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**AIRPOWER AND THE ESTABLISHMENT OF SEA CONTROL IN AN ANTI-
ACCESS ENVIRONMENT**

by

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**A paper submitted to the Faculty of the Naval War College in partial satisfaction of the
requirements of the Department of Joint Military Operations.**

**The contents of this paper reflect my own personal views and are not necessarily
endorsed by the Naval War College or the Department of the Navy.**

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ABSTRACT

The Taiwan Straits issue is a point of strategic, operational, and tactical priority for the U.S. Armed Forces. The 1979 Taiwan Relations Act expresses U.S. interests in the Western Pacific, stating that the United States would view attempts “to determine the future of Taiwan by other than peaceful means, including by boycotts or embargoes, a threat to the peace and security of the Western Pacific area and of grave concern to the United States.” Due to the PRC’s ongoing modernization and development of asymmetric weapons, any future U.S. military engagement with the PRC in support of Taiwan may incur significant operational risk. Thus, the qualities of land-based airpower must be leveraged to establish sea control in anti-access environments such as the Taiwan Straits in order to meet operational objectives. USAF assets provide the Joint Forces Commander and Joint Forces Maritime Component Commander critical operational capabilities to enhance maritime freedom of action. To provide a background, four cases, starting with the sinking of the *Ostfriesland* in 1921, spanning action in the Atlantic and Pacific during World War II, and ending with the Falkland Islands conflict in 1982, illustrate land-based airpower’s ability to affect maritime freedom of action. Joint doctrine and Service doctrine prescribe how land-based airpower will and should be employed in support of maritime operational objectives. Additionally, USAF Countersea doctrine details how the JFACC could support the JFMCC at the operational level of war. Land-based airpower employed jointly with organic naval airpower can have a synergistic effect toward accomplishment of maritime objectives and reduce the risk to the force through persistent ISR, C², AAR and stealth.

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INTRODUCTION

“Whosoever can hold the sea has command of everything”

- Themistocles (524-460 B.C.)¹

The Taiwan Straits issue, specifically the decade’s long friction between the People’s Republic of China (PRC) and Taiwan, is a point of strategic, operational, and tactical priority for the U.S. Armed Forces. The 1979 Taiwan Relations Act expresses U.S. interests in the Western Pacific, stating that the United States would view attempts “to determine the future of Taiwan by other than peaceful means, including by boycotts or embargoes, a threat to the peace and security of the Western Pacific area and of grave concern to the United States.”² In March 1996, voicing displeasure in the U.S. policy debate over Taiwan relations, the PRC demonstrated a show of force by conducting tactical ballistic missile tests targeted near Taiwan.³ The U.S. sailed two carrier battle groups into the region in response to the PRC’s coercive missile tests, bringing the U.S. and the PRC closer to a crisis anytime since the early 1960s.⁴ Since the 1996 Taiwan Straits Crisis, the PRC’s has significantly modernized its military, especially its sea denial and anti-access weaponry vis-à-vis U.S. capabilities. Any future U.S. military engagement with the PRC in support of Taiwan may incur significant operational risk.

The qualities of land-based airpower must be leveraged to establish sea control in anti-access environments such as the Taiwan Straits in order to meet operational objectives. United States Air Force (USAF) assets provide the Joint Forces Commander (JFC) and Joint Forces Maritime Component Commander (JFMCC) critical operational capabilities to enhance maritime freedom of action. These capabilities include: Maritime surveillance and reconnaissance; Antisurface ship warfare; Antisubmarine warfare; Aerial minelaying operations; Counterair operations; Air- to- air refueling; Amphibious operations; Close air

support; Maritime air support.⁵ If effectively integrated into the JFC's operational scheme, the flexibility and persistence of USAF assets would provide operational capabilities, versatility, and options to obtaining sea control versus a near-peer competitor with significant asymmetric advantages.

To construct the argument, historical examples are presented to provide a background of the effectiveness of land-based airpower in maritime environments. Four cases, starting with the sinking of the *Ostfriesland* in 1921, spanning action in the Atlantic and Pacific during World War II, and ending with the Falkland Islands conflict in 1982, illustrate land-based airpower's ability to affect maritime freedom of action. A discussion of operational risk in relation to possible U.S. courses of action (COA) pertaining to sea control in the Taiwan Straits amidst an asymmetric threat; a threat using old and existing technologies in innovative ways specifically designed to counter a superior adversary follows.⁶ Next, Department of Defense (DoD) regulations, Joint and Service doctrine are examined as they pertain to the JFC's and JFMCC's probable operational objectives and command relationships. Finally, the efficacy of USAF maritime capability is analyzed within the context of gaining sea control to set the conditions for decisive operations. Realistically, what capabilities can land-based airpower provide the JFC to meet operational objectives in the maritime environment?

