Beyond Tanker Adaptive Basing: Alternative Options to Improve United States Indo-Pacific Command's Air Refueling Readiness Posture and Extend Operational Reach

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The 2019 Indo-Pacific Strategy Report concedes that China would enjoy a military advantage at the outset of conflict if it chose to employ force in pursuit of territorial interests along its periphery in the South China Sea. To counter this threat, United States Indo-Pacific Command seeks to posture combat-credible forces forward, compelling China to advance its interests through benign means subject to internationally recognized rules. This strategy relies upon newly developed operational concepts to mitigate China's anti-access, area denial threats. One such operational concept, the adaptive basing of air forces, is designed to decrease vulnerability, complicate Chinese targeting efforts, enhance operational maneuver, and enable combat persistence while under threat of attack through the agile disaggregation of aircraft and support resources. However, an objective analysis demonstrates that, due to logistical and operational limitations, adaptive basing is incompatible with the Air Force's current air refueling fleet. This analysis argues that United States Indo-Pacific Command would realize a more capable tanker readiness posture and ensure more comprehensive operational reach by pursuing two alternatives to tanker adaptive basing. First, by seeking an increase in the number of tanker squadrons assigned in future Global Force Management Allocation Plans. Second, by seeking new tanker basing agreements with regional partners throughout South Asia, Southeast Asia, and Oceana.

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INTRODUCTION

The Unclassified Summary of the 2018 United States (US) National Defense Strategy (NDS) declares that the US is "emerging from a period of strategic atrophy, aware that [its] competitive military advantage has been eroding."[1] Equally disconcerting is the admission in the 2019 Indo-Pacific Strategy Report (IPSR) that China would enjoy a military advantage at the outset of conflict if it chose to employ force in pursuit of territorial interests along its periphery in the South China Sea (SCS). The IPSR describes the critical challenge facing the US as a *fait accompli* scenario in which China consolidates territorial gains while forestalling a response from the US, its allies, and partners.[2] In terms of operational art, the IPSR acknowledges that China enjoys significant time, space, and force advantages in the SCS vis-à-vis the US.

To counter this Chinese threat, the IPSR articulates three lines of effort focused on preparedness, partnerships, and promotion of networked regional relationships.[3] In terms of instruments of national power, these can be understood broadly as United States Indo-Pacific Command's (INDOPACOM's) military, diplomatic, and informational/economic goals, respectively. They are intended to nest under the NDS direction to "increase lethality, strengthen alliances, and expand the competitive space."[4]

In describing preparedness, the IPSR clearly articulates INDOPACOM's military strategy to deter Chinese aggression by posturing combat-credible forces forward, thereby compelling China to advance its interests through benign means subject to internationally recognized rules.[5] Implicit in the IPSR is the idea that combat credibility in an anti-access, area denial (A2AD) environment is primarily predicated upon newly developed, multi-domain operational concepts. One such concept, the adaptive basing of air assets, envisions forces capable of deploying, surviving, operating, maneuvering, and regenerating from smaller, dispersed, resilient bases while under threat of attack.[6]

However, due to logistical and operational limitations, adaptive basing is incompatible with a vital warfighting asset in the SCS – the Air Force's current air refueling tanker fleet. As an alternative to adaptive basing, INDOPACOM would realize a more capable tanker readiness posture by pursuing an increase in the number of Air Force tanker squadrons assigned in future Global Force Management Allocation Plans (GFMAPs) while simultaneously seeking new tanker basing agreements with regional partners throughout South Asia, Southeast Asia, and Oceana.

This paper is divided into three sections. It begins with a discussion of the necessity of tankers to conduct operations in the SCS and the threats posed by Chinese missile systems. Next, it considers the logistical and operational limitations of tanker adaptive basing. Subsequently, it presents arguments for and against the proposed alternatives.

TANKERS AND A2AD THREATS IN THE SOUTH CHINA SEA

A recent Brookings Institute study notes, "The cumulative effect of unavailable fuel and [air] refueling assets at the tactical level can result in operational failure … and the inability to conduct operations in a particular region due to [airborne] fuel constraints can degrade military strategy."[7] The study goes so far as to suggest that current tankers are a "strategic vulnerability."[8] In doing so, it emphasizes an inherent weakness of US airpower in the SCS – an adversary incapable of challenging US fighters for air superiority can disrupt the American advantage by targeting the tankers which fighters rely upon to sustain that superiority.[9]

The implication is clear. Tanker survivability is critical to the military strategy articulated in the IPSR, especially given the tyranny of distance in the SCS. Moreover, the ability to safely base tankers near contested SCS airspace could help INDOPACOM mitigate Chinese advantages in time, space, and force by increasing offensive tempo, expanding operational reach, and enabling greater tactical strike radii for airborne weapon systems.

However, tankers have finite offload capacities, meaning overall fuel requirements for air operations increase exponentially as a tanker's transit distance increases. Loiter time for fighter, bomber, and surveillance aircraft are wholly dependent on the proximity of air refueling tracks to combat airspace, especially in contested A2AD environments in which receiver aircraft can expect higher fuel-burn rates from maneuvers in response to land-based, sea-based, and airborne threats. If Chinese A2AD capabilities were to succeed in denying tanker basing options in the SCS, INDOPACOM would require more tankers and fighters to achieve the same effects.

