

AIR COMMAND AND STAFF COLLEGE

AIR UNIVERSITY

NEXT GENERATION AERIAL REFUELING:
CRITICAL CAPABILITY FOR PENETRATING CHINESE DENIED
ENVIRONMENTS

by

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Abstract

The purpose of this paper is to illustrate how the KC-46, the next generation tanker, will improve air superiority and enable fighter and bomber aircraft to persist in a Chinese Air Defense Identification Zone (ADIZ) environment. The paper examines China's pursuit of an expansive ADIZ in the South and East China Seas (SCS)/(ECS) and the negative impacts of their pursuit on the global commons. This paper discusses one advantage China has that the U.S. military will need to counter through the capability enhancements of the KC-46.

The methodology followed in this research is the problem/solution approach. The paper's key findings demonstrate the current United States Air Force (USAF) tanker fleet's inadequate capability to persist in a current environment of Chinese anti-access/area-denial environment (A2/AD), given China's strategy and improvements in capability. Additionally, the research reveals that China's ADIZ poses a threat to the current U.S. forward bases in Japan, and South Korea. The paper's recommendations include continued U.S. military sponsorship of the next generation tanker through improved funding for development and production through 2027. Further, the paper recommends additional or alternate forward basing locations in the Pacific region.

Introduction

The Chinese are advancing an aggressive world dominance strategy by expanding their military capabilities beyond their borders and potentially destabilizing the Pacific region. Like many countries, China has an Air Defense Identification Zone (ADIZ), which is “an area of airspace beyond a country’s sovereign territory within which the country requires the identification, location, and air traffic control of aircraft in the interest of its national security.”¹ However, unlike the other countries, China is using the ADIZ to aggressively pursue control beyond international standards. Specifically, China has purposefully overextended its coastal ADIZ along the East and South China Seas, thus interloping on international air space and sea channels.

In addition to exceeding an ADIZ beyond international standards, China has unlawfully “reclaimed over 2000 acres of territory in the South China Sea”² and is expanding its presence in the Senkaku, Spratly and Paracel islands in the South China Sea (SCS). Supporting China’s philosophy of denying enemies access of movement and freedom of operation with the ADIZ, China built a formidable naval and air force presence by manufacturing aircraft carriers, submarines and highly sophisticated aircraft that are currently capable of competing with any superpower. Moreover, China has aggressively pursued control of the SCS islands by continuing massive construction of seven island bases in the SCS.³ On June 15, 2015, “satellite images of Subi Reef showed 17 out of 57 Chinese civilian ships engaged in island construction in the SCS.”⁴ The implications of this expansion are significant: these islands make ideal staging areas for offensive operations and can pose as strategic locations for China’s anti-ship ballistic missiles.⁵ These capabilities thus pose a growing threat to U.S. naval assets in the Pacific area and a growing anti-access/area-denial (A2/AD) environment in China’s ADIZ.

Anti-access (A2) is defined as “action intended to slow deployment of friendly forces into a theater or cause forces to operate from distances farther from the locus of conflict than they would otherwise prefer. A2 affects movement to a theater.”⁶ Area-denial (AD) is “action intended to impede friendly operations within areas where an adversary cannot or will not prevent access. AD affects maneuver within a theater.”⁷ A foundational component of the Chinese strategy is to effectively operate in and deny adversaries access to airspace by building the anti-access/area-denial (A2/AD) framework.⁸ China is building their framework.

The propagating effect of China’s A2/AD environment is far reaching, and “anti-access strategies also undermine U.S. ability to stabilize crises. If the United States cannot reliably defeat the aggressor's array of cruise and ballistic missiles, submarines, aircraft, etc. and project power, U.S. forces will be less able to move into the area to interdict attacks, reassure our allies, and defuse potential hostilities”⁹ This restrictive environment jeopardizes the U.S. strategy for Global Reach, Global Power and inhibits air superiority. Air Force Core Doctrine, Volume 4 defines Global Reach as the “ability to project military capability responsively – with unrivaled velocity and precision – to any point on or above the earth, and provide mobility to rapidly supply, position, or reposition joint forces.”¹⁰ It continues to define Global Power as the “ability to hold at risk or strike any target anywhere in the world, assert national sovereignty, safeguard joint freedom of action, and achieve swift, decisive, precise effects.”¹¹ China’s A2/AD environment impedes the USAF’s ability to conduct both Global Reach and Power missions.

As China continues to extend its coastal ADIZ coverage, it directly affects the Air-Sea Battle concept, specifically the operational planning of tankers. The extended ADIZ coverage forces current refueling operations to operate farther from the battlespace because of the tanker’s

lack of situational awareness technology, thus reducing overall refueling effectiveness with combat aircraft.

The United States is acutely aware of Chinese efforts of greater control in the Pacific region, mentioned above, and has taken action to deter further Chinese aggression by pivoting the strength of its force posture toward the Pacific.¹² To deter China's active building of a greater A2/AD capability, the United States and its allies must rely on the capabilities of its tanker aircraft. Joint Publication 3-17 defines aerial refueling (A/R) as, "the refueling of an aircraft in flight by another aircraft. AR extends presence, increases range, and serves as a force multiplier. AR significantly expands the options available to a commander by increasing the range, payload, persistence, and flexibility of receiver aircraft."¹³ The next generation tankers will supply fuel to the warfighters closer to the battlespace and they will become another set of eyes that can relay real time battle information, thus enhancing all allied forces' situational awareness.

However, the current operational U.S. and allied tankers are over 50 years old and lack the latest technology needed to persist in a medium or contested threat environment. By design, these older tankers are large, airborne targets for easy detection by enemy radar and it is unrealistic to expect them to persist in highly capable A2/AD environments. They cannot persist well because they lack the new technology necessary to detect and evade the newest A2/AD threats that China poses.

The advanced Chinese air defense systems threaten the United States and their allies' ability to project global airpower, specifically rapid global mobility and global strike. In the past, the USAF enjoyed forward uncontested basing in the Pacific--outside China's reach.

However, the current forward area bases in the Pacific theater, such as Japan, and South Korea are all now within China's detection and lethal range.

