⁹ Since Chinese A2/AD is capable of disrupting U.S. military deployment into a potential operating base like Guam, PACOM planners must consider the capabilities of all the U.S. armed services to determine how best to maximize U.S. force survivability against A2/AD systems.³⁰ While air superiority over Guam is likely, sea control around the island must be assured before U.S. forces are able to mitigate the Chinese anti-access threat and dependably conduct missions in support of Taiwan's defense. Of particular importance will be the U.S. Navy's ability to keep Chinese submarines and surface combatants outside of land-attack missile range and to provide sea-based air defense of Guam.

With air and sea control around Guam assured, a joint ballistic missile defense (BMD) force will be required to defend the island in preparation for air and naval operations. Cooperation between all U.S. services is critically important, as U.S. BMD is most effective with the maximum integration of satellite sensor information, USN Aegis equipped ships, and US Army Terminal High Altitude Area Defense (THAAD) and Patriot SAM systems.³¹ U.S. cyber operations must also be utilized in order to both protect information pertaining to friendly force movement and operations, as well as interfere with Chinese military capabilities to locate and attack U.S. forces on the island.³²

In terms of domain control, U.S. military success against A2/AD will require a philosophical shift in what constitutes an acceptable level of air, space and maritime superiority. Current U.S. joint doctrine, supported by U.S. experience since the Vietnam War, essentially assumes that attaining this superiority not only achievable, but is generally required to conduct expeditionary warfare. Gaining superiority across all domains, however, will prove to be a major challenge when U.S. forces are required to operate in areas defended by A2/AD. Temporary, local control of the air and sea is a much more realistic expectation, and may be achieved through focused application of selected principles of war and by balancing operational factors. For example, the massing of selected U.S. forces at a particular time and location will create opportunities to surprise, saturate and overwhelm air defenses. This concentration of forces will create a temporary positional advantage in which specific objectives may be achieved. Furthermore, unlike wars of the past, the United States must be completely prepared for both offensive and defensive anti-satellite and cyber warfare, and must be able to effectively operate without these systems.

In a China-Taiwan scenario, the strengths of A2/AD may prevent U.S. forces from attacking many Chinese centers of gravity (COGs) directly. However, since China is a large country and area denial weapons are often expensive and limited in number, they are also unable to simultaneously defend multiple decisive points across such a large geographic area. As suggested by JP 3-0, indirect approaches will therefore be critical to U.S. military success. Operational commanders would therefore need to

²⁸ Christopher J. Bowie, *The Anti-Access Threat and Theater Air Bases* (Washington, DC: CSBA, 2002), ii. http://www.csbaonline.org/4Publications/Archive/R.20020924.CSBA_AirBases/R.20020924.CSBA_AirBases.htm (accessed 23 February 2010).

²⁹ Chairman, U.S. Joint Chiefs of Staff, *Joint Operations*, Joint Publication (JP) 3-0, Change 2 (Washington, DC: CJCS, 22 March 2010), III-24.

³⁰ Claus, telephone call with author, 17 February 2010.

³¹ Lockheed Martin Corporation. Terminal High Altitude Area Defense. Bethesda, MD. <http://www.lockheedmartin.com/products/thaad/index.html> (accessed 6 May 2010).

³² Chairman, U.S. Joint Chiefs of Staff, *Joint Operations*, Joint Publication (JP) 3-0, Change 2 (Washington, DC: CJCS, 22 March 2010), III-24.

consider suitable ways to exploit Chinese critical vulnerabilities not protected by A2/AD “to gain leverage over its COGs,” such as attacking command and control facilities and severing lines of communication (LOCs).³³ One example of an indirect approach is to attack Chinese merchant shipping and resources transiting the Strait of Malacca. Since 80% of China’s imported oil passes through these waters, the Strait is arguably a potential decisive point for U.S. and Chinese forces in a western Pacific conflict.³⁴

Is A2/AD the new face of war right now?