Enter adaptive basing – a concept designed to increase the survivability of air assets. It is predicated upon the idea of agile disaggregation to enhance operational maneuver and enable combat persistence in A2AD environments.[10] As introduced in the 2012 Joint Operational Access Concept and explained by Dr. Robert C. Owen, former Dean of the United States Air Force's School of Advanced Airpower Studies, the disaggregation of aircraft and support resources is expected to decrease vulnerability through redundancy while simultaneously complicating the enemy's targeting efforts.[11] Owen's 2015 publication, *Basing Strategies for Air Refueling Forces in Antiaccess/Area-Denial Environments*, provides one of the most substantive, unclassified studies of tanker basing strategies in the SCS. Chinese capabilities and the region's geography, he argued, make the SCS a worst-case challenge for tanker basing.[12]

In the four years since Owen's study was published, the threat posed by China has only increased. In addition to new space-based and cyber capabilities, China has realized a substantial increase in its time, space, and force advantages through investments in new aircraft, ships, and ballistic missile systems designed to hold US airbases and maritime forces at risk.

In his February 2019 remarks to the Senate Armed Service Committee, INDOPACOM Commander Admiral Philip Davidson noted China's road-mobile, nuclear- and conventional-capable DF-26 intermediate-range ballistic missile (IRBM) possesses near-precision strike

capability as far as the second island chain.[13] During an October 2019 military parade in Beijing, China debuted new capabilities designed to increase the stand-off distance for US forces seeking access to the SCS. These included the DF-17 hypersonic boost-glide missile,[14] the DF-100 anti-ship ballistic missile,[15] and the DF-41 road- and rail-mobile intercontinental ballistic missile.[16]

These weapon systems are undoubtedly the reason former Deputy Secretary of Defense Robert Work cautioned in a June 2019 study that China has reached near-technological parity with the US in guided munitions. In his view, "the US Joint Force may be close to becoming the victim of a deliberate, patient, and robustly resourced military-technical offset strategy."[17]

China's new missile systems create a huge dilemma for tanker basing, especially given the recommendation from a RAND study to base tankers and other large aircraft "out of range of China's conventional ballistic missiles."[18] At the time the RAND study was published in 2007, China's DF-21 medium-range ballistic missile dictated tanker basing locations roughly 1,000 miles from the Chinese coast. Given the range and accuracy of the DF-26 IRBM, that stand-off range today is in excess of 2,000 miles. That is the same distance from Guam to Hong Kong, a one-way flight of over four hours that would necessitate, by conservative estimates, more than 60,000 pounds of fuel per tanker, per mission, for transit alone.

TANKER ADAPTIVE BASING – LOGISTICAL AND OPERATIONAL LIMITATIONS

Adaptive basing is intended to enable the operation of bases within Chinese missile rings in the SCS by mitigating the threat in three ways. First, by expanding the number of fixed targets China would be required to attack.[19] Second, by threatening to escalate the consequences of a Chinese strike due to the presence of US forces at airfields within the sovereign territory of partners and allies.[20] Finally, by allowing the rapid regeneration of combat power at unpredictable locations within the time constraints imposed by the Chinese targeting cycle.[21]

The efficacy of the first two threat mitigation features depends largely upon assumptions regarding the likelihood China would expend short- and medium-range ballistic missiles against disaggregated bases as well as China's willingness to escalate tensions with neighboring states. If China were reluctant to employ these weapons, choosing instead to husband them for broader strategic concerns, adaptive basing could exploit that hesitation.[22] However, in the case of a scenario involving Taiwan, the US, along with its partners and allies, must assume China would not hesitate to engage opposition forces regardless of their location. As the Chinese government has clearly articulated, the "South China Sea islands … are inalienable parts of the Chinese territory."[23] Regarding Taiwan, China has stated its unequivocal resolve, "[reserving] the option of taking all necessary measures" targeted at "the interference of external forces."[24]

The efficacy of the final threat mitigation feature of adaptive basing depends upon two requirements. First, the ability to preserve ambiguity regarding US post-mission recovery locations. Second, the ability to recover, refuel, rearm, and relaunch aircraft from these forward locations quicker than the Chinese targeting cycle can locate and kill them – or, barring the capability to beat the threat's timing, the ability to survive and subsequently launch after an attack without affecting the sequencing of follow-on missions. Although an exact missile threat timeline is difficult to determine, a 2014 study on forward arming and refueling points for fighter aircraft identified a planning factor of between sixty and ninety minutes for an airfield between 540 and 810 nautical miles from the Chinese coast.[25] Current Air Force tanker aircraft are incompatible with these two requirements due to both logistical and operational limitations.