HISTORY

History is replete with examples of how land-based airpower achieved impressive success in the maritime realm. In 1921, Brigadier General William "Billy" Mitchell, considered to be the father of the modern USAF⁷, validated ideas of land-based maritime interdiction. While controversial at times, Mitchell expanded upon existing theories of his day regarding the function of land-based airpower in maritime roles. Mitchell asserted that

land-based airpower could be used to attack naval forces, in maritime reconnaissance, and in air superiority roles⁸. Land-based airpower's potential contribution to sea control was demonstrated when a US Army Air Service *MB-2*, acting in an antisurface ship warfare function, sunk the former German capital ship *Ostfriesland* during an aerial bombing demonstration⁹. While the sinking of the *Ostfriesland* verified the creative thinking of early airpower visionaries, the demonstration was conducted in an environment of controlled risk. Arguably, the bombing demonstration highlighted tactical over true operational level capability, but nonetheless established a framework for land-based airpower's future operational-level maritime role.

World War II action in the seas surrounding the British Isles displayed land-based airpower's contribution in neutralizing an asymmetric threat. During the Battle of the Atlantic, German U-Boats sank over 1,000 British and neutral-flagged vessels.¹⁰ Initially, the Germans were able to exploit the seams of British antisubmarine warfare capabilities due to insufficient numbers of British forces available to perform convoy escort functions over the great distances. In response, the British converted B-24 Liberator bomber aircraft into anti-submarine warfare platforms and deployed them in a maritime role.¹¹ The modified B-24's were credited with sinking multiple German U-Boats and negating the attacks of others by forcing the submarines to submerge and disengage prior to commencing their attacks.¹² The radar equipped B-24's range, speed, and operational search coverage highlighted how land-based airpower's factor force¹³ compared to surface vessels had a significant effect in turning the Battle of the Atlantic in the favor of the Allies.¹⁴ As illustrated, the speed and search coverage of land-based airpower mitigated the operational factor of space¹⁵ and diminished the asymmetric threat posed by German U-Boats to Allied shipping.¹⁶

Not to be outdone by their British counterparts in the Atlantic, air forces operating in the Pacific Theater during World War II demonstrated land-based airpower's ability to engage in decisive operational-level maritime battle. In the March of 1943, Battle of the Bismarck Sea, more than one hundred U.S. Fifth Air Force and Royal Australian Air Force aircraft operating in airspace contested by the Japanese attacked a Japanese troop convoy en-route to New Guinea.¹⁷ The Allies used innovative skip-bombing tactics¹⁸ in an anti-surface ship warfare role to send 12 of 16 Japanese convoy ships to the bottom.¹⁹ The Japanese suffered nearly 3,000 casualties including 20 fighter escort aircraft.²⁰ In 1944, Allied Air Forces supported amphibious operations during the Leyte Gulf Campaign. Again, Fifth Air Force aircraft supported a maritime objective by supporting the landings at Leyte Island with operational fires into Japanese reinforcement ships located on the east side of the island. Air power provided persistent fire support to Leyte operation and prevented approximately 70,000 Japanese reinforcement troops and their vessels from engaging U.S. ground forces.²¹ The Battles of the Bismarck Sea and Leyte Gulf displayed the capability of land-based airpower to effectively mass and concentrate fires in support of operational objectives while functioning in areas of significant risk.

Inspection of the 1982 Falklands War reveals distinct parallels to operational factors in the Taiwan Straits. The most significant lesson is the vulnerability of naval surface forces to land-based aircraft armed with anti-ship cruise missiles.²² The Argentine Air Force successfully employed Exocet missiles on multiple occasions, ultimately leading to the sinking of the *HMS Sheffield* and the *Atlantic Conveyor*.²³ The sinking of the *HMS Sheffield* by a threat for which the British possessed limited defenses against²⁴ highlights the tension between operational risk and operational objectives. Admiral Sandy Woodward, commander

of the South Atlantic Task Group was forced to resolve an “impossible dilemma,” whereby he needed to maintain air superiority and support to the land battle but could neither politically nor strategically risk the loss of an aircraft carrier.²⁵ Woodward subsequently decided to move the carriers outside the range of the Exocet-armed Argentine aircraft.²⁶ The British Navy was unable to exercise maritime surface freedom of action and did not inflict the amount of damage expected prior to the British amphibious invasion²⁷ due to the asymmetric Exocet threat.

