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China's Expanding Ability to Conduct Conventional Missile Strikes on Guam

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Executive Summary

The Chinese Communist Party (CCP) perceives that its legitimacy in the eyes of China's citizens is based, in part, on its ability to demonstrate that it is capable of strengthening the nation and safeguarding China's territorial interests and claims. Yet the CCP leadership believes the United States' presence in the Asia Pacific could interfere with its ability to defend these interests and claims if a regional crisis were to arise. This concern has prompted Beijing to develop conventional missile capabilities to target U.S. military facilities in the Asia Pacific in general, and Guam in particular, in order to expand China's options and improve its capacity to deter or deny U.S. intervention during such a crisis.

Several new conventional platforms and weapons systems developed by China in recent years have increased its ability to hold U.S. forces stationed on Guam at risk in a potential conflict. Currently, accuracy limitations and platform vulnerabilities render this risk relatively low, but China's commitment to continuing to modernize its strike capabilities indicates the risk will likely grow going forward. The current array of Chinese conventional missiles able to reach Guam includes: 1) the DF-26 intermediate-range ballistic missile (IRBM), not yet a precision strike weapon but potentially of concern in large numbers; 2) the DF-26 antiship ballistic missile (ASBM), unproven against a moving target at sea but undergoing further development; 3) air-launched land-attack cruise missiles (LACMs), launched from bombers with a high probability of being detected and intercepted by U.S. aircraft and anti-aircraft systems; 4) air-launched antiship cruise missiles (ASCMs), with the same aircraft limitation; 5) sea-launched ASCMs, of concern should the platforms be able to move into range undetected, a challenge for China's relatively noisy submarines; and 6) sea-launched LACMs, which China does not currently field but is likely working to develop. To evaluate China's ability to strike Guam going forward, the areas that should be monitored most closely are increased deployments of DF-26 missiles and qualitative improvements to China's precision strike capabilities, bomber fleet, in-air refueling capability, and submarine quieting technology.

Guam, a territory of the United States, is growing in importance to U.S. strategic interests and any potential warfighting operations in the Asia Pacific, even as China's ability to strike the island is increasing. Such attacks could hold key U.S. assets stationed on Guam at risk and also disrupt their region-wide response effort, slowing deployment timetables and reducing the effectiveness of U.S. forces in the theater. China's leaders could also be more willing to resort to military force in an existing crisis if they believed they could successfully hold Guam at risk, diminishing the United States' ability to deter an escalation, although it is difficult to determine the extent to which better operational capabilities influence strategic thinking in Beijing. Options such as hardening facilities on Guam, further dispersing U.S. regional military facilities, continuing investments in "next-generation" missile defense capabilities, revisiting the Intermediate-Range Nuclear Forces Treaty (INF) Treaty, and maintaining superiority in regional strike capabilities offer potential avenues for addressing these key security concerns.

Introduction

Observers of China's September 2015 military parade witnessed the surprise introduction of a new road-mobile intermediate-range ballistic missile (IRBM), the DF-26, reported to feature nuclear, conventional, and antiship variants and a range of 3,000–4,000 kilometers (km) (1,800–2,500 miles [mi])[1]—greater than any of China's current systems, except the intercontinental ballistic missiles (ICBMs) in its nuclear arsenal. This range would cover U.S. military installations on Guam, roughly 3,000 km (1,800 mi) from the Chinese mainland, prompting some analysts and netizens to refer to the missile as the "Guam Express" or "Guam Killer" (derived from the term "carrier killer" used to refer to China's antiship ballistic missile).[2] Combined with improved air- and sea-launched cruise missiles and modernizing support systems, the DF-26 would allow China to bring a greater diversity and quality of assets to bear against Guam in a contingency than ever before.

This report examines the challenges posed to the United States by a crucial aspect of China's military modernization: its investments in conventional offensive missile forces to hold an expanding range of regional targets at risk.[*] It specifically seeks to explain the drivers behind China's regional strike buildup and the importance of Guam in particular as a focal point, assess the array of platforms and weapons systems that could reach Guam, and analyze the implications of these developments for the United States.

Freedom of Action, U.S. Presence, and Guam as a Focal Point

China's reason for developing capabilities to hold locations in the Pacific at risk can be traced to the domestic political interests of its leaders. The Chinese Communist Party (CCP) seeks to maintain its legitimacy in the eyes of China's citizens by demonstrating, among other qualities, its ability to strengthen the nation[3] and defend what it defines as the country's "core interests," which include issues of sovereignty and territorial integrity.[† 4] The core missions of the People's Liberation Army (PLA) have long reflected these interests,[5] with China's latest defense white paper reaffirming that safeguarding "the sovereignty and security of China's territorial land, air, and sea" and "the unification of the motherland" (referring to Taiwan) are among the military's primary tasks.[‡ 6] China's military modernization efforts have thus sought to narrow gaps in the PLA's ability to defend national interests and "win local wars under informationized conditions,"[7] an effort lent urgency by several crises that have highlighted the limited options available to Beijing in contingencies.[§ 8] These experiences have also solidified the requirement for