Logistical Limitations

Tanker adaptive basing fails to address the feasibility of sustaining, maintaining, and defending current tanker aircraft, personnel, and infrastructure at multiple dispersed airfields across an expansive region. In simpler terms, today's Air Force tanker fleet consists of airliner-

derived airframes which require well-developed airfields with substantial weight-bearing capacity, sizeable runways and taxiways, specialized maintenance equipment, and significant fuel stores for maximum effectiveness. The fleet is composed of 380 KC-135s with an average age of just under 59 years and 59 KC-10s with an average age of just under 34 years.[26] To date, the Air Force has received 19 KC-46 tankers of a planned 179,[27] though it is currently estimated to be three or four years away from being deployable due to multiple category one deficiencies.[28] This analysis excludes drogue-equipped United States Marine Corps KC-130 variant aircraft due to their limited airspeed envelope for refueling operations and inability to refuel Air Force aircraft which require an air refueling boom.

Studies have indicated that upwards of 163 airfields in the region with runways at least 8,000 feet long and 75 feet wide would be suitable for adaptive basing.[29] However, given the average temperature and atmospheric pressure in the SCS, current tankers at maximum gross weight would require over 10,000 feet of runway for takeoff (assuming minimum permissible climb gradients). That requirement could grow to more than 12,000 feet if the runway were wet.[30] A cursory review of regional airfields reveals fewer than 30 runways of sufficient length for effective tanker operations. Many of these runways are at major international airports incapable of maintaining operational ambiguity.[31] Disaggregation also assumes pre-existing basing agreements at suitable airfields – agreements that currently do not exist. The scarcity of airfields which meet the criteria of current tankers largely restricts the ability to disaggregate with sufficient unpredictability to complicate Chinese tracking and targeting.[32]

The disaggregation of tanker basing would also dramatically increase manpower requirements for specialized technicians and the need for spare parts to avoid the potential for grounded aircraft in a combat zone. The Air Force is suffering from significant shortages in both areas. A February 2019 Government Accountability Office report to Congress noted that the Air

Force has no strategy to enhance the retention of experienced maintenance personnel despite significant manning gaps that persist in 5-level and 7-level skilled maintainer positions.[33] A Defense Logistics Agency communication from May of 2019 identifies KC-135 parts procurement as one of the Agency's major challenges, noting that the government has not purchased several components since the aircraft's manufacture in the 1960s.[34]

Perhaps the biggest sustainment concern of all is sourcing jet fuel. As Owen warned, "the most daunting logistical challenge will be satisfying the huge fuel requirements of air refueling units," which could easily exceed 620,000 gallons daily for as few as six tankers, each flying three maximum-offload sorties per day.[35] Given that some planners estimate the number of tankers required to support a regional conflict to be as high as 200,[36] adaptively basing tankers becomes increasingly unrealistic. Successful efforts would require a network of airfields with substantial support infrastructure in a region of the world in which there are few feasible sites.

That infrastructure would also require persistent defense. As Owen points out, this creates a rippling set of security concerns associated with "warehousing, local support contracts, and host nation access arrangements needed to prepare airfields for disaggregated operations." All of these efforts would "be impossible to hide, and, in all likelihood, [would] enable potential enemies to develop air and ground attack folders on every disaggregation base long before any shots are fired."[37]

Operational Limitations

Operationally, tanker adaptive basing fails to reconcile its no-delay, no-fail mission requirement with the suboptimal maintenance- and supply-driven mission capability rates of currently employable tankers. Moreover, current tankers lack the defensive systems necessary to operate continuously in a high-threat environment.

In fiscal year 2018, the KC-135 mission-capable (MC) rate was just over 73 percent, while the KC-10 MC rate was just under 80 percent.[38] The rate is calculated by adding the total number of hours an aircraft is in a fully mission-capable status to the number of hours the aircraft is in a partially mission-capable status, then dividing by the total number of hours possessed.[39]

Although break rates and 12-hour fix rates offer more utility in assessing the suitability of a given aircraft type to meet the post-mission timing demands imposed by adaptive basing, these rates are intended for official use only and unavailable for inclusion in this analysis. However, the MC rate still offers a useful benchmark in that it represents the efficacy of maintenance efforts conducted primarily in a peacetime environment at robust, well-resourced garrison bases with the highest likelihood of available specialized maintenance personnel and parts. Even under ideal conditions, current tankers are non-mission capable roughly 25 percent of the time. Planners should expect significantly lower MC rates in the SCS if adaptively basing tankers.

Perhaps most importantly, adaptive basing is designed to ensure the safety of aircraft on the ground – nothing precludes the detection, targeting, or engagement of aircraft once airborne. Without question, neither the KC-135 nor the KC-10 are well suited to operate in the threat environment of the SCS given their complete lack of defensive systems. Worse, the KC-46 was designed only for a medium-threat environment. Even if the KC-46 were fully mission capable and fully delivered – a milestone likely more than a decade away – the adaptive basing challenge for tankers in the SCS would persist. The KC-46's networked data link systems, threat detection receivers, and infra-red countermeasures would likely enable a head-start in detecting threats, but that does not mean the aircraft would be capable of surviving advanced, land-based or ship-launched surface-to-air or air-to-air weapons.[40]

Summary of Limitations

As the analysis in this section has shown, logistical and operational limitations render the current tanker fleet incapable of preserving the operational ambiguity of post-mission recovery bases and reliably launching within the time constraints imposed by China's missile targeting cycle. The lack of hardened aircraft shelters at suitable disaggregation airfields – and the untenable financial prospect of constructing them in sufficient numbers at suitable sites across the region – means that tankers will be without protection from a ballistic missile attack if caught on the ground. Current tankers, therefore, lack the necessary resilience to be compatible with the operational concept of adaptive basing in the SCS.