A second parallel between the Falklands and the Taiwan Straits deals with how the British dealt with the operational factor of space. During the Black Buck raids, land-based RAF Vulcan bombers provided operational fires onto Argentine positions in the Falklands after taking off from Ascension Island, located 3,400 miles away.²⁸ However, the nearly 7,000-mile round trip mission required a significant air-refueling effort, including eleven support tankers, 17 air-refuelings and more than 220,000 gallons of gasoline per mission.²⁹ The missions had limited success³⁰, but nonetheless demonstrated that land-based airpower’s operational reach traversing the maritime domain can overcome great distances in support of operational objectives.

BALANCING RISK

As history provides the background, then context provides the lens and a framework for analysis of operational risk in scenarios pertaining to U.S. involvement in the Taiwan Straits. The previously discussed historical cases illustrate the varying degrees of risk associated with mission accomplishment; ranging from the controlled risk in the Ostfriesland bombing demonstration to the *risk to the force* determination made by British commanders to move the aircraft carriers away from the asymmetric Exocet threat in the Falklands. Concerning any scenario involving U.S. military engagement in the Taiwan Straits, what

risks are forces willing to take to accomplish the objective in relation to the threat? As the British learned in the Falklands, a force can incur risk by “overrating one’s capabilities and underestimating the enemy’s capabilities.”³¹ Thus, operational objectives must be based on a clear understanding of both the national strategy and tactical capabilities for forces to assume a commensurate level of risk. However, mitigating operational risk is difficult when faced with an asymmetric threat. Just as the Germans employed their U-Boats in an asymmetric manner against seams in the British defenses in the Battle of the Atlantic, so too can the PRC aspire to use their “assassin’s mace”³² concept to counter U.S. operational objectives and to constrain maritime freedom of action in the Pacific. It is important to note that sea control is not the ultimate operational objective. Rather, sea control sets the conditions for other potentially decisive operations.³³

NATURE OF THE THREAT

The lesson from the last war that stands out clearly above all the others is that if you want to go anywhere in modern war, in the air, on the sea, on the land, you must have command of the air.

- Fleet Admiral William F. Halsey to Congress after World War II³⁴

The 2008 *Annual Report to Congress, Military Power of the Peoples Republic of China* describes both the threat and the ways the PRC could hedge its capabilities and use the “assassin’s mace” construct against potential adversaries. The specific tactical employment, integration, and vulnerabilities of the PRC’s weapon systems are beyond the scope of this discussion. However, the threat’s nature and the PRC’s ability to constrain maritime freedom of action still warrant a brief overview. First, the PRC has acquired systems to challenge the ability of the U.S. to maintain air superiority, particularly with non-stealth, carrier-borne aircraft. As Admiral Halsey contends and the British learned in the Falklands, air superiority is a requisite of maritime freedom of action. The PRC’s acquisition of the

land-based SA-20 Surface-to-Air Missile (SAM), land based SU-30 and F-10 fighters with advanced air-air-missile (AAM) capability, the sea-based LUZHOU and LUYANG II class guided missile destroyers (DDG) with long range SA-N-20 and HQ-9 SAMs, airborne command and control systems, and unmanned aerial drones constitute a formidable airspace defense in depth with ranges extending beyond Taiwan's eastern coast.³⁵ Carrier and non-stealth land-based aircraft have limited capability against these systems³⁶, but the utility and risk of engaging a land-based SAM or a capital platform to further sea control efforts must be weighed against the operational objective and potential for strategic escalation.

The PRC has acquired a modern array of sea denial weapons as well. Acquisition continues of Russian KILO-class diesel electric submarines with SS-N-27B SIZZLER supersonic anti-ship cruise missiles (ASCM), SS-N-22 SUNBURN supersonic ASCMs for the SOVREMENNY-class DDG, and Type 022 catamaran-style missile patrol craft with ASCMs.³⁷ Of particular concern is the development of a 900NM range anti-ship ballistic missile (ASBM) with terminal homing capability against surface ships on the high seas.³⁸ When combined with over the horizon targeting capability³⁹, the synchronization of these weapons systems presents a formidable challenge to sea control efforts. Intuitively, any operational objectives reliant on maritime freedom of action would necessarily be questioned. As with the aforementioned air superiority discussion, U.S. Naval forces have the ability to operate in this environment, but not without significant risk to the force.⁴⁰

Lastly, the PRC continues to pursue other anti-access and asymmetric capabilities. Development of conventional tactical ballistic missiles, anti-radiation missiles, and air and land-based cruise missiles continues.⁴¹ Additionally, the PRC recently demonstrated the capability to employ anti-satellite (ASAT) weapons and various computer networks have

been subject to intrusion attempts with origins within China.⁴² ASAT and cyber warfare have anti-access implications with their ability to delay, disrupt, or outright destroy communications and intelligence networks and associated infrastructure. Without information and communications, the risk to U.S. surface forces would summarily increase. Overall, the PRC's increasing weapons quality, development of land-based weapons that threaten ships, and possession of a vast land area from which to launch these weapons puts U.S. access and maritime freedom of action at great risk.