[*] China has been able to reach Guam with nuclear weapons for decades. The nuclear-armed DF-4, deployed in the 1970s, was likely targeted at Guam in the past and will probably be replaced by the new nuclear-armed DF-31 ICBM. Conventional gravity bombs, naval gunfire, and torpedoes could theoretically reach Guam as well, but the same air and naval platforms that would deliver these are now equipped with significantly more advanced cruise missiles. This report thus focuses on the more relevant concerns posed by missiles below the nuclear threshold. Andrew S. Erickson and Justin D. Mikolay, "Guam and American Security in the Pacific," in Andrew S. Erickson and Carnes Lord, eds., *Rebalancing U.S. Forces: Basing and Forward Presence in the Asia-Pacific*, Naval Institute Press, 2014, 27-28; Christopher Yeaw, Andrew Erickson, and Michael S. Chase, "The Future of Chinese Nuclear Policy and Strategy," in Toshi Yoshihara and James R. Holmes, eds., *Strategy in the Second Nuclear Age: Power, Ambition, and the Ultimate Weapon*, Georgetown University Press, 2012, 66.

[†] Nationalist sentiments in China, as Western scholars have documented, provide opportunities for the CCP to bolster its governing credentials by defending national interests. Bruce J. Dickson et al., "Generating Regime Support in Contemporary China: Legitimation and the Local Legitimacy Deficit," *Modern China* (forthcoming), 33, 37; Lyle J. Goldstein, "Is It Time to Meet China Halfway?" *National Interest*, May 12, 2015. *http://nationalinterest.org/feature/it-time-meet-china-halfway-12863?page=2*; Andrew J. Nathan and Andrew Scobell, *China's Search for Security*, Columbia University Press, 2012, 31, 33; Susan Shirk, *China: Fragile Superpower*, Oxford University Press, 2007, 2-4, 6-7, 68, 79-104.

[‡] While reunifying Taiwan with the Mainland and defending specific territorial claims remain priorities among PLA missions, it is probable that a separate set of drivers has led in recent years to the introduction of new missions for the PLA Navy in particular, focused on out-of-area operations. The Guam-centered regional strike capability buildup on which this report is focused is likely not directly associated with these new and evolving missions. State Council Information Office of the People's Republic of China, *China's Military Strategy,* May 2015; U.S. Department of Defense, *Annual Report to Congress on the Military Power of the People's Republic of China*, May 2012, 6; Andrew J. Nathan and Andrew Scobell, *China's Search for Security*, Columbia University Press, 2012, 294; and Toshi Yoshihara and James R. Holmes, *Red Star over the Pacific: China's Rise and the Challenge to U.S. Maritime Strategy,* Naval Institute Press, 2010, 10-11, 19, 169.

[§] These events include the Taiwan Strait Crisis in 1996, the accidental U.S. bombing of the Chinese embassy in Belgrade in 1999, and the collision of a PLA fighter with a U.S. EP-3 reconnaissance aircraft in 2001. The 1991 Gulf War and 1999 NATO intervention in Serbia, while they did not involve China, also underscored the capability gaps China would face in a potential conflict and lent urgency to PLA modernization.

an "antiaccess/area denial (A2/AD)" or "counterintervention" component within PLA missions,[*] in anticipation of potential outside interference.[9]

China's decision to develop the ability to strike U.S. facilities in the Asia Pacific in particular stems from a perception that the United States' presence in the region interferes with Beijing's objectives as outlined above. The network of regional U.S. military facilities and alliances—intended to back the United States' commitment to defending key interests and upholding global norms in the Asia Pacific, such as the security of allies and partners, the peaceful resolution of disputes, and freedom of navigation[10]—complicates the CCP's freedom of action in potential contingencies.[11] Observing this, Chinese academic and military writings declare the United States to be pursuing a long-term strategy to "strategically encircle" or "contain" China. These observers point to U.S. strategies and regional activities such as the Rebalance to Asia strategy and Air-Sea Battle concept, U.S.-led efforts to establish a missile defense architecture in East Asia, growing U.S. diplomatic and military engagement with countries throughout Asia, and the increasing frequency of U.S. military exercises and deployments in the Asia Pacific as evidence of this strategy.[12]

Chinese writings on the perceived U.S. encirclement strategy further explain why specific military installations such as Guam are focal points for China's developing regional strike capabilities. These writings argue that the United States relies primarily on bases and alliances throughout the "first island chain" and "second island chain"[†] to carry out its encirclement strategy and prevent China from "settling" its objectives vis-à-vis Taiwan, the East China Sea, and the South China Sea (see map below for an illustration of the first and second island chains).[13] Chinese analysts assert that the "island chains" concept was developed and implemented by the United States after World War II in order to "surround" and "contain" the newly established People's Republic of China.[‡] [14] They frequently pinpoint the following locations as key to this strategy:

- **Taiwan** is frequently described as a "key point" in the first island chain[15] that the United States supports politically for its geostrategic value.[16] Despite the absence of a U.S. military presence on the island since 1979,[17] many PLA academic and military analysts assert that a Taiwan independent of Chinese control provides the United States with an "unsinkable aircraft carrier"[18] that could allow it to contain China militarily, isolate it politically, and blockade it economically.[19]
- **Japan** is also viewed as a close partner of the United States in implementing the island chain strategy, both in hosting several U.S. bases and in providing strategic collaboration. A 2004 article in the CCP's official newspaper referred to Japan as a potential "Asian Pentagon," for example.[20] More recently, PLA strategists and academics have asserted that Japan is "trying in vain to blockade [China] within the first island chain"[21] and that U.S. and Japanese military forces along the first island chain collaborate to monitor the PLA's naval and air forces and collect intelligence on PLA strategy and technology.[22]
- **Guam** is seen as a highly important feature in the purported U.S. containment strategy,[23] with analysts noting its strategic position[24] and its role as an "anchor" of U.S. forces in the region[25] and of the second island chain in particular.[26]

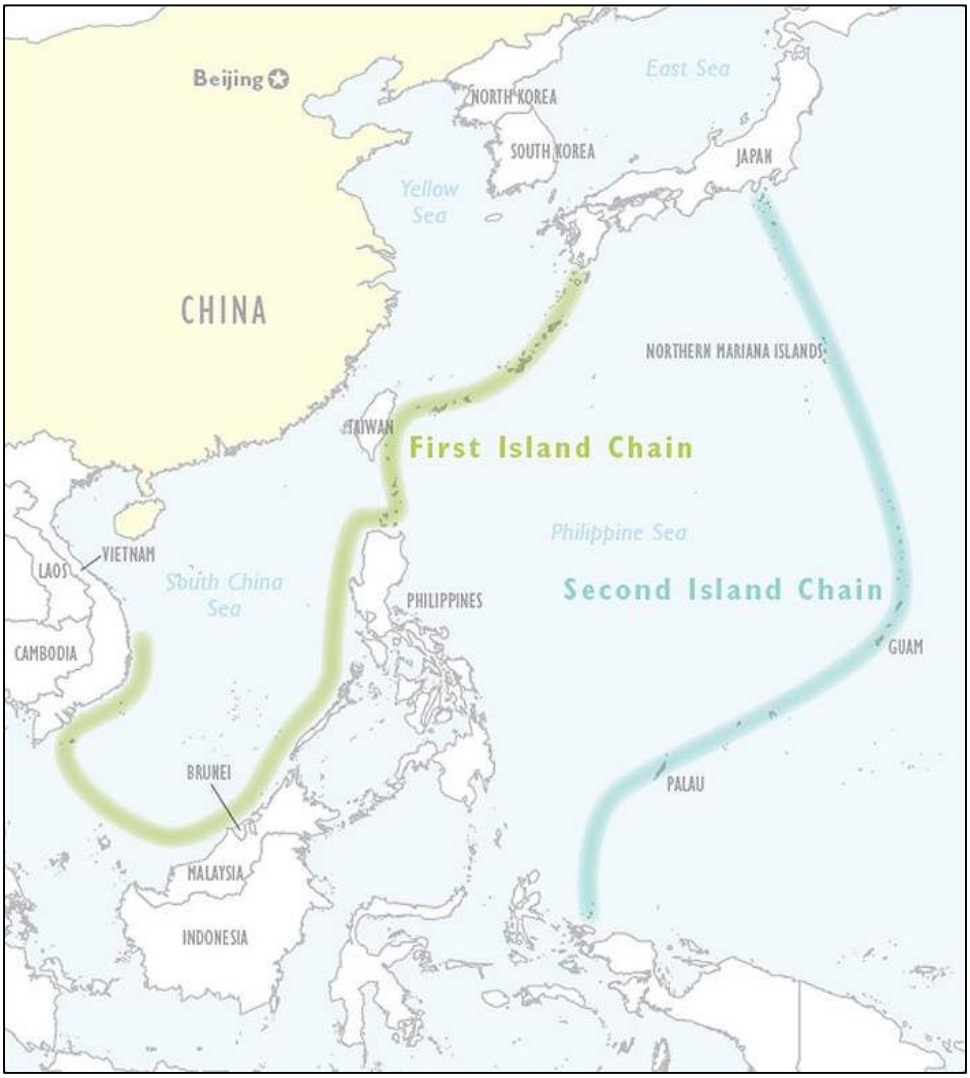
[*] According to the U.S. Department of Defense, "antiaccess" actions are intended to slow the deployment of an adversary's forces into a theater or cause them to operate at distances farther from the conflict than they would prefer. "Area denial" actions affect maneuvers within a theater, and are intended to impede an adversary's operations within areas where friendly forces cannot or will not prevent access. China, however, uses the term "counterintervention," reflecting its perception that such operations are reactive. U.S. Department of Defense, *Military and Security Developments Involving the People's Republic of China 2013,* 2013, i, 32, 33; U.S. Department of Defense, *Air-Sea Battle: Service Collaboration to Address Anti-Access & Area Denial Challenges,* May 2013, 2.