RECOMMENDATIONS: INCREASING ASSIGNED SQUADRONS AND AIRBASES

Until the US can acquire the type of tanker Owen suggests,[41] a midsized "tactical" tanker with the capabilities needed to feasibly operate within the constraints imposed by the adaptive basing operational concept, INDOPACOM must pursue two alternatives to enhance its tanker readiness posture and ensure operational reach into the South China Sea. First, INDOPACOM must seek an increase in GFMAP-assigned tanker squadrons, thereby decreasing response time and increasing both the size and combat effectiveness of its force. Second, INDOPACOM must ensure reliable access to the SCS by establishing new tanker basing agreements with regional partners throughout South Asia, Southeast Asia, and Oceana, thereby expanding options for force design and maneuver.[42]

Increasing Assigned Squadrons

As a RAND study on countering Chinese A2AD threats posits, the emphasis on surprise, preemption, and rapid operations in Chinese doctrine would likely result in little or no warning for the US at the outset of hostilities and have a significant effect on the US ability to shape the outcome of a conflict.[43] Admiral Davidson acknowledged this likelihood in his testimony to the

Senate, noting in his discussion of INDOPACOM's global force management that the theater requires short response timelines and immediately responsive forces that "can exercise, train, and operate with our partner nations' militaries."[44]

To realize the level of responsiveness and interoperability Admiral Davidson envisions, an enduring command relationship over INDOPACOM's forces must exist. This type of command structure can only occur by assignment through the global force management process, as allocation and apportionment do not guarantee sufficient force availability in the time frame necessary to respond in a meaningful way to a preemptive Chinese military action. Assignment of forces also meets the intent of the 1986 Goldwater Nichols Act to "ensure the authority of [combatant] commanders is fully commensurate with [their] responsibility,"[45] Most importantly, GFMAP assignment facilitates both steady-state and contingency operations by improving the forces' knowledge, experience, and relationships while reducing response times during crises.[46]

Currently, INDOPACOM is assigned only a single active-duty tanker squadron consisting of 15 KC-135s at Kadena Air Base in Okinawa, Japan.[47] This renders INDOPACOM entirely dependent upon United States Transportation Command's (TRANSCOM's) timely identification, mobilization, and deployment of tanker squadrons from the continental US to ensure operational reach and combat persistence in response to a Chinese *fait accompli.* General Charles Brown, Commander of Pacific Air Forces, voiced his desire for more air refueling capability in the region at the 2018 Air Force Association Air, Space, and Cyber Conference.[48] His advocacy came on the heels of former Air Force Secretary Heather Wilson's "The Air Force We Need" presentation, an announcement of the service's intention to grow the number of operational squadrons from 312 to 386. This included an increase in the total number of operational tanker squadrons from 40 to 54 – the second largest of the eleven category increases announced and an increase twice as large as that desired for fighter squadrons.[49] However, rather

than waiting for the activation of new tanker squadrons, INDOPACOM must seek reassignment of tanker squadrons from TRANSCOM to INDOPACOM in the next GFMAP.

Critics of this recommendation are likely to counter-argue that the overall scarcity of active-duty tankers drives the need to utilize them as a rotational force, consistent with their employment model over the preceding two decades in the war against terror. Admittedly, active-duty tanker forces are in short supply. In addition to the Kadena squadron, only one of the Air Force's other thirty-nine operational tanker squadrons is assigned to a geographic combatant command.[50] Of the remaining thirty-eight, only eleven are manned by active-duty Airmen flying active-duty tankers permanently assigned to that squadron – the rest are assigned to the air reserve component.[51] Critics are also likely to argue that this disparity limits options to reassign active-duty tanker squadrons from TRANSCOM to INDOPACOM, pointing to the cascading effects of KC-46 program delays as further evidence that current rotational constructs must remain in place until the new tanker has been delivered and is fully mission capable. Doing otherwise, they will argue, would limit tanker support options for ongoing combat operations in United States Central Command's area of responsibility.

However, this is precisely the type of "difficult choice" described in the NDS – one which forces the US "to prioritize what is most important to field a lethal, resilient, and rapidly adapting Joint Force."[52] As Defense Secretary Mark Esper recently declared unambiguously, INDOPACOM is the Department's "priority theater."[53] This priority dictates a GFMAP change.

Regarding the disparity in tankers between the active and reserve air components, undoubtedly, it has been shaped to a certain degree by political processes involving the Air National Guard. However, given the emphasis on enhancing the combat-credible posture of forward forces in both the NDS and IPSR, the incongruence between tankers assigned to active forces and those assigned to the air reserve component suggests a suboptimal distribution of air

refueling capability to meet the nation's strategic priorities. The discrepancy can and should be addressed.