The 2008 *Annual Report to Congress, Military Power of the Peoples Republic of China* describes four ways the PRC could project its conventional and asymmetric capabilities in increasingly sophisticated campaigns against Taiwan whilst denying third party intervention.⁴³ These COAs include a limited force or "no war" option, a coercive air and missile campaign, a maritime quarantine or blockade, or an amphibious invasion.⁴⁴ The nature of PRC's campaign would ostensibly determine the U.S. response in accordance with the 1979 Taiwan Relations Act and U.S. national security interests, spanning the range of diplomatic and military options.

The PRC's limited force or "no war" option would indirectly target the Taiwan people's confidence in their leadership through low-intensity military engagements coupled with other clandestine operations. These operations may take the form of computer network attacks against Taiwan's economic infrastructure or special operations sabotage of key military, economic, or leadership targets.⁴⁵

The PRC may also employ a campaign using their precision strike tactical ballistic and air-launched cruise missiles into Taiwan's military and command and control infrastructure. The missile strikes could cripple Taiwan's military, isolate the political

leadership, and break the will of Taiwan's people⁴⁶, thereby forcing reunification negotiations by other than peaceful means.⁴⁷ A coercive missile campaign, such as the missile testing exercises conducted by the PRC during the 1996 Taiwan Straits Crisis, could be conducted with little to no warning would likely be combined with other coercive measures.

The PRC may attempt a conventional naval or an air, missile, or sea-mine blockade or quarantine of Taiwan.⁴⁸ A traditional blockade would be force intensive and costly for the PRC, and thus the non-conventional method is perhaps more likely. However, any coercive blockades or indiscriminate mining of ports may escalate the scenario and bring unwanted international pressure from other than the U.S. due to the effect on international commerce.⁴⁹

A full-scale invasion of Taiwan may exceed the PRC's capabilities⁵⁰, but the PRC is capable of smaller-scale operations.⁵¹ Regarding a full-scale invasion, the military complexity and the risk of international intervention "make an amphibious invasion of Taiwan a significant political and military risk for China's leaders."⁵² An amphibious assault of a Taiwan-held island could demonstrate the PRC's military capability, but may have the unwanted effect of strengthening the will of the Taiwanese.⁵³

While the PRC has acquired and continues to modernize its force with considerable tactical and operational capability, it does not necessarily have the "capacity to force the resolution of a Taiwan conflict by military means alone."⁵⁴ As discussed, more than one source asserts the likelihood of a full-scale invasion of Taiwan as being small, and that any coercive campaign would necessarily involve many elements of the PRC's national power. Also, advanced asymmetric weapons may grant the PRC great combat potential to counter U.S. operational objectives, but the actual combat power of the PRC's forces is reduced by

an indeterminate, possibly decisive amount due to a multitude of environmental factors, including visibility, terrain, and the climate.⁵⁵ Thus, depending on the PRC's COA and the corresponding U.S. response, it is reasonable due to Taiwan's geographic position that U.S. military engagement would necessitate some form of maritime freedom of action to set the conditions for decisive operations. How then, can land-based airpower be used within the framework of operational art to support efforts to achieve this essential maritime freedom of action while reducing the risk to the force?

ANALYSIS

Sea control entails control of the surface, subsurface, and airspace affecting naval operations in any littoral or open ocean...control of the sea is required in specific regions for particular periods of time, to allow unencumbered maritime operations.