[†] The first island chain refers to a line of islands running through the Kurile Islands, Japan and the Ryukyu Islands, Taiwan, the Philippines, Borneo, and Natuna Besar. The second island chain is farther east, running through the Kurile Islands, Japan, the Bonin Islands, the Mariana Islands, and the Caroline Islands. Bernard D. Cole, *The Great Wall at Sea: China's Navy in the Twenty-First Century,* Naval Institute Press, 2010, 174-176.

[‡] In addition to this view, some Chinese military writings have also described the island chains as benchmarks for China's force projection abilities, or as a potential part of China's defensive perimeter, should it expand control over these areas. Andrew S. Erickson and Joel Wuthnow, "Barriers, Springboards and Benchmarks: China Conceptualizes the Pacific 'Island Chains,'" *China Quarterly,* January 21, 2016, 14-16. *http://journals.cambridge.org/abstract_S0305741016000011*; Zhao Lei, "Air Force Now Able to Launch Long-Range, Precision Strikes," *China Daily,* October 14, 2015. *http://usa.chinadaily.com.cn/china/2015-10/14/content_22178561.htm*; Bernard D. Cole, *The Great Wall at Sea: China's Navy in the Twenty-First Century,* Naval Institute Press, 2010, 174-176; and Toshi Yoshihara and James R. Holmes, *Red Star over the Pacific: China's Rise and the Challenge to U.S. Maritime Strategy,* Naval Institute Press, 2010, 20.

- Chinese analysts over the years have identified numerous other U.S. military facilities, potential facilities, alliances, and even relations with non-allies as supporting the U.S. strategy to encircle and contain China. In geographic terms, some implicate countries on or near the first island chain such as the Republic of Korea (ROK) and the Philippines,[27] and on or near the second, such as Australia (particularly given the new U.S. facility in Darwin) and New Zealand,[28] as participating in this strategy. Some analysts include other regional locations such as Vietnam's Cam Rahn Bay naval base (absent any U.S. presence), the U.S. base in Singapore, and Hawaii.[29] Outside the Pacific, some reference the U.S. military base on Diego Garcia in the Indian Ocean,[30] U.S. security ties with India,[31] and U.S. attempts to "permeate" Mongolia and Central Asian states with political, military, and economic engagement.[32]

First and Second Island Chains, Showing Guam*



Source: U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2012*, 2012, 40.

Several key PLA strategic and academic writings explain Beijing's perception of Guam's role in the United States' strategy more fully:

* The precise boundaries of the island chains vary among Chinese sources, and have never been officially defined by China's government. Andrew S. Erickson and Joel Wuthnow, "Barriers, Springboards and Benchmarks: China Conceptualizes the Pacific 'Island Chains,'" *China Quarterly*, January 21, 2016, 3, 7-9, 17. *http://journals.cambridge.org/abstract_S0305741016000011*.

- In 2007, an official PLA Navy periodical suggested the United States' assessment that the PLA had a "very limited" ability to strike Guam had "enhanced the role of Guam in the U.S. strategic system."[33]
- According to a 2012 article in the PLA's official newspaper, "the U.S. military is now worried that the first island chain will no longer be able to contain China, so it [has begun] to step up efforts to reinforce the second island chain. The 'second island chain' for the United States is pivoted at Guam … it is the rear backup for first-line U.S. forces in the Asia-Pacific region and such countries [as] Japan and the ROK, and also functions as important forward bases for U.S. military forces."[34]
- A 2012 article in a CCP-affiliated publication explained that Guam had become a "chess piece of the utmost importance in the U.S. control of the Asia Pacific" and that the U.S. government had "approved Guam to be the geographic center from which [it] will intervene in Asia Pacific affairs and control the Western Pacific region." It asserted that by "building Guam into a strategic center" the United States was able to "deal [in a timely manner] with military conflicts that might occur in the Taiwan Strait region, the Korean Peninsula, or the South China Sea." Further, by selecting Guam as its major military site in the Western Pacific, the United States "can ensure the U.S. military is far from the deterrence ranges of hostile nations' missiles and their sea and air forces and … ensure the long-range strike capability advantages of the U.S. military are brought into play."[35]
- Upon the announcement of the planned deployment of a fourth U.S. Navy submarine to Guam in 2014, PLA officers asserted that the move was "a concrete step in the U.S. 'return to Asia strategy'" that would "enhance the U.S. military's Air-Sea Battle capability," that the submarine "definitely posed a threat," and that such expanded deployments were intended to make Guam a forward base for containing China.[36]
- Later in 2014, a PLA expert noted the island's specific military advantages:

  > *Owing to its proximity to the Asian continent, it is very convenient for aircraft of the U.S. Air Force and warships of the U.S. Navy to launch from [Guam]. For instance, B-52 bombers can fly directly to the Asian continent to execute missions without aerial refueling if they take off from here; F-35 and F-22 fighters can also reach the Asian continent with aerial refueling; aircraft carriers and nuclear-powered submarines can get replenishment and maintenance here.*[37]

  He concluded that "to achieve a strategic balance between the two sides, China needs to have an attack means able to reach Guam."[38]

Multiplying Forces Capable of Striking Guam

Since the mid-1990s, PLA modernization has focused on the development of a widening range of conventional regional strike capabilities designed to provide the ability to counter key aspects of U.S. military power in the region and to overwhelm U.S. forces as they approach China,[39] thereby deterring or denying U.S. intervention in a conflict. As these capabilities have advanced, and as Beijing's assessment of Guam's role has made it a focal point of these developments, several new weapons systems have emerged that would place U.S. forces on Guam at substantially greater risk if a conflict were to occur.