Establishing New Tanker Basing Agreements across the Region

INDOPACOM's need for increased airbases goes hand-in-hand with its need for more GFMAP-assigned tanker squadrons due to the significant risk inherent in the command's current posture. Beyond Alaska and Hawaii, the majority of INDOPACOM's air combat capability is concentrated in Japan, South Korea, and Guam, all of which are in range of Chinese IRBMs. This vulnerability is reflected in the stark declaration from a recent RAND study that the "US does not have enough peacetime overseas airbases to conduct distributed operations."[54]

Admiral Davidson acknowledged the need to update INDOPACOM's posture, which he labeled a "legacy of the Second World War and Korean War."[55] His emphasis on rebalancing capabilities across South Asia, Southeast Asia, and Oceana[56] reflects his recognition that "a combination of ballistic missile, cruise missile, aircraft, and covert operative attacks on runways, aircraft, shelters, and other critical facilities could render US airfields in Okinawa, South Korea, and the main islands of Japan unusable, particularly in the early days of a conflict."[57]

This risk, compounded by the incompatibility of current tankers with the adaptive basing concept, demands that INDOPACOM identify and pursue basing agreements at airfields capable of serving as more-distant tanker main operating bases. These bases must be outside the cluster of current basing locations in Northeast Asia. Potential locations could include India, Bangladesh, Indonesia, and Australia, all of which could offer INDOPACOM distinct advantages in offsetting Chinese advantages in time, space, and force if agreements and necessary infrastructure were in place before the onset of hostilities. Establishing an operational presence in these nations would also expand options for force design and maneuver while providing insurance against a crippling, preemptive Chinese attack. Moreover, China would be

forced to expend resources to address the risk of horizontal escalation made possible by new bases.

Beyond efforts targeted at these larger nations, it is also essential for INDOPACOM to support efforts currently underway to secure renewal of the Compact of Free Association, currently scheduled to lapse in 2024.[58] A new agreement is vital to ensure the US maintains exclusive basing rights with the Federated States of Micronesia, the Marshall Islands, and Palau while simultaneously containing China's expanding economic influence.

Critics of this recommendation will no doubt counter-argue that the exorbitant price tag which accompanies new bases – especially the cost associated with supporting overseas families – makes this an untenable option. As a 2013 RAND study of overseas basing identified, airbases constitute the highest source of overseas fixed costs, and the Asia-Pacific region generates one of the highest sources of overseas recurring variable costs.[59]

However, cost mitigation is possible if basing agreements similar to those that exist in Japan and South Korea are pursued. These agreements are heavily subsidized by host-nation financial and in-kind support, defraying higher direct costs to the Department of Defense.[60] Given that each nation suggested as a potential base partner has a vested financial interest in confronting Chinese aggression in the SCS, it is not unreasonable to suggest a cost-sharing approach based on the value of the deterrence derived from a permanent US presence.

Undeniably, there will be significant sunk costs associated with the initial investment in developing infrastructure at new basing locations, but these costs are outweighed by the benefits of ensuring INDOPACOM's ability to forward position combat-credible forces to deter, and if necessary, respond to Chinese aggression. By contrast, the damage to US credibility if INDOPACOM were unable to mount a viable defense in support of an ally would present an unrecoverable cost.

CONCLUSION

This analysis has demonstrated the logistical and operational limitations which render current Air Force tankers incompatible with the operational concept of adaptive basing in the SCS. Due to stringent airfield requirements, the current tanker fleet is incapable of executing disaggregated operations with sufficient ambiguity to survive Chinese missile threats. Further, the current tanker fleet is incapable of regenerating at austere locations, as labor-intensive and time-consuming maintenance requirements cannot be completed within the timing limitations imposed by the Chinese missile targeting cycle. Due to a complete lack of defensive systems, current tankers are also ill-suited for operations in the high-threat SCS environment.

As an alternative to adaptively basing tankers, INDOPACOM would realize a more capable tanker readiness posture and ensure operational reach into the SCS by pursuing an increase in GFMAP-assigned tanker squadrons and seeking new tanker basing agreements with regional partners in South Asia, Southeast Asia, and Oceana. Changes in global force management are necessary to ensure an enduring command relationship can be achieved and to realize the level of responsiveness and interoperability necessary for responding to a Chinese *fait accompli* involving Taiwan. Increased tanker basing options will ensure INDOPACOM can rebalance a posture which is currently lopsided in favor of Northeast Asia while simultaneously mitigating the threat of a catastrophic preemptive attack. These recommendations are consistent with the priorities articulated in the NDS and offer INDOPACOM a feasible means of offsetting the advantages China currently enjoys in time, space, and force in the SCS.