Chinese enhanced ADIZ capabilities enable them to track any opposition's aircraft and naval assets in the ADIZ coverage area. This provides them the ability to target and strike critical locations in the adjacent allied countries where some U.S. military assets are located. Recognizing the Chinese preparations, Japan signed a memorandum of understanding with Indonesia "expanding collaboration in defense equipment and technology," supporting maritime security and sharing in military logistical support in the South China Sea (SCS) as a means to counter the increasing Chinese assertiveness in the region.¹⁴

Undaunted by U.S. attempts of diplomatic deterrence, and rebukes by the Association of Southeast Asian Nation (ASEAN) at China's unlawful reclamations in the SCS; China persists in building their arsenals, illicitly enlarging their territories and becoming an increasingly dangerous menace in the Pacific region. The Malaysian defense minister stated, "If we are not careful, it could certainly escalate into one of the deadliest conflicts of our time, if not our history."¹⁵ If the United States is compelled to enforce sanctions, impose penalties or go to war with China, it must have the right mix of deterrent capabilities to persist in the Chinese A2/AD coverage areas. Diplomatic efforts to slow China's aggression have produced little success.

Currently, the United States is addressing China's contraventions through diplomacy, however, in early 2015, Secretary of Defense Ashton Carter stated that "should diplomacy fail, in addition to deploying the largest military platforms to the region, the DoD is pursuing a range of new technologies."¹⁶ One of the DoD technologies that Secretary Carter refers to that will fill

a capability deficit is the development of a new air refueling (A/R) aircraft, the KC-46, that can operate in a medium threat environment.

Based on China's pursuit of an expansive Air Defense Identification Zone (ADIZ) in the South and East China Seas (SCS)/(ECS), how can the next generation of U.S. military aerial refueling aircraft strategically enhance U.S. air superiority in this region?

Strategically, the next generation tanker, the KC-46, will improve air superiority beyond the current tanker's capability and enable the fighter and bomber aircraft with the required persistence to operate in a Chinese ADIZ denied environment. The KC-46 will enable these aircraft because of the increased refueling capacity, improved efficiency, enhanced survivability, robust situational awareness and avoidance of enemy threats through on-board and off-board networked sensors.

These enhancements will allow the KC-46 tankers to operate closer to the threat, thus enabling the bombers and the fighters more time to persist in enemy territory and prosecute the Chinese ADIZ. The improved fuel efficiency of the KC-46 enables the aircraft extended range and larger fuel offloads, which translates into more fuel for the fighters and bombers to attack China's ADIZ. The improved efficiency of newer engines coupled with the streamlined Boeing commercial 767-2C airframe facilitates better maneuverability and improved performance overall. All of these factors culminate in being able to stay airborne longer and increasing the force multiplying capability in the battlespace. Another improvement is enhanced situational awareness, which aids the aircrew in hostile environments.

The enhanced situational awareness and threat avoidance systems in the KC-46 are radical improvements for the Air Mobility Command (AMC) tanker aircraft and its aircrew. The

defensive systems capability reduces aircraft damage, saves aircrew lives and keeps the tanker engaged in supplying a critical resource to the warfighters. Additionally, the major communications improvements add another layer of situational awareness, real-time threat awareness from other platforms. The accumulation of these capabilities is necessary to persist in a medium threat environment like China's ADIZ.

With the backdrop set, this paper will use the problem/solution framework for this research topic. Following the introduction, the background will elaborate on the current state of the Chinese ADIZ, show figures of the current Chinese ADIZ configuration, examine the international community's responses to the ADIZ declaration, introduce the new capabilities of the next generation tanker, as well as, describe the tanker's application of the Air-Sea Battle concept in the Pacific. The paper will conclude by confirming that the capabilities of the next generation tanker will improve overall fighter and bomber effectiveness and strategically improve the pursuit of air superiority in China's ADIZ environment. Further, it will explain the dilemma of the current Pacific forward bases and the need for alternate locations. The recommendations will support the continued development, and production of the KC-46 and the continued pursuit of alternate forward basing options in the Pacific theater. In order to increase the reader's knowledge, the paper will delve further into the background surrounding the growth of the Chinese ADIZ and the international protest that ensued. Additionally, the background will discuss the Air-Sea Battle concept and examine the capabilities of the KC-46.

Background

China's Air Defense Identification Zone (ADIZ)

On 23 November 2013, China surprised the world with its unilateral declaration of its new Air Defense Identification Zone (ADIZ) coverage in the East China Sea, causing much international consternation. In response, the United States, Japan, and South Korea were the most vocal in denouncing this abrupt and provocative act. The consensus regarding the issue identified a direct violation of the United Nations Convention of Law of the Sea (UNCLOS).

The UNCLOS outlines what countries may legally claim as sovereign territory off their respective coastlines.

The 1982 United Nations Convention on Law of the Sea (UNCLOS) informs present day international policy discussion regarding territorial waters and, consequently, matters of airspace sovereignty beyond land borders. In general, UNCLOS provides that nations maintain exclusive sovereignty within territorial seas, extending 12 nautical miles (roughly 14 statute miles) offshore. Additionally, UNCLOS defines “contiguous zones” as additional outer bands extending to 24 nautical miles (roughly 27.5 statute miles) from shore, in which a nation may exercise certain controls and enforcement actions to protect itself from infringement of its customs, fiscal, immigration, or sanitary laws and regulations. Further, UNCLOS allows nations to establish exclusive economic zones (EEZs), extending as far as 200 nautical miles (roughly 230 statute miles) offshore, in which a nation can exert control over activities impacting economic resources including fishing, mining, oil exploration, and pollution. UNCLOS maintains that all nations may enjoy the freedoms of navigation and overflight within these zones.¹⁷

China continues to infiltrate and take ownership in the South and East China Sea (ECS) outside the UNCLOS guidelines. To ease U.S. allies concerns regarding China's aggressiveness, the United States Secretary of State purposefully made efforts to reduce their anxiety. The United States directly reprimanded China in an attempt to halt China's illegal expansion.¹⁸