Intermediate-Range Ballistic Missiles (IRBMs): Foremost among China's military assets capable of reaching Guam, the DF-26 IRBM represents the culmination of decades of advancements to China's conventional ballistic missile forces. China began its deployment of conventionally-armed short-range ballistic missiles (SRBMs) along the Taiwan Strait in the late 1980s, and has since worked to expand their ranges and bring their number to at least 1,200 fielded today (for a classification of ballistic missile types by range, see table below).[40] By 2008 the PLA had deployed the DF-21C medium-range ballistic missile (MRBM) and CJ-10 ground-launched cruise missile, extending its ground-launched conventional missile range to between the first and second island chains for the first time (the figure on page 11 below displays how these ranges have extended outwards over time).[41]

Ballistic Missile Ranges Defined by U.S. Department of Defense

Ballistic Missile Type	Missile Range
Short-Range Ballistic Missile (SRBM)	<1,000 km (621 mi)
Medium-Range Ballistic Missile (MRBM)	1,000–3,000 km (621–1,864 mi)
Intermediate-Range Ballistic Missile (IRBM)	3,000–5,500 km (1,864–3,418 mi)
Intercontinental Ballistic Missile (ICBM)	>5,500 km (3,418 mi)

Source: U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2015*, May 2015, 46; U.S. National Air and Missile Intelligence Center, *Ballistic and Cruise Missile Threat*, 2013, 9.

The DF-26 is China's first conventionally-armed IRBM and first conventionally-armed ballistic missile capable of reaching Guam. Its inclusion in the September 2015 parade indicates it has likely been deployed as an operational weapon.[42] According to a November 2015 article by two experts at China's Academy of Military Sciences, the missile features a new "modular design" that allows for interchangeability: the launch vehicle can be fitted with "two types of nuclear warhead and several types of conventional warhead which use different destructive mechanisms to attack specific targets."[43] The authors assert that this "fast feature" gives the DF-26 greater "deterrence and real-war power."[44] As China's launch brigades have in the past been dedicated to either nuclear or conventional missions, but not both,[45] the "modularity" of the design likely means these launch vehicles can be assigned to either nuclear or conventional brigades, rather than that an individual brigade could quickly switch between warhead types.

Several recent Chinese military, academic, and media articles outline the DF-26's role within the A2/AD framework,[46] describing it as a "defensive weapon"[47] for use against an "invading" or "encroaching enemy,"[48] and the ability to "neutralize" Guam as important to countering the U.S. Air-Sea Battle strategy.[49] The Academy of Military Sciences article in particular provides sobering detail regarding how the missile's interchangeable conventional warheads could be employed against a target such as Guam:

> *Penetration warheads would be used to damage area type targets such as airfields and ports, piercing and exploding warheads would be used to destroy hardened targets such as bunkers and cave depots, and fuel-air explosive warheads would be used against electromagnetic targets such as command organizations and computer centers.*[50]

Importantly, only a few DF-26 missiles have likely been deployed thus far (16 launchers were seen in the parade, and the type of brigade to which they are assigned is unclear), and the missile likely has serious accuracy limitations. While exact measurements are not publicly available, a 2015 report by IHS Jane's assesses its current circular error probable (CEP)[*] at intermediate range to be 150–450 meters,[51] while China's DF-15B SRBM, for example, reportedly has a CEP of 5–10 meters as a precision guided weapon.[52] Many more launches would thus be required to achieve the same degree of confidence in inflicting damage as that provided by precision strike.

Antiship Ballistic Missiles (ASBMs): Official commentary at China's September 2015 military parade stated that the DF-26 also has an antiship variant, indicating it has joined the DF-21D as an ASBM.[†] [53] If true, this variant likely would enable the PLA to target U.S. aircraft carriers and other vessels as far as Guam (its precise range has not been confirmed). However, as stated by Andrew Erickson, associate professor at the U.S. Naval War College, the reconnaissance strike complex that supports China's ASBMs remains a work in progress.[54] The PLA has not conducted a successful publicly-reported test of either missile against a moving target at sea,[55] and the additional range of the DF-26 likely complicates the targeting challenge China already faces with the DF-21D. China's ability to employ DF-26 ASBMs in precision strikes against U.S. carriers near Guam will thus remain uncertain until the

[*] CEP is defined as the radius of a circle, centered about the intended point of impact, whose boundary is expected to include the landing points of 50 percent of the rounds. Oleg Yakimenko, "Statistical Analysis of Touchdown Error for Self-Guided Aerial Payload Delivery Systems," (American Institute of Aeronautics and Astronautics Aerodynamic Decelerator Systems Conference, Daytona Beach, FL, March 26, 2013), 1.