NOTES

1. U.S. Department of Defense, *Summary of the 2018 National Defense Strategy of the United States of America,* by James Mattis (Washington, DC, 2018), 1, https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf.
2. U.S. Department of Defense, *Indo-Pacific Strategy Report: Preparedness, Partnerships, and Promoting a Networked Region*, by Patrick M. Shanahan (Washington, DC, 2019), 18.
3. Ibid, 17.
4. Ibid.
5. Ibid, 18.
6. U.S. Department of Defense, *2018 National Defense Strategy*, 6.
7. Gregory D. Knepper, *Access Assured: Addressing Air Power Reach, Persistence and Fueling Limitations for Contested and Permissive Air Operations*, Center for 21st Century Security and Intelligence, Brookings Institute, September 2014 Policy Paper, 11.
8. Ibid, 15.
9. Ibid, 14-15.
10. David Dammeier, Meka Toliver, and Logan Smith, "Overcoming a Power Projection Problem," *CE Magazine Online*, Spring 2016, https://www.afcec.af.mil/News/CE-Online/Article-Display/Article/1004470/overcoming-a-power-projection-problem.
11. Robert C. Owen, *Basing Strategies for Air Refueling Forces in Antiaccess/Area-Denial Environments*, AFRI Paper 2015-1 (Maxwell AFB, Alabama: Air University Press, Air Force Research Institute, 2015), 1; U.S. Department of Defense, *Joint Operational Access Concept (JOAC)*, (Washington, DC, 2012), Version 1.0, 20.
12. Ibid.
13. *Statement of Admiral Philip S. Davidson, U.S. Navy, Commander, U.S. Indo-Pacific Command before the Senate Armed Services Committee on U.S. Indo-Pacific Command Posture*, 12 February 2019, https://www.armed-services.senate.gov/imo/media/doc/Davidson_02-12-19.pdf.
14. David Axe, "Check Out China's New DF-17 Hypersonic Glide Vehicle: A Real Killer?" *The National Interest*, 1 October 2019, https://nationalinterest.org/blog/buzz/check-out-chinas-new-df-17-hypersonic-glide-vehicle-real-killer-84946.
15. Sebastien Roblin, "China's New DF-100 Missile: Designed to Kill U.S. Navy Aircraft Carriers?" *The National Interest*, 5 October 2019, https://nationalinterest.org/blog/buzz/chinas-new-df-100-missile-designed-kill-us-navy-aircraft-carriers-85931.
16. Missile Defense Project, "DF-41 (Dong Feng-41 / CSS-X-20)," *Missile Threat*, Center for Strategic and International Studies, August 12, 2016, last modified October 8, 2019, https://missilethreat.csis.org/missile/df-41.
17. Robert O. Work and Greg Grant, *Beating the Americans at their Own Game: An Offset Strategy with Chinese Characteristics*, 6 June 2019, https://www.cnas.org/publications/reports/beating-the-americans-at-their-own-game.
18. Roger Cliff et al., *Entering the Dragon's Lair: Chinese Antiaccess Strategies and Their Implications for the United States* (Santa Monica, CA: RAND Corp, 2007), 99.

19. Miranda Priebe et al., *Distributed Operations in a Contested Environment: Implications for USAF Force Presentation* (RAND Corporation, 2019), 15-16, https://doi.org/10.7249/RR2959.

20. Robert D. Davis, "Forward Arming and Refueling Points for Fighter Aircraft: Power Projection in an Antiaccess Environment," *Air & Space Power Journal*, September-October 2014, 16.

21. Ibid.

22. Owen, *Basing Strategies,* 4.

23. China and State Council Information Office, *China's National Defense in the New Era*, 2019.

24. Ibid.

25. Davis, "Forward Arming and Refueling," 16.

26. U.S. Air Force, *2019 USAF Almanac: Equipment*, www.airforcemag.com/MagazineArchive/Magazine%20Documents/2019/June%202019/0619_Equipment.pdf.

27. Stewart Welch and David Leroy, "The Case for a Three-Tanker Air Force," *War on the Rocks*, 11 October 2019, https://warontherocks.com/2019/10/the-case-for-a-three-tanker-air-force.

28. Brian Everstine and John Tirpak, "AMC: KC-46 Can't Deploy for at Least 304 Years," *Air Force Magazine Online*, 18 September 2019, http://www.airforcemag.com/Features/Pages/2019/September%202019/AMC-KC-46-Cant-Deploy-for-at-Least-3-4-Years.aspx.

29. Ibid, 15.

30. Data calculated using KC-135 Fuel Management and Performance System Calculator Application, Version 2.1.

31. Airports in Asia, Aircraft Charter World Database, http://www.aircraft-charter-world.com/airports/asia/index.htm.

32. Owen, *Basing Strategies,* 9.

33. U.S. Government Accountability Office, *Military Personnel: Strategy Needed to Improve Retention of Experienced Air Force Aircraft Maintainers* (Washington, DC: GAO-19-160, 2019).

34. Cathy Hopkins, "DLA Aviation Parts Support Ensures Tankers Available for Aerial Refueling Mission," *DLA Aviation Public Affairs*, 6 May 2019, https://www.dla.mil/AboutDLA/News/NewsArticleView/Article/1834397/dla-aviation-parts-support-ensures-tankers-available-for-aerial-refueling-missi.

35. Ibid, 8.

36. Knepper, *Access Assured,* 15.

37. Owen, *Basing Strategies,* ix.

38. Stephen Losey, "Aircraft Mission-Capable Rates Hit New Low in Air Force, Despite Efforts to Improve," *Air Force Times Online*, 26 July 2019, https://www.airforcetimes.com/news/your-air-force/2019/07/26/aircraft-mission-capable-rates-hit-new-low-in-air-force-despite-efforts-to-improve.