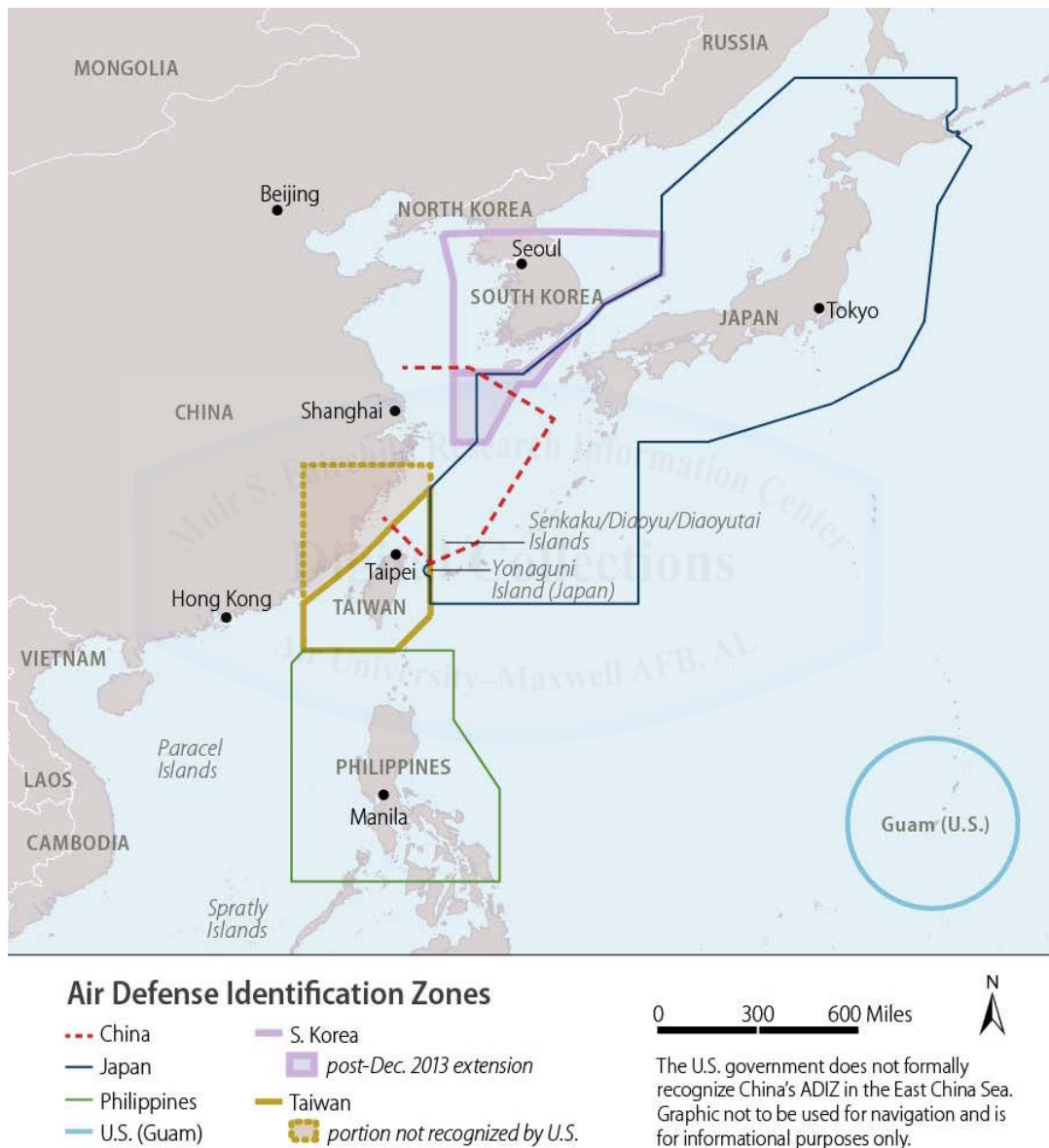
The United States made efforts to foster peace in the Asia-Pacific and promote a harmonious balance in a region warring on major conflict. Efforts to prevent a colossal impact on the world economy, if war were to break out in this region, should be on the forefront of U.S. Secretary of State Kerry's and other U.S. Asian diplomat's agendas. These diplomatic gestures should keep the Association of Southeast Asian Nations (ASEAN) members reassured of their protection from the foreboding China.

The diplomatic affirmations continued, when on 4 November 2014, Secretary John Kerry reiterated the centrality of Asia: "The Asia Pacific is one of the most promising places on the planet, and America's future and security and prosperity are closely and increasingly linked to that region."¹⁹ He particularly stressed, "The United States-China relationship is the most consequential in the world today, period, and it will do much to determine the shape of the 21st century."²⁰ Prior to this, at the ASEAN summit in 2010, then-Secretary of State Clinton emphasized that the United States has a "national interest in freedom of navigation, open access to Asia's maritime commons, and respect for international law in the South China Sea."²¹

However, diplomatic efforts to date have not stopped the emerging challenges of an anti-access/area-denial (A2/AD) environment, along the Chinese coast. This threat directly affects the orbits of the aerial refueling tankers, which are key enablers to the USAF fighters and bombers; forcing tanker orbits to move farther from the fight. The direct repercussions of this A2/AD environment are to both military strategies and global economics.

For the military, an A2/AD environment affects the war principles of mass and maneuver. For the world economy, the A2/AD environment affects the free flow of world goods inhibiting free trade. The effects of A2/AD on mass degrade the concentrated effects of combat power, coincidentally it impairs maneuver by altering speed, range and planning, thereby giving

the enemy the advantage.²² Aerial refueling provides a significant and critical capability to mass lethal and nonlethal forces on a global scale. Concentration of military power is a fundamental consideration in all military operations wherein A2/AD affects the tankers, because they will have less fuel to offload and less time on the tanker track supporting the aircraft in the fight.



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Figure 1. – Air Defense Identification Zones (ADIZ) in East Asia 2015
 (Adapted from Ian Rinehart, “China’s Air Defense Identification Zone,” *Congressional Research Service*, 30 Jan 2015, 8.)

Figure 1 depicts the current configuration of China's East China Sea (ECS) ADIZ and displays the overlap into other countries legal claims to airspace and waterways. China's ADIZ extends far beyond where it did in the past, provoking others affected by the declaration. Since the Chinese declaration in November 2013, they require all aircraft transiting this zone, both commercial and military, to file "flight plan identification, radio identification, transponder identification, and logo identification."²⁴ However, the international community rejected this unapproved assertion and made several overflights in the ECS ADIZ with limited confrontation by Chinese aircraft.

Impervious to the international outcry against the ECS ADIZ, China continues expanding their capabilities and making claims in the South China Sea (SCS) (see Figure 2 below). China is a claimant to the SCS, as are the Philippines, Vietnam, Malaysia, Brunei and Taiwan. However, China is very heavy-handed in the SCS essentially ignoring the rights and claims of the other ASEAN countries' economic interests in the region. The relationship between these countries is a tinderbox and Chinese assertiveness in reclamations is setting up possible ignition for conflict between these countries.