-Naval Doctrine Publication [NDP] 1, Naval Warfare⁵⁶

Just as history is replete with examples of how land-based airpower effectively supported friendly or denied adversary maritime freedom of action, DoD regulations, Joint doctrine and Service doctrine prescribe how land-based airpower will and should be employed in support of maritime operational objectives. Due to their complementary nature, integration of both air and naval forces in a joint construct is arguably the most effective means of gaining and maintaining sea control. Moreover, the preponderance of significant naval actions in the past century took place within the operational reach of land-based aircraft⁵⁷, and elements of the operational factor of space around the Taiwan Straits are no different. To limit the scale of the discussion, analysis of the regulations and doctrine will focus on a fundamental concept inherent in NDP 1's definition of sea control. Specifically, time and space bound sea control. The lens of operational art will therefore center on how land-based airpower, operating in the context of the previously described Taiwan Straits

scenarios, may enable “the fleet to operate with a high degree of freedom in a sea or ocean area, but only for a *limited time*.”⁵⁸

First, it is DoD Directive 5100.1, *Functions of the Department of Defense and Its Major Components*, that assigns the USAF the following collateral missions: Surface sea surveillance and anti-surface ship warfare; Antisubmarine warfare and anti-air warfare operations; Aerial mine-laying operations; Air-to-air refueling in support of naval campaigns.⁵⁹ Note the collateral, not primary, designation of these sea control supportive missions. The regulation dictates that collateral functions cannot provide services the sole basis for additional force requirements.⁶⁰ This may seem to limit the USAF’s capability in the maritime realm. Rather, it reinforces the concept that a joint construct, with naval forces and land-based airpower operating in supported and supporting roles, is necessary to achieve maritime objectives. Of the four listed collateral missions, the ability of land-based airpower to provide persistent sea surveillance and air-to-air refueling in joint operations are among the most critical in the Taiwan Straits. Additionally, USAF primary capabilities such as air superiority (leveraging the use of stealth platforms), command and control, and aerial intelligence and reconnaissance⁶¹ are equally important toward fulfillment of maritime objectives in relation to the PRC’s access denial and asymmetric capabilities.

While DoD Directive 5100.1 directs that USAF land-based airpower will perform maritime functions, it is Joint and Service doctrine that describes how these functions should be performed. More importantly, doctrine stresses the integration, and command and control of USAF land-based airpower in support of maritime operations. Joint Publication (JP) 3-30, *Command and Control for Joint Air Operations*, details the many responsibilities of the Joint Forces Air Component Commander (JFACC). The JFC normally assigns JFACC

responsibilities to “the component commander having the preponderance of air assets and the ability to effectively plan, task, and control joint air operations.”⁶² In the same manner, JP 3-32, *Command and Control for Joint Maritime Operations*, identifies the JFMCC as the JFC’s “maritime warfighter”⁶³ with equally broad responsibilities. Of greater importance with respect to the Taiwan Straits and land-based airpower’s contribution to sea control efforts is how JP 3-0, *Joint Operations*, describes supported and supporting relationships between the JFMCC and JFACC. Simply stated, in maritime areas of operations, the JFMCC is normally the supported commander.⁶⁴ As discussed, the four Taiwan Straits scenarios and their distinct maritime nature would suggest obtaining maritime freedom of action to set the conditions for decisive operations. The assertion can therefore be made that the JFC would designate the JFMCC as the supported commander with the JFACC performing supporting functions for most military operations pertaining to the Taiwan Straits. USAF *Countersea* doctrine addresses the concept of mutual support in Service relationships, noting that clearly defined support relationships are “essential to the conduct of joint military operations ensuring combat force is massed and concentrated to achieve decisive results over the enemy.”⁶⁵ If clearly defined support relationships are essential to the conduct of joint operations, how does Air Force Doctrine Document (AFDD) 2-1.4, *Countersea*, advise land-based airpower be used to support the JFMCC?

Using the four possible PRC COAs in the Taiwan Straits as a framework, USAF *Countersea* doctrine details how the JFACC could support the JFMCC at the operational level of war. Of the four prescribed PRC COAs, only two offer the greatest potential for significant U.S. military intervention at the operational level; the coercive air, missile and naval blockade and the amphibious invasion scenarios. The other two scenarios, the limited

“no war” option and the tactical ballistic and air-launched cruise missile barrage present serious challenges. But, discussions on how to counter these actions, besides preempting or deterring the PRC through freedom of navigation activities, maritime shows of force, or military assistance to Taiwan, form the basis for a forthcoming countervailing discussion. While serving as the supported commander in the JFMCC would provide the JFACC with target sets, intelligence, surveillance, and reconnaissance (ISR) requests, and other desired effects required to meet maritime objectives.⁶⁶ In response, the JFACC would make an apportionment recommendation to the JFC on how airpower, specifically land-based, should be used to support the JFMCC’s objectives⁶⁷ within the JFC’s overall operational scheme.