39. U.S. Air Force Logistics Management Agency, *Maintenance Metrics: U.S. Air Force*, 30 December 2001, 15-38.

40. Knepper, *Access Assured,* 16.

41. Owen, *Basing Strategies*, ix.

42. Statement of Admiral Philip S. Davidson.

43. Cliff et al., *Entering the Dragon's Lair,* 100.

44. Statement of Admiral Philip S. Davidson.

45. Heather Reed, "Advantages of Assigning Forces," *Military Review*, May-June 2016, 119.

46. Ibid, 120-121.

47. Kadena Air Base 18th Wing Website, "Who We Are," https://www.kadena.af.mil/Home/Welcome.

48. Brian Everstine, "PACAF Boss: More Tankers Needed in the Pacific," *Air Force Magazine Online*, 20 September 2018, http://www.airforcemag.com/Features/Pages/2018/September%202018/PACAF-Boss-More-Tankers-Needed-in-the-Pacific.aspx.

49. U.S. Secretary of the Air Force Public Affairs, "The Air Force We Need: 386 Operational Squadrons," 17 September 2018, https://www.af.mil/News/Article-Display/Article/1635070/the-air-force-we-need-386-operational-squadrons.

50. The two tanker squadrons assigned to geographic combatant commands are the 909 ARS at Kadena Air Base, Japan and the 351 ARS at RAF Mildenhall, United Kingdom.

51. The 11 squadrons include the following KC-135 squadrons: 92 ARS, 93 ARS, and 384 ARS at Fairchild, 349 ARS and 350 ARS at McConnell, 50 ARS and 91 ARS at MacDill; The 11 squadrons also include the following KC-10 squadrons: 2 ARS and 32 ARS at McGuire, 6 ARS and 9 ARS at Travis. The 906 ARS at Scott, 911 ARS at Seymour Johnson, 912 ARS at March, 64 ARS at Pease, and 99 ARS at Birmingham are manned by active duty but fly aircraft assigned to the air reserve component. All of the Air Force's 59 KC-10s are assigned to active duty.

52. U.S. Department of Defense, *2018 National Defense Strategy*, 1.

53. Aaron Mehta, "Esper Calls for New Basing Investments in the Pacific," *Defense News Online*, 27 August 2019, https://www.defensenews.com/pentagon/2019/08/27/esper-calls-for-new-basing-investments-in-the-pacific.

54. Priebe et al., *Distributed Operations*, 5.

55. Statement of Admiral Philip S. Davidson.

56. Ibid.

57. Cliff et al., *Entering the Dragon's Lair*, 100.

58. Colin Packham and Jonathan Barrett, "U.S. Seeks to Renew Pacific Islands Security Pact to Foil China," *Reuters World News*, 5 August 2019, https://www.reuters.com/article/us-micronesia-usa-pompeo/us-seeks-to-renew-pacific-islands-security-pact-to-foil-china-idUSKCN1UV0UV.

59. Michael J Lostumbo et al., "Overseas Basing of U.S. Military Forces: An Assessment of Relative Costs and Strategic Benefits," 2013, xxv.

60. Ibid.

BIBLIOGRAPHY

Aircraft Charter World Database. Airports in Asia. http://www.aircraft-charter-world.com/airports/asia/index.htm.

Axe, David. "Check out China's New DF-17 Hypersonic Glide Vehicle: A Real Killer?" *The National Interest.* 1 October 2019. https://nationalinterest.org/blog/buzz/check-out-chinas-new-df-17-hypersonic-glide-vehicle-real-killer-84946.

China and State Council Information Office. *China's National Defense in the New Era.* 2019.

Cliff, Roger, Mark Burles, Michael S. Chase, Derek Eaton, and Kevin L. Pollpeter. *Entering the Dragon's Lair: Chinese Antiaccess Strategies and Their Implications for the United States.* Santa Monica, CA: RAND Corporation. 2007.

Dammeier, David, Meka Toliver, and Logan Smith. "Overcoming a Power Projection Problem," *CE Magazine Online*, Spring 2016, https://www.afcec.af.mil/News/CE-Online/Article-Display/Article/1004470/overcoming-a-power-projection-problem.

Davidson, Philip S. *Statement of Admiral Philip S. Davidson, U.S. Navy, Commander, U.S. Indo-Pacific Command before the Senate Armed Services Committee on U.S. Indo-Pacific Command Posture*. 12 February 2019. https://www.armed-services.senate.gov/imo/media/doc/Davidson_02 -12-19.pdf.

Davis, Robert D. "Forward Arming and Refueling Points for Fighter Aircraft: Power Projection in an Antiaccess Environment." *Air & Space Power Journal*. September-October 2014.

Everstine, Brian. "PACAF Boss: More Tankers Needed in the Pacific," *Air Force Magazine Online*. 20 September 2018. http://www.airforcemag.com/Features/Pages/2018/September%202018/PACAF-Boss-More-Tankers-Needed-in-the-Pacific.aspx.

Everstine, Brian and John Tirpak. "AMC: KC-46 Can't Deploy for at Least 304 Years." *Air Force Magazine Online.* 18 September 2019. http://www.airforcemag.com/Features/Pages/2019/September%202019/AMC-KC-46-Cant-Deploy-for-at-Least-3-4-Years.aspx.

Hopkins, Cathy. "DLA Aviation Parts Support Ensures Tankers Available for Aerial Refueling Mission." *DLA Aviation Public Affairs.* 6 May 2019. https://www.dla.mil/AboutDLA/News/NewsArticleView/Article/1834397/dla-aviation-parts-support-ensures-tankers-available-for-aerial-refueling-missi.