Beijing preparing new air defense zone in South China Sea



The Asahi Shimbun

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Figure 2. – China’s new South China Sea Air Identification Defense Zone 2014

Figure 2 depicts “China's sovereignty claims by what it calls the "nine-dotted line" map, the U-shaped demarcation line that outlines the territory it claims as its own, which is basically the bulk of the South China Sea.”²⁶ A critical point to comprehend, the ADIZ identifies, tracks and terminates targets within its range; either by Chinese fighter aircraft, ground or naval launched surface-to-air missiles (SAMs) sites. This creates an untenable situation for those using the airspace or waterways near China’s ADIZ.

The implications are “by creating an overlapping area where different militaries seek to administer airspace, China’s ECS ADIZ may increase the risk of an incident that could lead to a

military conflict.”²⁷ Based on current intelligence data and dependent on the U.S. response to the Chinese aggression, the Chinese ADIZ network will expand in the SCS. This could possibly strain the relationships between the United States and its allies in the region. The U.S. military is witnessing the rise in air defense coverage from China, which will obstruct the United States’ ability to achieve air superiority in this region.

A primary USAF goal in any conflict is to gain and maintain air superiority. Air superiority is described by Joint Publication 1-02 as the “degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and its related land, sea, and air forces at a given time and place without prohibitive interference by the opposing force.”²⁸ In this context, the improvements of China’s ADIZ increases the degree of difficulty to the USAF’s ability to gain and maintain air superiority in an environment saturated with radars. This lethal threat has the adjacent countries circumspect of China’s intentions.

Chinese developments and investments in improved capabilities intimidate its neighboring countries such as Japan, Indonesia, Taiwan, and South Korea. Further aggravating concerns, in July 2015, the People’s Liberation Army Navy (PLAN) conducted the “largest firepower demonstration to date” in the South China Sea.²⁹ The exercise lasted 10 days and included over 100 ships and dozens of aircraft. This display highlighted anti-submarine rockets carrying torpedoes, surface to air missiles and a long-range bomber dropping parachute equipped sea mines.³⁰ China’s exposition of their capabilities alarmed the United States and its allies in the region. Based on China’s illegal overextension of their ADIZ, an examination of the international responses is required to assess the unstable environment.

International Response to the Chinese ADIZ

The international response to the Chinese ADIZ expansion began with Japan's leader's extremely critical demand that, "China rescind its decision to establish the ADIZ, terming it "dangerous" and "one-sided," and Prime Minister Shinzo Abe declared that it would not have any effect on Japan.³¹ Japan expressed great concern about the United States' response to China, as it sends a signal to the U.S. allies in the region. In response, in July 2014 the U.S. Senate responded by passing resolution (S.Res. 412), "expressing firm support for Japan and calls on China to refrain from implementing the ECS ADIZ."³² This act helped to allay some of the anxiety, but did not stop Japan from rendering a stern response.

Japan's harshest rejection of the declaration was due to the preexisting territorial disputes between China and Japan, over the Senkaku/Diaoyu Islands. These islands are under administrative control of Japan and the U.S. previously used them as bombing ranges. However, China had already installed early-warning mechanisms and implemented air traffic control procedures with regard to "the islands over which it claims jurisdiction, including the Senkaku/Diaoyu Islands, and the East China Sea airspace over the related waters."³³

As a direct consequence of China's disregard for the UNCLOS, the Japanese government enacted Prime Minister Abe's doctrine of 'proactive pacifism,' which adopts a collective self-defense (CSD) approach.³⁴ This stance could turn out to be "the most crucial change in the country's military doctrine since the Second World War."³⁵ The doctrine permits Japanese forces to be involved in CSD activities with other states when "the security of Japan (broadly defined to include the security of its citizens and access to resources, as well as territory) is threatened."³⁶ Appropriately, other countries, such as South Korea and Taiwan, reacted to the Chinese ADIZ declaration by rejecting the ADIZ assertion, protesting by formally issuing complaints to the

International Civil Aviation Organization (ICAO), and as an extreme, Japan responded by scrambling fighters to dissuade Chinese trespassers. Further, the Republic of Korea and Taiwan responded to the declaration too.

The Republic of Korea's (ROK) Foreign Minister provided a weaker response than the Japanese admonishment, but posed that, "the issue of the air defense identification zone is making the already difficult regional situations even more difficult to deal with. We see competition and conflict in the region deepening."³⁷ The ROK reciprocated and announced on 8 December 2013 that it would extend the ROK ADIZ to overlap the Japanese and Chinese ADIZs and would increase patrols in the new areas.³⁸ This bold resistance helped reinforce confidence with the other allied countries in the region, but added risk to possible incident with China. The ROK's response left one remaining allied country to express their concerns; Taiwan's response was clear.

Taiwan responded as the last quasi-ally affected by China's unilateral decision to extend its ADIZ. In November 2013, after China's ADIZ decision, Taiwan declared: "(1) Taiwan has sovereignty over the Diaoyutai (Senkaku) Islands with no change due to the PRC's ECS ADIZ, and that Taiwan will continue to defend that sovereignty over the islands and continue operations to protect fishermen. (2) Each side should use peaceful dialogue to resolve disputes in line with President Ma Ying-jeou's "East China Sea Peace Initiative" of August 2012. (3) Taiwan's military will use peaceful principles of Ma's initiative and adopt appropriate measures in light of the overlap between the PRC and Taiwan ADIZs. And (4) Taiwan is "gravely concerned" and will maintain close contact with all sides to maintain peace and stability."³⁹ China's unilateral decision only embittered an already strained relationship.

Although China and Taiwan consistently battle over Taiwan's claim of independence since 1949, Taiwan maintains good diplomatic relations with both China and the United States since they are closest in proximity to China and could not withstand a conflict with China without U.S. support. Amid the protracted turmoil between China and Taiwan, the United States has agreements in "Section 3(3) of the United States Taiwan Relations Act of 1979, which requires the U.S. President to inform Congress of any threat to the security of "the people on Taiwan" and any danger to the interests of the United States. Even then, there would be no unequivocal obligation to come to Taiwan's defense: the U.S. President and Congress have the discretion to determine an appropriate response."⁴⁰ Despite the verbal admonishments from the neighboring countries, China continues ignoring the angry sentiments.

Chinese aggressions are not new, and pose a threat to U.S. interests and its allies in the neighboring region. Their actions were observed before 2010, when the Quadrennial Defense Review (QDR) for the Department of Defense (DOD) supported a move to the Pacific. They specifically stated that the defense strategy, "assumes the need for a robust forces capable of protecting U.S. interests against a multiplicity of threats, including two capable nation-state aggressors."⁴¹ China's relentless pursuit can be viewed as a political ploy to subvert U.S. allies' relationships, or simply a power play for more territory improving their military advantage.