Despite the recent, rapid modernization of the Chinese military, there are two reasons to believe that the situation in the western Pacific may not be as dire as it appears. While its military capabilities have drastically improved, China has a host of internal issues preventing it from threatening the U.S. military in the near future.³⁵ More importantly, while Chinese A2/AD is a viable threat in the western Pacific, A2/AD does not exclusively represent the face of modern conflict.

Although Chinese military capability is growing impressively, studies suggest three shortfalls that currently prevent China from posing a serious threat to the U.S. military. China’s defense budget is smaller than that of the U.S., and a relatively small percentage of Chinese forces are actually modern.³⁶ China also faces significant disadvantages in areas of logistics, readiness, training and experience.³⁷

While these arguments may have merit, comparisons of budgets and percentages of modern forces are mostly irrelevant metrics when considering the potential effects of A2/AD on U.S. forces. China wisely invested in ballistic missile and SAM technologies specifically designed to counter strengths of the U.S. military. For example, it does not matter that China has not fielded an aircraft carrier while the U.S. has eleven, as Chinese anti-ship missiles are now designed to negate such advantages by preventing the U.S. ships from entering the area of operations.

Chinese logistics, training, and readiness standards, however, may very well be less than those of the United States, and they may represent a comparative advantage for U.S. forces. Likewise, history indicates that the U.S. military is much more experienced in the conduct of modern combat operations, which also serves as a disadvantage for the Chinese.³⁸ The combination of these factors, however, does not tell the whole story. No amount of U.S. combat experience, for example, will change the fact that the S-300 SAM system can deny the vast majority of U.S. airpower flight over the Taiwan Strait.

The importance of addressing A2/AD, however, reaches far beyond Taiwan. Chinese A2/AD directly influences the balance of power in the South China Sea and throughout the western Pacific, as China continues to use its new military strength to reveal aspirations of regional leadership and global relevance.³⁹ In addition, proliferation trends indicate that imbalances created by A2/AD are not limited

³³ Chairman, U.S. Joint Chiefs of Staff, *Joint Operations*, Joint Publication (JP) 3-0, Change 1 (Washington, DC: CJCS, 13 February 2008), IV-12, 13.

³⁴ Mamdouh G. Salameh, *China’s Global Oil Diplomacy: Benign or Hostile?* (Cleveland, OH: International Association for Energy Economics, First Quarter 2010), 22. http://www.iaee.org/documents/2010Winter_EnergyForum.pdf (accessed 17 April 2010).

³⁵ James Fallows, “Cyber Warriors,” *The Atlantic*, March 2010. <http://www.theatlantic.com/magazine/archive/2010/03/cyber-warriors/7917> (accessed 26 March 2010).

³⁶ *Ibid.*

³⁷ *Ibid.*

³⁸ *Ibid.*

³⁹ Christopher Claus (CSAF Strategic Studies Group), e-mail message to author, 21 April 2010.

to China, as fourteen other countries possessed S-300 SAMs as of 2009.⁴⁰ While Iran is not believed to currently operate the S-300, they have been seeking modern A2/AD technology since the mid-1990s.⁴¹ Iranian A2/AD assets positioned near the Strait of Hormuz would similarly alter the balance of power in the Middle East by denying other's access to the Persian Gulf, and is just one example of the danger of A2/AD proliferation.

Admittedly, A2/AD is not the only challenge U.S. forces face in the 21st Century, as the character of modern conflict is extraordinarily complex. While not a new concept, many current wars have recently been defined as "hybrid" in character, with adversaries effectively employing elements of regular and irregular warfare.⁴² It is hybrid warfare, not state actors employing A2/AD, which has become the focus of U.S. military efforts since the terrorist attacks of September 11, 2001, and has required creative approaches to address the challenges of fighting insurgents in foreign lands. Additionally, combating irregular warfare has been a top priority of the Department of Defense (DoD) since 2008. As such, it has driven the majority of contemporary thought on the conduct of operational warfare.⁴³