Knepper, Gregory D. *Access Assured: Addressing Air Power Reach, Persistence and Fueling Limitations for Contested and Permissive Air Operations*. Center for 21st Century Security and Intelligence. Brookings Institute Policy Paper. September 2014.

Losey, Stephen. “Aircraft Mission-Capable Rates Hit New Low in Air Force, Despite Efforts to Improve.” *Air Force Times Online*. 26 July 2019. https://www.airforcetimes.com/ news/your-air-force/2019/07/26/aircraft-mission-capable-rates-hit-new-low-in-air-force-despite-efforts-to-improve.

Lostumbo, Michael J., Michael J. McNerney, Eric Peltz, Derek Eaton, David R. Frelinger, Victoria A. Greenfield, John Halliday, Patrick Mills, Bruce R. Nardulli, Patrick Mills, et. al. *Overseas Basing of U.S. Military Forces: An Assessment of Relative Costs and Strategic Benefits*. Santa Monica, CA: RAND Corporation, 2013.

Mehta, Aaron. “Esper Calls for New Basing Investments in the Pacific.” *Defense News Online*. 27 August 2019. https://www.defensenews.com/pentagon/2019/08/27/esper-calls-for-new-basing-investments-in-the-pacific.

Missile Defense Project. "DF-41 (Dong Feng-41 / CSS-X-20)." *Missile Threat*. Center for Strategic and International Studies. 12 August 2016. Last modified 8 October 8 2019. https://missilethreat.csis.org/missile/df-41.

Owen, Robert C. *Basing Strategies for Air Refueling Forces in Antiaccess/Area-Denial Environments*. Air Force Research Institute Paper 2015-1. Maxwell AFB, Alabama: Air University Press, 2015.

Packham, Colin and Jonathan Barrett. “U.S. Seeks to Renew Pacific Islands Security Pact to Foil China.” *Reuters World News*. 5 August 2019. https://www.reuters.com/ article/us-micronesia-usa-pompeo/us-seeks-to-renew-pacific-islands-security-pact-to-foil-china-idUSKCN1UV0UV.

Priebe, Miranda, Alan J. Vick, Jacob L. Heim, and Meagan L. Smith. *Distributed Operations in a Contested Environment: Implications for USAF Force Presentation.* Santa Monica, CA: RAND Corporation. 2019.

Reed, Heather. “Advantages of Assigning Forces.” *Military Review.* May-June 2016.

Roblin, Sebastien. “China’s New DF-100 Missile: Designed to Kill U.S. Navy Aircraft Carriers?” *The National Interest*. 5 October 2019. https://nationalinterest.org/blog/ buzz/chinas-new-df-100-missile-designed-kill-us-navy-aircraft-carriers-85931.

U.S. Air Force. “Who We Are.” *Kadena Air Base 18th Wing Website*. https://www.kadena.af.mil/ Home/Welcome.

U.S. Air Force Enterprise Capability Collaboration Team. *Air Superiority 2030 Flight Plan.* May 2016. https://www.af.mil/Portals/1/documents/airpower/Air%20Superiority%202030%20Flight%20Plan.pdf.

U.S. Air Force Logistics Management Agency. *Maintenance Metrics: U.S. Air Force.* 30 December 2001.

U.S. Air Force Magazine. *2019 USAF Almanac: Equipment*. www.airforcemag.com/Magazine Archive/ Magazine%20Documents/2019/June%202019/0619_Equipment.pdf.

U.S. Department of Defense. *Indo-Pacific Strategy Report: Preparedness, Partnerships, and Promoting a Networked Region.* Washington, DC: 2019.

U.S. Department of Defense. *Joint Operational Access Concept (JOAC)*. Version 1.0. Washington, DC: 2012.

U.S. Department of Defense. *Summary of the 2018 National Defense Strategy of the United States of America*. Washington, DC: 2018.

U.S. Government Accountability Office. *KC-46 Tanker Modernization: Aircraft Delivery Has Begun, but Deficiencies Could Affect Operations and Will Take Time to Correct*. Report to the Subcommittee on Seapower and Projection Forces, Committee on Armed Services, House of Representatives. GAO-19-480. June 2019.

U.S. Government Accountability Office. *Military Personnel: Strategy Needed to Improve Retention of Experienced Air Force Aircraft Maintainers*. Report to Congressional Committees. GAO-19-160. February 2019.

U.S. Secretary of the Air Force Public Affairs. "The Air Force We Need: 386 Operational Squadrons." 17 September 2018. https://www.af.mil/News/Article-Display/Article/1635070/the-air-force-we-need-386-operational-squadrons.

Welch, Stewart and David Leroy. "The Case for a Three-Tanker Air Force." *War on the Rocks*. 11 October 2019. https://warontherocks.com/2019/10/the-case-for-a-three-tanker-air-force.

Work, Robert O. and Greg Grant. *Beating the Americans at their Own Game: An Offset Strategy with Chinese Characteristics.* 6 June 2019. https://www.cnas.org/publications/ reports/beating-the-americans-at-their-own-game.