The reasons for the Chinese posturing range from a political move of a major superpower protecting the sovereignty of state, to a "ratcheting affect" that initially pushes the boundaries by keeping the pressure on the neighboring countries and then regressing.⁴² This declaration appears political, but one could surmise that this could be an attempt to undermine allied relationships between the United States and Japan causing more instability in the region. A Peoples Liberation Army Navy expert from the U.S. National War College stated that, the ECS ADIZ is

more a “political declaration than anything that contributes materially to the military capability to carry out an A2/AD strategy.”⁴³

The Chinese continue to build their ADIZ capability throughout the Southern and Eastern China Seas hypothetically denying the United States and their allies’ freedom to maneuver in these nearby waters, stifling world trade and potentially causing global economic problems. This restriction and deterrent force encroaches on the Taiwanese and trespasses on the Japanese and South Korean’s previously held territories, thus restricting world trade and freedom of movement. These key allied locations are critical to the U.S. military for forward deploying to the region. The extended range of China’s new ADIZ directly affects U.S. forward bases in the region. In response to this evolving threat, an examination of the Air-Sea Battle (ASB) Concept of the Asia-Pacific is required. Specifically, the paper will explain how tankers integrate into the ASB and their strategic role in this complex environment.

Air-Sea Battle Concept

Chinese advances in military technology create a formidable opponent in a period when there is a massive drawdown of the U.S. military forces. The DOD’s response was to synergize Navy and Air Force strengths to develop a way to regain the advantage. They call this strategy the Air-Sea Battle (ASB) Concept.⁴⁴

Presently, the Joint ASB planning encompasses the Chinese ADIZ scenario. The overarching ASB strategy espouses strength through synergy and is “designed to attack-in-depth, but instead of focusing on the land domain from the air, the concept describes integrated operations across all five domains (air, land, sea, space, and cyberspace) to create advantage.”⁴⁵

This section will focus on the air domain aspect and how tankers facilitate air superiority.

The ASB concept is highly collaborative, leverages strengths from all military Services, and consequently “it is a natural and deliberate evolution of U.S. power projection and a key support component of U.S. national security strategy for the 21st century.”⁴⁶ If the U.S. military engages China in combat, they must have the key enablers to be successful in the air superiority campaign of the ASB concept; one critical enabler is the KC-46 air refueling tanker.

In order for the U.S. military to counter the Chinese ADIZ, it will need joint fighters, bombers, tankers, and space based assets located within reasonable proximity of the Chinese ADIZ. A critical link in the *air* component of the ASB concept is air refueling (A/R). The ASB air assets require air-refueling capability, secure network-centric capabilities and threat detection systems for threat awareness. The KC-46 possesses the requisite capabilities required by the ASB to enable success in the A2/AD environment. The ASB planners will need to revise their baseline planning and amend their strategy incorporating the new KC-46 air refueling capabilities for China’s A2/AD network.

The Chinese A2/AD environment is expanding and becoming increasingly impenetrable, while simultaneously weakening the Air-Sea Battle capabilities in the region. “On May 25, 2015 China’s Ministry of National Defense released a White Paper outlining the dimensions of an increasingly assertive military and geopolitical strategy that stressed the need to develop and demonstrate enhanced capabilities across four domains: maritime, cyber, nuclear and space.”⁴⁷ The QDR highlights that “the United States needs to maintain a significant forward presence to deter aggression and preserve regional stability.”⁴⁸ To achieve these objectives the U.S. military must pursue the next generation tanker as an enabler to air assets countering the emerging Chinese threat. Next, the paper will examine the enhanced capabilities of the KC-46 and describe how these capabilities will strategically improve air superiority.

Next Generation Tanker Capabilities

Currently, one of the top three Air Force acquisition programs is the next generation aerial refueling tanker, the KC-46 Pegasus. The KC-46 will significantly contribute to the deployment of forces, fighters prosecuting their targets and keeping a continual deterrence ready to suppress the enemy's offensives. Conveying additional sponsorship for the KC-46, the 2014 Quadrennial Defense Review (QDR) addressed and supported the critical need for aerial refueling stating that, "sustaining superior power projection forces – enabled by mobility capabilities including airlift, aerial refueling, surface lift, sealift, and prepositioning – will remain a top priority for force planning and development, even in an austere fiscal environment."⁴⁹

The KC-46 tanker program is developing improved capabilities that will reduce risk in this hostile environment. The KC-46 has approximately 212,300 pounds of fuel offload and is a capable receiver for taking fuel from other tankers. One of the KC-46 development requirements to improve on is fuel offload and hours in the A/R track by 15-35 percent over the legacy KC-135. Additionally, there are requirement for a defensive system, which enhances the pilots situational awareness.

The defensive system suite consists of on-board sensors and the radar-warning receiver (RWR)¹, which alerts the crew to enemy threats. Off-board networked sensors include, the Multifunction Informational Distribution System Low Volume Terminal (MIDS LVT), otherwise known as LINK 16, intelligence broadcast receiver (IBR), military and civil satellite secure communications (SATCOM); all dynamically fused together through the Tactical

¹ The ALR-69(V) is the world's first all-digital radar warning receiver (RWR). The RWR system detects, identifies, processes and displays airborne interceptor (AI), surface-to-air missile (SAM) and anti-aircraft artillery (AAA) weapon systems. Situation awareness provides the crew with threat type, emitter mode and threat angle-of-arrival (AOA) information assisting in threat avoidance.

Situational Awareness System (TSAS). Finally, the Large Aircraft Infrared Countermeasures (LAIRCM) improves survivability and flexibility to execute multi-role missions. The combination of these capabilities adds vital awareness and increases aircrew survivability.

The capabilities of the KC-46 will help the United States and its allies to compete with China's intruding presence. One critical component in any air superiority campaign is fuel. The KC-46 is developing the capabilities to extend range, incorporate robust situational awareness, and globally networked communications that will enable them to persist in the threat-saturated environment. The KC-46 Pegasus is the newest tanker that will enhance the ability to overcome the threats in austere environments. Combining the joint networked capabilities, tactics, and the KC-46 enhanced situational awareness, the newest tanker will further improve allied forces ability to gain and maintain air superiority.