[†] In 2010 China deployed the world's first ASBM, the DF-21D, a variant of the DF-21C MRBM mentioned above (the DF-21 and DF-21A were nuclear-armed versions). The DF-21D has a maximum range of more than 1,500 km (932 mi) and is armed with a maneuverable warhead, providing China with the ability to hold at risk U.S. Navy aircraft carriers operating east of Taiwan from sites on the Chinese mainland. It cannot, however, reach ships operating near the second island chain. U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "China's Offensive Missile Forces," in *2015 Annual Report to Congress*, November 2015, 352-353, 372-373.

PLA demonstrates this capability, but the possibility that a large quantity of these missiles could be fired, and the fact that the PLA has apparently deployed them as operational weapons,[56] indicates they could still be relevant in a conflict.

Air-Launched Land Attack Cruise Missiles (LACMs): China's newest and most capable bomber, the H-6K, when equipped with up to six recently-developed air-launched CJ-20 LACMs, gives China the ability to conduct precision airstrikes and potentially reach Guam with air-launched weapons for the first time.[57] The CJ-20 has an assessed range of 1,500 km (932 mi),[58] while open source reports have indicated the H-6K's combat radius to be 3,500 km (2,175 mi).[59] China had deployed 36 H-6K bombers as of 2015.[60] There are caveats to their potential effectiveness in a mission against Guam, however, as Ian Easton, research fellow at the Project 2049 Institute, has noted:

> *Due to range (fuel) limitations these bombers would not be able to fly low radar-evading flight paths on their way out past the first island chain. Only by flying high in less dense air could they hope to get close enough to launch their LACMs on Guam. Given their large radar cross-sections, these antiquated PLA bombers[*] would be easy targets for American, Japanese, and Taiwanese air defenders long before they could get within range of Guam."*[61]

Such an attack would also outdistance the range of any Chinese escort fighters, according to a 2015 RAND Corporation study,[62] and China's air refueling fleet is still too small to support large-scale, long-distance air combat.[63] One of China's most authoritative resources on military strategy, the 2013 *Science of Military Strategy*, calls for the PLA Air Force to have an "effective combat radius" (platform plus missile range) of 3,000 km [1,800 mi] from China's borders that specifically reaches the second island chain,[64] indicating these gaps will likely continue to be a focus of modernization going forward.

The PLA Air Force did conduct an exercise in November 2015 in which four H-6K bombers broke off from four others "west of Okinawa" and flew 1,000 km (621 mi) past the first island chain, according to a PLA Air Force spokesperson;[65] a senior Japanese military official told the Commission this was likely a simulated attack on Guam.[66] Whether this exercise was intended to prepare for an actual military scenario or was merely an effort to signal resolve, these bombers must be considered to be among the forces China could bring to bear upon Guam in a contingency.

Air-Launched Antiship Cruise Missiles (ASCMs): The PLA Navy's H-6 bombers, including its H-6Ks, can also carry up to four of China's new long-range, supersonic YJ-12 ASCMs, which have an unofficially-reported range of 215 nautical miles (nm) (248 mi)—more than double that of China's previous air-launched ASCMs.[† 67] The YJ-12's ability to conduct evasive maneuvers as it approaches its target poses immense challenges for shipboard defenses.[68] Robert Haddick, an independent contractor at U.S. Special Operations Command and an expert on Asia Pacific security, described the missile in 2014 as "the most dangerous antiship missile China has produced thus far, posing an even greater risk to the U.S. Navy's surface forces in the Western Pacific than the much-discussed DF-21D antiship ballistic missile."[69] H-6K bombers equipped with the YJ-12 could reach ships operating in waters around Guam. The limiting factors to a successful airstrike mentioned above would be exacerbated, however, by the need to launch these missiles from a closer distance.

Sea-Launched Land Attack Cruise Missiles: Although the PLA Navy currently does not have the ability to strike land targets, China likely has begun to develop a sea-based LACM capability over the last few years.[70] The U.S. Department of Defense (DOD) has stated that this capability may involve the forthcoming Type 095 nuclear-powered attack submarine (SSN) or new LUYANG-III guided missile destroyer (DDG).[71] Depending on their position, surface ships and submarines equipped with LACMs would be able to provide additional strike options against facilities on Guam.

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[*] The H-6 design, on which future versions have been based, is a licensed copy of the ex-Soviet Tu-16 "Badger" medium jet bomber, first flown in 1952. U.S. Office of Naval Intelligence, *The PLA Navy: New Capabilities and Missions for the 21st Century*, April 2015, 18; Encyclopedia Britannica, "Tu-16." *http://www.britannica.com/technology/Tu-16*.