USAF land-based airpower can provide the JFC capabilities that extend the range, persistence, and command and control functions of naval assets.⁶⁸ The synergy of land-based airpower’s countersea capabilities with naval surface, subsurface, and aviation capabilities enable the JFMCC’s freedom of action efforts. The capabilities of USAF land-based airpower were highlighted in this paper’s introduction and are codified in USAF Countersea doctrine. The U.S. Navy has the ability to perform these missions with its organic air capabilities⁶⁹, but land-based air power’s qualitative edge over organic naval air assets⁷⁰ lies in its ability to persist with ISR and command and control (C²) assets to maintain an air and surface common operating picture and to mitigate factor space with dedicated air-to-air refueling (AAR) platforms. Moreover, the stealth capability of the USAF’s F-22 and B-2 may provide the JFMCC other means toward attainment of operational objectives, as these assets may be able to operate with increased effectiveness and reduced risk compared to conventional platforms; much in the same manner as Naval sub-surface forces.⁷¹ With respect to the operating environment of the Taiwan Straits, the nature of the PRC threat, and

the JFMCC's objectives, these operational level functions are land-based airpower's most significant contribution to gaining and maintaining sea control.

The significance of the qualitative edge of land-based ISR, C², and AAR lies in their ability to maintain the common operating picture⁷² while mitigating the risk to the force by enabling land and naval based airpower to operate outside the reach of the PRC's currently fielded anti-access weapons systems.⁷³ Similarly, basing strategies for land-based airpower must be made with particular consideration to the PRC ballistic missile capability, force protection, and logistical sustainability if far removed from the operational objective. In his USAF School of Advanced Air and Space Studies research paper, Major Lawrence Spinetta recommends establishing a "web of austere, forward-operating bases" in the region as part of a broader strategy to counter the PRC's advantages⁷⁴ in relation to factors force and space. Regardless of whether a web or relatively few bases are used for land-based airpower, if sufficient AAR assets are available, operations of both land and carrier-based airpower are possible. Nevertheless, like the Black Buck raids in the Falklands War, there would be significant cost if the bases are established outside the range of the PRC's tactical ballistic missiles-possibly thousands of miles away from the objective.

Likewise, naval surface assets would assume increasing risk to force as they approach or encroach upon the PRC's anti-access capabilities. Thus, if sea control inside the PRC's access denial defense system is necessary to set the conditions for future decisive actions, an appropriate risk to force determination, similar to that made by Admiral Woodward in the Falklands, must be made to balance the risk versus the benefit of achieving the operational objective. Land-based airpower, functioning in a supporting role to the JFMCC, can support efforts to achieve maritime freedom action through traditional kinetic operational fires. More

importantly, land-based airpower employed jointly with organic naval airpower can have a synergistic effect toward accomplishment of maritime objectives and reduce the risk to the force through persistent ISR, C², AAR and stealth.

LESSONS LEARNED

The PRC's anti-access capabilities pose a significant challenge to unencumbered naval freedom of action should conflict erupt in the Taiwan Straits. Critical analysis of the PRC threat and possible COAs in relation to U.S. Naval capabilities and supportive land-based airpower reveals several lessons learned operational-level warfighters. These lessons learned are by no means all-inclusive, but necessarily bounded by the scope of this paper. Thus, the lessons learned relate to operational risk, imbalances between operational objectives versus force capabilities, and the capability of land-based airpower to support maritime objectives.

1. The limited "no war" option and the tactical ballistic and air-launched cruise missile barrage COAs present serious operational and strategic challenges. In both cases, strategic escalation by the U.S. may be necessary to prevent continued PRC coercive action. A conventional military solution by the U.S. versus a PRC coercive campaign using no or limited force may aggravate tensions. To counter a missile barrage, escalation may be necessary in order to target ballistic missile batteries on the mainland or supply Taiwan with advanced anti-ballistic missile capabilities. If conventional forces were used to attack targets on the PRC mainland, the complete capabilities of the joint force would be needed to mitigate risk in the anti-access environment.

2. U.S. Naval surface vessels may operate independently within the range of the PRC's *currently fielded* anti-access weapon systems, but not without considerable risk to the force. Naval surface and air assets can use operational maneuver, surveillance,

reconnaissance, and maritime air superiority functions to build a common operating picture and obtain sea control for a limited time in a limited space to conduct decisive operations. Increasing the distance from PRC's access-denial capabilities will correspondingly decrease the risk to the force from ASCMs and submarines, but may also lessen the effect of freedom of navigation actions or show of force missions. While not immune from the PRC's anti-access challenges, U.S. Naval submarines with their inherent stealth characteristics may be able to operate with subsurface freedom of maneuver.

3. Current PRC precision tactical ballistic missile capability places U.S. land-based forces operating within 1,000NM of China at risk.⁷⁵ Similarly, once operational, the PRC's over the horizon targeting capability synchronized with homing anti-ship ballistic missile will make U.S. Naval surface operations within 900NM of China nearly untenable without accepting significant risk to high value assets.