The KC-46 program plans to replace one-third of the tanker fleet by procuring 179 new aircraft. The KC-46 is a commercial derivative aircraft of the Boeing 767-2C. Figure 3 below, shows the key features that will include wing-mounted refueling systems that complement the aircraft's boom and centerline drogue system.⁵⁰



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Figure 3. KC-46 Tanker Key Features

(Adapted from Jeffery Wuich, “KC-46 Live Fire Test and

Faced with an aging tanker fleet and an escalating threat pushing the tankers farther from the fight, jeopardizes air superiority in the Chinese ADIZ. To overcome this weakness, the USAF must develop and field the KC-46, and educate ASB planners on the new tanker’s capabilities in order to gain air superiority over the Chinese A2/AD environment in the Pacific. Next, the paper will analyze the improvements of the KC-46 compared to the legacy tankers, discuss the impact of China’s ADIZ on the Pacific forward bases and offer recommendations for overcoming China’s A2/AD environment.

Analysis

There are two major areas analyzed in this research: 1) the legacy tanker's inability to persist in an anti-access/area-denial (A2/AD) environment versus the next generation tanker, and 2) the impact of the Chinese Air Defense Identification Zone (ADIZ) on the Pacific forward bases. The analysis will show the marked improvement of the next generation tanker, its ability to persist in an A2/AD environment, and how its extended range provides flexibility in forward basing options in the Pacific.

Legacy versus Next Generation Tankers Capabilities

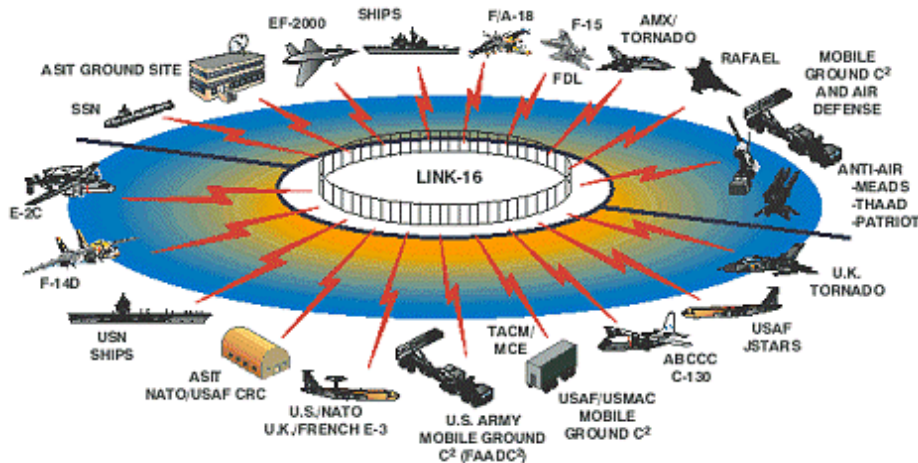
Current U.S. tanker capabilities for the KC-10 and KC-135 include a standard communications suite, but they lack critical defensive systems such as a radar warning system and are unable to detect enemy threats. Therefore, this relegates the legacy tankers to the standard low threat-operating environment, which translates to flying in friendly airspace. In theory, by locating and avoiding the threat, the KC-46's new enhanced capabilities will save lives, preserve valuable mission assets, save time, improve fuel efficiency, and strategically enhance the warfighters ability to gain air superiority. Next, the paper will address more shortfalls of the legacy tankers.

Legacy tankers operating in the low threat environment cause the fighters and the bombers to fly farther from their respective enemy targets to refuel. The lack of countermeasures, robust communications and the inability to see enemy threats increases the legacy tanker's susceptibility to enemy attack. If the enemy destroys the tanker or causes it to leave its anchor orbit, there is a negative ripple effect to the combat aircraft's mission effectiveness. Without aerial refueling, the fighters and the bombers return to base. Therefore,

tankers are a critical connection to destroying the enemy's capabilities. The next generation tanker development addresses the legacy tanker's shortfalls.

The KC-46 is designed to operate in a low to medium threat environment. The KC-46 is equipped with the ALR-69A Radar Warning Receiver (RWR); this capability enables the KC-46 aircrew to identify the location of the threat, type of threat, its lethal radius, and provides the safest route to avoid it. Subsequently, the tanker pilots will have the option to route around the threat and regain their original flight plan. Having a dynamic picture of the battlespace assists the tanker crew's decisions and presents new unprecedented threat awareness capability for tankers. This improvement enables the combat aircraft to extend their range, increase their time prosecuting enemy targets and communicating more effectively in the battlespace.

With limited communication capabilities, the legacy tanker aircrews are unable to monitor or participate on the Multifunction Informational Distribution System Low Volume Terminal (MIDS LVT) network, otherwise known as LINK 16. The LINK 16 network allows fighters, bombers, Airborne Warning and Control System (AWACS), and other critical ground/airborne theater assets to share the same sight picture of the battlespace. In the Figure 4 below, one can notice the stark absence of any air refueling assets. Once employed, the LINK 16 improvement will have a high return on investment for the warfighter.



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Figure 4. DoD Link 16 Architecture

(Adapted from Sharif Calfee, "Autonomous Agent-Based Simulation of an AEGIS Cruiser Combat Information Center

Simply stated, LINK 16 presents a broader picture of the battlespace for the KC-46 and situational awareness never before seen on legacy tanker platform in Air Mobility Command (AMC). This fused network-centric warfare heightens allied forces' awareness and strengthens successful mission execution by having all aircraft in the affected area on the same network exchanging up to date threat information. LINK 16 adds another layer of situational awareness, and robust communications that strategically enhances air superiority for the warfighter.

The KC-46 development supports an essential prerequisite established by the Joint Air Sea Battle (ASB) office, which is the "cross-domain operations for communication and data links that connect sensors, decision-makers, and shooters armed with kinetic, electromagnetic, and cyber weapons."⁵³ The ASB concept is investing in increasingly robust networks enabling critical communication amongst each service's platforms, even in a contested environment.⁵⁴ This concept aligns with the communications capabilities and future upgrades that the KC-46 is delivering to AMC for the next generation tankers.

To ensure the USAF can gain and maintain air superiority, they must be able to keep the fighters and bombers fueled to engage the enemy's assets with overwhelming speed and force. To optimize the fighter and bomber "kill chain," described as "the sequence of events that must succeed to destroy a target," the combat aircraft must have optimal range and the tankers closer to the fight will materially contribute the most.⁵⁵ The most common usage of the term includes Find, Fix, Track, Target, Engage, and Assess (F2T2EA).⁵⁶ Critical to the F2T2EA is positioning of the air assets; to do this requires air refueling (A/R) capabilities that can persist in the threat environment. One force enabler fortifying the warfighter's successful employment of F2T2EA is the new KC-46 tanker due to the proximity to the fight.