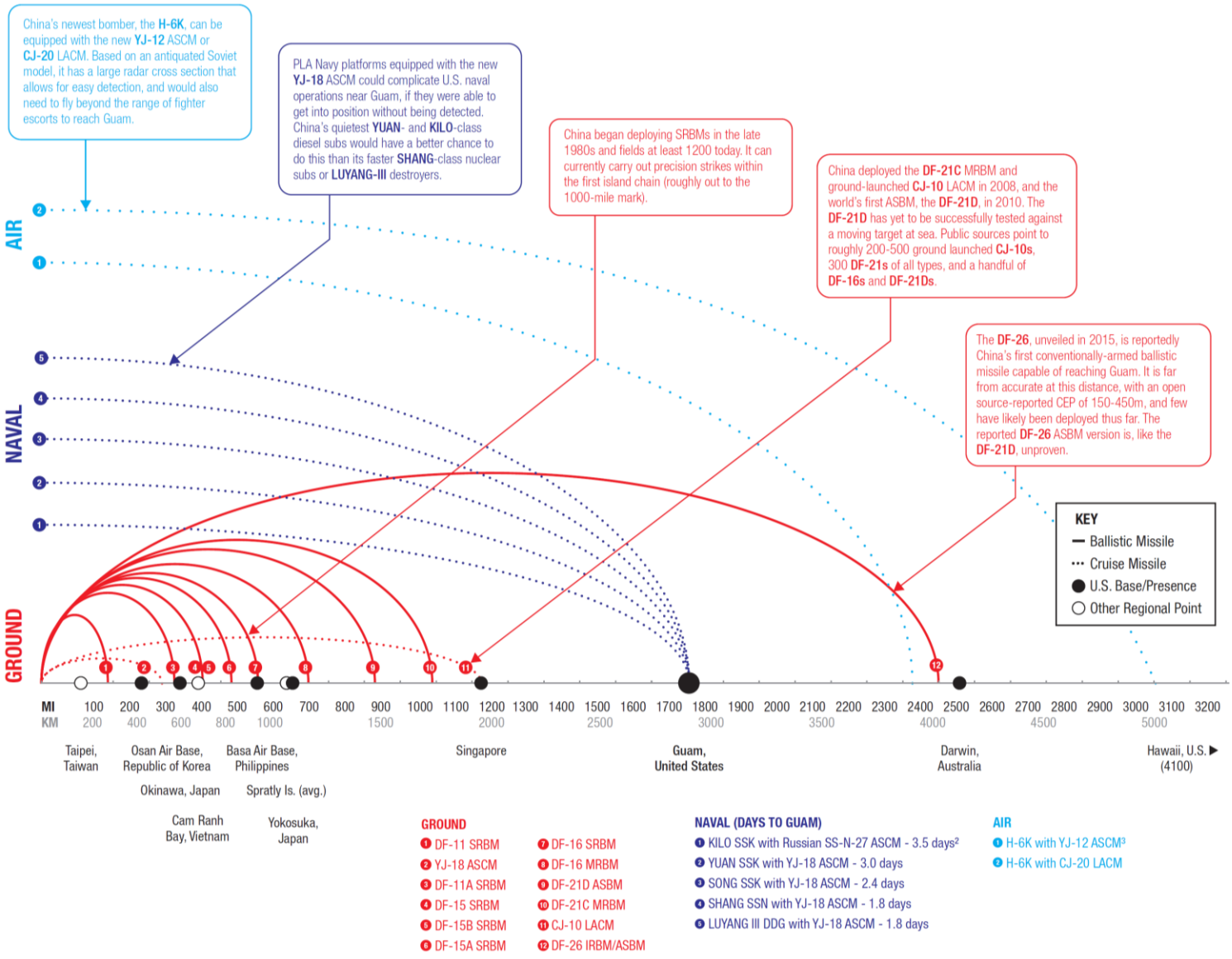
[†] PLA Navy Aviation fighter-bombers and bombers have carried a 107 nm (124 mi) range version of the YJ-83 family ASCM. U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "China's Offensive Missile Forces," in *2015 Annual Report to Congress*, November 2015, 356-357.

Sea-Launched Antiship Cruise Missiles: China has deployed its new YJ-18 ASCM on its LUYANG III DDGs, and likely will deploy the missile on its SONG-, YUAN-, and SHANG-class submarines as well as its Type 095 SSN and Type 055 DDG, which are still under development.[72] According to DOD, the YJ-18 would extend the ASCM range of China's current submarines to a maximum of 290 nm (334 mi)[73]—about 14 times greater than that of the ASCM previously carried by these classes[74]—and will likely provide a similar range on other platforms.[75] It also more than doubles the 120 nm (138 mi) range of the Russian SS-N-27 ASCM carried by eight of China's 12 Russian-made KILO-class submarines.[76] Further, the YJ-18 is almost certainly capable of supersonic speeds during the final phase of its flight, which would reduce the time shipborne defenses have to react to an incoming threat and increase the difficulty of shooting it down, relative to subsonic missile attacks.[77]

PLA Navy platforms equipped with ASCMs, particularly the YJ-18, could complicate U.S. naval operations near its Guam facilities provided the PLA Navy vessels were able to get into position without being detected. China's submarines, specifically its quietest—those of the YUAN and KILO classes[78]—would have a better opportunity to do this than its surface ships. These classes are also diesel-electric and relatively slow in comparison to other types, however (see comparison in figure below).

The Expanding Range of China's Conventional Missiles

Credited maximum range based on open source reporting, in miles and kilometers, shown in relation to Guam and other key regional points[1]



[1] Distances to key regional points measured from nearest point on China's mainland (including Hainan), estimated using open source mapping software.