4. The clash of U.S. conventional land and sea-based airpower with the PRC's anti-access capabilities may create a de facto demilitarized zone or contested sea where neither force can operate on the surface or exercise sea control without significant operational risk.⁷⁶

5. Analysis of theater geometry, specifically in regard to range, reveals that land-based USAF assets can perform persistent ISR, C², and AAR functions from ranges outside currently fielded PRC weapon capabilities and support joint air and surface operations. Land-based assets are ideally suited to maintain a common operating picture and perform C² functions to support the JFMCC's operation scheme due to their AAR capability-a capability not present with organic naval assets. The utility of land-based ISR, C², and AAR increases as the distance naval forces operate away from the PRC's anti-access construct increases.

CONCLUSION

Increases in technology and refinement in tactics have enabled increases in speed, range, and lethality of aircraft. The first Gulf War, the air war over Kosovo, and Operations Iraqi and Enduring Freedom demonstrated how the current inventory of U.S. aircraft can operate over great distances to provide critical command and control, intelligence support, and operational and tactical fires in support of a JFC's objectives. Likewise, technological advances have enabled increased capabilities in countries to deny or severely hamper access to the air and waters surrounding their territories. In the case of China, their anti-access defense construct is considered asymmetric, as it seems acutely designed to counter many of the U.S.'s operational strengths. If hostilities were to erupt or if China were to embark on a coercive course of action against Taiwan, the decision to employ the military instrument of power would not be without significant risk. China's ongoing military modernization will not make operations in the future any easier. The entire range of military operations in the Taiwan Straits would benefit from the synergy of joint operations-specifically leveraging land-based assets with naval power to obtain maritime freedom of action. However, achieving sea control in an increasingly dangerous anti-access environment is risky. Operational planners must ensure that there is balance between the risk that forces are willing to take in relation to the threat and the objective. To this end, land-based airpower when properly integrated into the JFC's operations scheme, operating with clear command relationships can provide the JFC and the JFMCC a persistent common operating picture that may further reduce the risk to friendly forces and provide options for gaining and maintaining maritime freedom of action.

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ENDNOTES

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- ¹ NDP 1, *Naval Warfare*, 3.
- ² *Taiwan Relations Act*.
- ³ Ross, "The 1995-1996 Taiwan Strait Confrontation: Coercion, Credibility, and Use of Force", 1.
- ⁴ *Ibid.*, 1.
- ⁵ AFDD 2-1.4, *Countersea Operations*, 33-43.
- ⁶ Annual Report to Congress. *Military Power of the Peoples Republic of China 2008*, 20.
- ⁷ Ott, "Maj Gen William "Billy" Mitchell: A Pyrrhic Promotion", 27.
- ⁸ Hurley, *Billy Mitchell: Crusader for Air Power*, 58.
- ⁹ AFDD 2-1.4, *Countersea Operations*, 35.
- ¹⁰ Churchill, *The Second World War*, vol. 4, *The Hinge of Fate*, 414.
- ¹¹ Syrett, *The Defeat of the German U-Boats*, 15.
- ¹² *Ibid.*, 15. Syrett notes that unlike present day submarines, the German U-Boats needed to surface to employ their weapons.
- ¹³ Vego, *Joint Operational Warfare*, III-33.
- ¹⁴ Syrett, *The Defeat of the German U-Boats*, 133.
- ¹⁵ Vego, *Joint Operational Warfare*, III-7.
- ¹⁶ Syrett, *The Defeat of the German U-Boats*, 415.
- ¹⁷ McAulay, *Battle of the Bismarck Sea*, 136.
- ¹⁸ AFDD 2-1.4, *Countersea Operations*, 11.
- ¹⁹ McAulay, *Battle of the Bismarck Sea*, 136.
- ²⁰ McAulay, *Battle of the Bismarck Sea*, 136, and Spector, *Eagle against the Sun: The American War with Japan*, 228.
- ²¹ The United States Strategic Bombing Survey, *The Fifth Air Force in the War against Japan*, 63.
- ²² Chipman, "Airpower: A New Way of Warfare (Sea Control)", 65.
- ²³ Hastings and Jenkins, *The Battle for the Falklands*, 156, 227.
- ²⁴ *Ibid.*, 161.
- ²⁵ *Ibid.*, 156.
- ²⁶ Chipman, "Airpower: A New Way of Warfare (Sea Control)", 66.
- ²⁷ Hastings and Jenkins, *The Battle for the Falklands*, 161.
- ²⁸ Hastings and Jenkins, *The Battle for the Falklands*, 143.
- ²⁹ *Ibid.*, 143.
- ³⁰ *Ibid.*, 151.
- ³¹ Vego, *Joint Operational Warfare*, I-41.
- ³² Annual Report to Congress. *Military Power of the Peoples Republic of China 2008*, 20. The PLA has developed capabilities, referred to as "assassin's mace" programs, designed to give a technologically inferior military advantage over technologically superior adversaries.
- ³³ Vego, *Joint Operational Warfare*, II-48.
- ³⁴ AFDD 2-1.4, *Countersea Operations*, 12.
- ³⁵ Annual Report to Congress. *Military Power of the Peoples Republic of China 2008*, 4,5,23.
- ³⁶ The ability of airpower to operate within a SAM ring is dependant on a multitude of factors. While stealth aircraft may have additional capability, specific tactical employment is beyond the classification of this paper.
- ³⁷ *Ibid.*, 2,3,5.
- ³⁸ *Ibid.*, 2,4,23.
- ³⁹ *Ibid.*, 4.
- ⁴⁰ Specific tactical capabilities, vulnerabilities and countermeasures to these systems are beyond the classification of this paper.
- ⁴¹ *Ibid.*, 24.
- ⁴² *Ibid.*, 3.
- ⁴³ *Ibid.*, 41.
- ⁴⁴ *Ibid.*, 42-44.
- ⁴⁵ *Ibid.*, 42-44.
- ⁴⁶ *Ibid.*, 42-44.