For example, the F-15 has "electronic systems and weaponry to detect, acquire, track and attack enemy aircraft while operating in friendly or enemy-controlled airspace. The weapons and flight control systems are designed so one person can safely and effectively perform air-to-air combat."⁵⁷ The max combat radius of the F-15 before it needs refueling is less than 1,200 nautical miles without external fuel tanks.⁵⁸ The KC-46, with its new defensive systems capabilities, can move the orbit closer to the threat than the legacy tankers. This force multiplier empowers the fighters with more range, more speed and more time pursuing China's targets, strategically enhancing their ability to persist in the A2/AD environment.

The previous example would apply to the F-16, F-18, F-22, B-1, B-2, B-52 and the Joint Strike Fighter (JSF) F-35. All of these weapons systems have similar or improved capability compared to the F-15 Strike Eagle and would have a multiplying effect in the battlespace. Furthermore, the KC-46 will have communications and navigation capabilities to act as a relay; passing relevant battlespace information to those engaged in combat. These advanced communications will enhance awareness of the enemy threat, improve communications with

U.S. and allied aircraft requiring fuel and increase the ability to persist in these denied environments. The ASB principles guide and manage these networked platforms in the austere environments and the KC-46 delivers strategic improvements to air superiority.

The ASB office provides the “key objectives and guide the Services’ efforts to develop the networked, integrated forces able to attack and defend where and when required—throughout any contested domain.”⁵⁹ The KC-46 development supports this networked construct, whereas the legacy tankers do not. With the robust situational awareness and communications upgrades of the KC-46 addressed, the paper will assess the forward basing situation in the Pacific. In any deployment scenario, consideration of logistics is necessary, especially for forward basing and the need for A/R tankers.

Forward Basing in the Pacific

When U.S. forces deploy across the globe preparing for conflict, they must have locations that will logistically accommodate their assets. To get those air assets in place, they need air refueling to deploy to various locations in Japan, South Korea, and Guam. These bases are the main forward bases the U.S. military utilizes in the Pacific that surrounds China’s coast. A study analyzing the evolving Chinese integrated air defense system (IADS) threat emphasized that, “it bears repeating that addressing basing and airfield access issues with allied and friendly nations for forward deployment is essential to maximize USAF effectiveness and progress toward a sustainable USAF and DoD deterrent capability.”⁶⁰ The KC-46 possesses the capabilities to deliver fuel, passengers and cargo anywhere in the world, even near highly contested areas.

To contest China, U.S. air assets have traditionally leveraged the forward bases in South Korea, Japan and Guam. However, if tensions escalate with China, most of these forward bases

would be in jeopardy of direct attack by China's improved long-range capability. U.S. forces assume higher risk when required to deploy greater distances to areas of interest. In this cauldron of threats lining China's coasts, there is the probability of "ballistic and cruise missiles being used with little warning, and ambiguous or minimal warning received of air and maritime deployments. The implications are that a short warning timeline requires the United States to maintain ready forces that are routinely integrated and prepared to conduct high risk operations against very capable adversaries."⁶¹ Possessing long range aerial refueling, like the KC-46, can influence and provide more options for forward basing locations in the Pacific. Additionally, the KC-46 can reduce the warfighters "kill-chain" timing by extending their range and allowing more loiter time. The research will define the "kill-chain" in the upcoming analysis section.

The proximity and lethal range of the Chinese ADIZ affects the U.S. strategic forward basing in the Pacific. The QDR predicts, "China will continue seeking to counter U.S. strengths using A2/AD approaches and by employing other new cyber and space control technologies. Additionally, these and other states continue to develop sophisticated integrated air defense system (IADS) that can restrict access and freedom of maneuver in waters and airspace beyond territorial limits."⁶² These capabilities affect where we deploy these critical assets, like the KC-46 tankers.

Forward basing in the Pacific for the U.S. military is an issue for the Pacific Air Forces (PACAF) assets. In the past, the U.S. military leveraged Japan, South Korea and Guam as military strongholds to support and defend our allies from China. PACAF has bases at Kadena, Misawa, and Yokota in Japan, Kunsan and Osan in South Korea, and Anderson AB in Guam. The Chinese ADIZ directly envelops five of the six bases in Japan and South Korea. Currently,

Anderson AB in Guam is just out of the Chinese detection range, but development of new weapons may put Guam within the China's reach.

This issue captured the attention of the U.S. government in 2012 as they began a diplomatic tour of the Asia-Pacific to solicit support for U.S. forces to bed down in the event of conflict. Secretary of Defense Leon Panetta stated that, "the United States will promote international rules and order to advance peace and security in the region, deepening and broadening our bilateral and multilateral partnerships, enhancing and adapting the U.S. military's enduring presence in this region, and to make new investments in the capabilities needed to project power and operate in Asia-Pacific."⁶³ If the U.S. military engages in a conflict with China, it is expected that China will directly target the current allied bases accommodating U.S. military forces.

Both Japan and South Korea would sustain major damage if China were to target U.S. interests in their respective countries. Consequently, the U.S. leadership made a tremendous effort to foster and resurrect alliances in the Pacific region. The United States arranged for future maritime exercises in Singapore when Chairman of the Joint Chiefs of Staff Dempsey traveled to Singapore and the Philippines in 2012. Furthermore, Secretary Panetta stated, "the United States has key treaty alliances with Japan, South Korea, Australia, Philippines and Thailand. We have key partners in India, Singapore, Indonesia, and other nations. And we are working hard to develop and build stronger relations with China."⁶⁴ To project power the U.S. military needs bases in range of the Eastern Chinese coast in order to support our allies in the region, specifically, Japan, South Korea and Guam. Air refueling enables power projection and global reach, which are key principles to air superiority success in a Chinese conflict.

Likewise, the ASB concept anticipates that during a conflict, China will “attack American aircraft, ships, space assets, networks, and people, denying access to U.S. forces and would require attacks on bases from which United States and its allies are operating, including those on allied or partner territory. The implication is that the defense of all bases from which U.S. forces operate must be addressed, whether on U.S. or partner/allied territory.”⁶⁵ If a retreat to Guam for more secure forward basing is necessary or other locations farther away, the KC-46 could easily support fighters and bombers to the regain their tactical position off the Chinese coast because of the extended range and offload capability.