Many of the same experts agree, however, that hybrid warfare does not replace conventional warfare, or eliminate the need to prepare for it.⁴⁴ A2/AD technologies will, however, serve to amplify the dangers posed by hybrid warfare as anti-access weapons proliferate to state and non-state actors around the world. But while the DoD advocates the need for balance between conventional and irregular capabilities and highlights the need for superior conventional forces, the U.S. military remains ill-prepared to execute combat operations against modern A2/AD systems that are employed in many places around the world.⁴⁵ A2/AD is therefore the critical underlying theme that defines the evolution of modern combat, whether conventional, irregular or hybrid. As long as U.S. forces remain unprepared to counter A2/AD, the American military will suffer the same fate as that of the French in 1940: military failure due to the inability to comprehend the evolution of modern warfare.⁴⁶

CONCLUSION

Just as Blitzkrieg changed combat in 1940, anti-access/area denial technologies and strategies have re-defined the character of modern warfare. A2/AD undermines contemporary U.S. power projection by denying freedom of movement and freedom of action in and around areas of interest, and clearly reveals problems American forces would face in the event of conflict with China over Taiwan or the South China Sea. Implications of A2/AD, however, reach far beyond that of conflict in the western Pacific. To successfully operate in the A2/AD environment, the U.S. military must prepare adequately for this evolution of modern warfare by understanding the operational implications presented by modern technology. Planners must use innovative joint planning concepts such as AirSea Battle and effective integration of joint forces to help achieve the desired end state with the resources available to

⁴⁰ O'Halloran and Foss, *Jane's Land Based Air Defence 2008-2009*, 186.

⁴¹ Anoushiravan Ehteshami, "Iran's National Strategy Striving for Regional Parity or Supremacy?," *Jane's Online* (Vol. 27, Issue 4, 1 April 1994) <http://search.janes.com> (accessed 28 August 2009).

⁴² Robert Wilke, "Hybrid Warfare: Something Old, Not Something New" (Maxwell AFB, AL: *Air and Space Power Journal*, Volume XXIII, No. 4, Winter 2009), 14.

⁴³ U.S. Department of Defense, *National Defense Strategy*, (Washington, DC: DoD, June 2008), 13.

⁴⁴ Frank G. Hoffman, "Hybrid Warfare and Challenges," *Joint Force Quarterly*, No.52, (1st Quarter 2009). <http://smallwarsjournal.com/documents/jfqhoffman.pdf> (accessed 17 April 2009), 38.

⁴⁵ U.S. Department of Defense, *National Defense Strategy*, (Washington, DC: DoD, June 2008), 13.

⁴⁶ Williamson Murray and Allan R. Millett (eds.), *Military Innovation in the Interwar Period*, 1996, 34-35.

the U.S. military. A2/AD not only increases the dangers of conventional war, but also offers non-state actors worldwide options to increase the effectiveness of irregular or hybrid warfare.

RECOMMENDATIONS

The U.S. Department of Defense should consider the following actions to adequately prepare for combat operations in the modern A2/AD environment:

- Accept A2/AD as a fundamental change to the character of conventional warfare, as adversaries with A2/AD capabilities can deny freedom of movement and freedom of action across the range of military operations.
- Re-assess joint doctrine relevance to operations against A2/AD threats.
- Ensure U.S. forces have the means to achieve the operational objectives.
- Accept the increased risk operating against A2/AD threats, or change the objective.
- Utilize AirSea Battle innovation as a starting point to integrate command and control between the services, realize the maximum counter A2/AD potential of existing platforms, and identify capability shortfalls that need to be addressed. Participation cannot, however, be limited to USAF and USN – cooperation from other U.S. services and agencies should be encouraged.
- Understand that while Chinese A2/AD capability is a leading example, challenges are not limited to China. A2/AD proliferation is already significant, and today presents challenges to U.S. power projection around the world.

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