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- ⁴⁷ Bartee, "Possible U.S. Navy Responses to People's Republic of China Military Action against Taiwan", 68-73.
- ⁴⁸ Annual Report to Congress. *Military Power of the Peoples Republic of China 2008*, 42-44.
- ⁴⁹ Ibid., 42-44.
- ⁵⁰ Bartee, "Possible U.S. Navy Responses to People's Republic of China Military Action against Taiwan" 68-73.
- ⁵¹ Annual Report to Congress. *Military Power of the Peoples Republic of China 2008*, 42-44.
- ⁵² Ibid., 42-44.
- ⁵³ Ibid., 42-44.
- ⁵⁴ Martin, "Countering a Strategic Gambit: Keeping US Airpower Employable in a China-Taiwan Conflict", 66.
- ⁵⁵ Vego, *Joint Operational Warfare*, III-33.
- ⁵⁶ NDP 1, *Naval Warfare*, 26.
- ⁵⁷ Hallion, "Air Warfare and Maritime Operations"
- ⁵⁸ Vego, *Joint Operational Warfare*, II-48.
- ⁵⁹ Department of Defense, *Functions of the Department of Defense and Its Major Components*, DOD 5100.1, 23.
- ⁶⁰ Ibid., 14.
- ⁶¹ Ibid., 21.
- ⁶² U.S. Office of the Chairman of the Joint Chiefs of Staff, *Command and Control for Joint Air Operations*, JP 3-30, II-1.
- ⁶³ U.S. Office of the Chairman of the Joint Chiefs of Staff, *Command and Control for Joint Maritime Operations*, JP 3-32, V.
- ⁶⁴ U.S. Office of the Chairman of the Joint Chiefs of Staff, *Joint Operations*, JP 3-0, III-7.
- ⁶⁵ AFDD 2-1.4, *Countersea Operations*, 2.
- ⁶⁶ Ibid., 12.
- ⁶⁷ Ibid., 12.
- ⁶⁸ Ibid., 2.
- ⁶⁹ Department of Defense, *Functions of the Department of Defense and Its Major Components*, DOD 5100.1, 20.
- ⁷⁰ All of the USAF's manned ISR platforms have the ability to air-refuel, thus providing increased loiter time compared to Naval assets normally providing similar operational functions. If these forces are operating from extended ranges, USAF assets would not be limited by internal fuel, and thus may have extended loiter time.
- ⁷¹ Patton, "Stealth, Sea Control, and Air Superiority."
- ⁷² Janes Online, Search categories: KC-135, KC-10, E-3A, RC-135, EC-130, E-8C, E-2C, EP-3, MQ-1, MQ-9, RQ-4, U-2, Link-16.
- ⁷³ Annual Report to Congress. *Military Power of the Peoples Republic of China 2008*, 42.
- ⁷⁴ Spinetta, "The Malacca Dilemma-Countering China's String of Pearls with Land-Based Airpower," 88.
- ⁷⁵ Ibid., 24.
- ⁷⁶ Vego, *Joint Operational Warfare*, II-53.