Forward basing in Guam for the KC-46 is not a limiting factor in the Pacific because of its extended range capability. The KC-46 is a multi-role asset that can both offload and receive fuel. Fully fueled the KC-46 can fly over 6,000 nautical miles before refueling.⁶⁶ If forward bases closer to the Chinese ADIZ coverage are in jeopardy, the KC-46’s extended range adds flexibility to contingency planners when faced with a potential Chinese conflict. The KC-46’s extended range is another factor that adds to attaining the air superiority goal.

Basing in Guam, Philippines, Australia, and Singapore, outside of the Chinese threat, reduces the number of tankers needed in a given scenario and reduces risk to the tanker crews. The distances from the previously listed bases to Kunsan, Okinawa, Misawa, or Osan are less than 1800 miles. A KC-46 carrying a full fuel load would have over 80,000 pounds of fuel to offload to aircraft in the fight. This unique capability adds flexibility, endurance and enables U.S. aircraft to achieve air superiority in the Asia-Pacific region. This is another example of the KC-46 capabilities that give a strategic edge to realizing air superiority.

Recommendations

To achieve air superiority in China's A2/AD regions, the U.S. military must continue sponsorship of the next generation tanker through improved funding for development and production. The KC-46 remains one of the USAF's top three acquisitions programs and must continue to secure full funding through the production phase of the program in 2027. Without consistent funding, the KC-46 will not realize its full potential to the Air-Sea Battle (ASB) concept and it will further degrade the ability to achieve air superiority.

Purposeful efforts to fully immerse and educate the Air-Sea Battle planners with the KC-46 tanker's capabilities must be a priority. Introducing the KC-46 capabilities to the Air-Sea Battle strategy overhauls the status quo of tankers orbiting further from the battlespace. The KC-46 capabilities allow closer proximity to the adversaries' defenses and facilitate the fighter and bomber aircraft to extend loiter time and extend range in enemy territory. Therefore, the KC-46 development increases new benefits to the ASB concept that enhances persistence for combat aircraft in hostile environments strengthening air superiority.

Buttressing deterrence further in the Pacific region, the United States should look for alternative bases in the Association of Southeast Asian Nation (ASEAN) alliance to encircle China's defenses. Secretary Kerry reiterated this point in November 2014, stressing to an audience, which included PRC Ambassador Cui Tian-kai, at the School of Advanced International Studies Asian conference: "Let me be clear: The United States will never shy away from articulating our deeply held values or defending our interests, our allies, and our partners throughout the region."⁶⁷ Secretary Kerry's assertion implies diplomatic actions, but also military action that must occur to solidify U.S. military support in the region.

As the United States fortifies its support in the Asia-Pacific region, they should endeavor to open new joint military bases with other ASEAN allied members. The opportunity presented here is that these bases could support a conflict outside the range of Chinese ADIZ and their offensive weapons. To overcome or even compete with the growing Chinese ADIZ expansion, the United States should seek basing in Singapore, Philippines and Australia, outside of China's ADIZ lethal radius. This basing approach should bolster confidence from other ASEAN members and help initiate securing alternate bases in the Pacific region. Ultimately, more basing options would present the Chinese with a progressively difficult targeting dilemma and risk the threat of attacking other regional Nations, risking strategic failure.

In the long-term, the U.S. military should equip all the next generation aircraft with robust networked communications, situational awareness, and improve operating ranges to counter the challenges in the emerging A2/AD environment. This improvement to legacy aircraft and next generation aircraft will increase the warfighter's situational awareness (SA), and reduce falling prey to enemy radar and defensive weapons. Early warning of enemy targeting radar locations and robust networked communications permits less maneuverable aircraft to avoid the affected area, thus increasing survivability. Extending the range of aircraft allows more time in the air to prosecute enemy targets and expedites obtaining the air superiority goal. Global Reach and Global Power are unattainable without A/R resources that can persist in a hostile environment. The KC-46 is a critical force multiplier that contributes to achieving air superiority in an A2/AD environment.

Conclusion

This paper explored how the KC-46, the next generation tanker, will improve air superiority and enable fighter and bomber aircraft to persist in a Chinese anti-access/area-denial (A2/AD) environment. The research also showed the scant capability of the USAF tanker fleet to persist in the Chinese A2/AD environment, given China's strategy and improvements in capability. The research divulged a collateral effect of the Chinese A2/AD environment, which was the economic impact on the global commons. Additionally, the research discussed the international objection of the expansion of the Chinese ADIZ. Furthermore, the paper conveyed how the next generation tanker capabilities support the Air-Sea Battle concept through robust communication and networked capabilities, consequently facilitating and fortifying air superiority ambitions in China's A2/AD environment.

Finally, the paper presented the challenge of China's ADIZ for the U.S. forward bases in the Pacific and the potential danger to these bases during a conflict with China. The United States' is obliged to continue making strong diplomatic efforts in the Asia-Pacific region to support their allies and obstruct the determined Chinese expansion in the Pacific. The international community is duty-bound to confront these brazened acts of the Chinese for unlawfully extending their territory. The Chinese technology advancements, coupled with their world dominance mindset, amplify the need for continuous deterrence. The KC-46 capabilities support the U. S. deterrence strategy and enhance the Air-Sea Battle planning concept. Tanker operations are critical in any military conflict. The U.S. cannot defeat China's A2/AD environment in an Air-Sea Battle without airpower and airpower is not an option without tankers.

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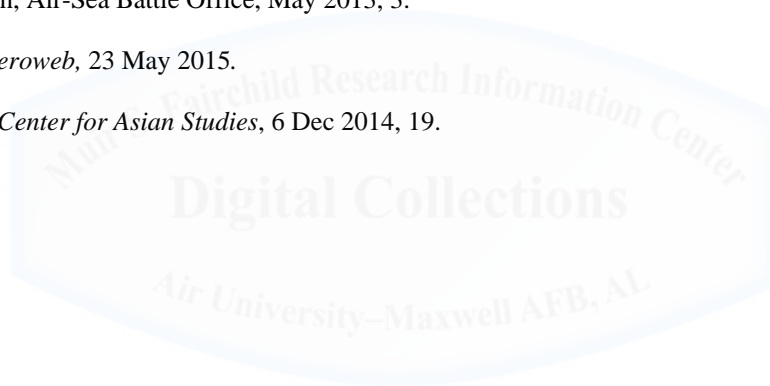
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