[2] Naval data measured in days under way required to move into missile range from nearest point on China's mainland (including Hainan), based on top speed and calculated in nautical miles.

[3] Air data measured in distance from nearest point on China's mainland (including Hainan), based on bomber's maximum reported combat radius plus maximum missile range.

Source: U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "China's Offensive Missile Forces," in *2015 Annual Report to Congress*, November 2015, 338, 340, 347, 351-357, 362, 372-373; National Institute for Defense Studies (Japan), *NIDS China Security Report 2016*, 2016, 48; IHS Jane's, *Jane's Fighting Ships: Luyang III (Type 052D) Class,* December 29, 2015, 2; IHS Jane's, *Jane's Fighting Ships: Shang Class (Type 093/093A),* December 24, 2015, 1; IHS Jane's, *Jane's Fighting Ships: Song Class (Type 039/039G),* December 24, 2015, 2; Ronald O'Rourke, "China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress," *Congressional Research Service,* December 21, 2015, 11; IHS Jane's, *Sentinel Security Assessment: China and Northeast Asia, Procurement,* December 16, 2015, 25; IHS Jane's, *Jane's Fighting Ships: Kilo Class (Project 877EKM/636),* December 14, 2015, 2; IHS Jane's, *Jane's Air-Launched Weapons: CJ-10 (DF-10/KD-20),* September 30, 2015, 2; Benjamin David Baker, "Revealed: Why China Is Selling Submarines to Pakistan," *Diplomat,* September 28, 2015; Andrew S. Erickson, "Showtime: China Reveals Two 'Carrier-Killer' Missiles," *National Interest,* September 3, 2015; U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2015*, April 2015, 87; U.S. Office of Naval Intelligence, *The PLA Navy: New Capabilities and Missions for the 21st Century*, April 2015, 18; Eric Heginbotham et al., "The U.S.-China Military Scorecard: Forces, Geography, and the Evolving Balance of Power 1996-2017," *RAND Corporation,* 2015, 29, 63; Ron Christman, "China's Second Artillery Force: Capabilities and Missions for the Near Seas," in Peter Dutton, Andrew Erickson, and Ryan Martinson, eds., *China's Near Seas Combat Capabilities*, Naval War College, 2014, 38; U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2013,* May 2013, 42, 81; Economist, *China's Missiles: An Interactive Graphic Showing the Range of a Selection of China's Missiles*, December 6, 2010; Ian Easton, "The Assassin Under the Radar: China's DH-10 Cruise Missile Program," *Project 2049 Institute*, October 2009, 3.

Naval Operations: Beyond hardware, China's efforts to qualitatively improve its naval forces through training and exercises are also relevant to its increasing ability to target Guam. The number of what official Chinese sources refer to as PLA Navy "combat readiness patrols," or "blue-water training" deployments, increased from six in 2007 to 28 in 2013 (the last year assessed),[79] and the PLA Navy now maintains a near-constant presence throughout the first and second island chains. This activity appears to be concentrated in the Philippine Sea, an area Beijing judges would be crucial to interdicting U.S. forces coming from Guam and Hawaii in a conflict.[80] According to a senior U.S. Navy official, "the amount of time [PLA Navy surface action groups] train in the Philippine seas now rivals that of the United States."[81]

Additionally, the PLA Navy has been deploying maritime collection ships near Guam.[82] These ships likely have equipment enabling them to collect signals intelligence and map the ocean floor,[83] suggesting the PLA Navy may be preparing for more routine naval operations in the vicinity of Guam in the near future.

C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance) Modernization: Of importance to the performance of its Guam-ranging weapons, China is in the midst of an extensive C4ISR modernization program designed to improve the PLA's ability to coordinate operations within and among its ground, air, naval, and missile forces; detect and track foreign military activities throughout the Asia Pacific; and enable time-sensitive, long-range strikes with its ballistic and cruise missiles.

China's ISR satellite coverage is concentrated on the first island chain to support PLA operations in potential conflicts there, but is expanding to the second island chain and beyond as China fields additional ISR and data relay satellites.[84] China currently has more than 177 operational satellites in orbit, 140 of which have been launched since 2009 and 112 of which are reportedly operated by the military or defense industry, serving functions such as ISR.[85] The PLA can currently detect and monitor U.S. air and naval activity out to the second island chain with sufficient accuracy and timeliness to 1) assess U.S. military force posture and 2) cue land-, maritime-, and air-based collection assets for higher-fidelity and more time-sensitive tracking and targeting. Beijing will thus almost certainly invest in improving this level of coverage and in expanding it to areas immediately around and beyond Guam in the future, although building a complete picture of such a large area and coordinating these complex systems will present a formidable challenge.[86]

The PLA currently can only carry out precision strikes within the first island chain,[87] although it certainly will be working to expand this range in the future.[88] Practically, this limitation means a lower level of confidence in the accuracy of a DF-26 strike on Guam, as discussed above, pending the improvement of the sensor systems on the missile and the space-based systems providing pre- and post-strike ISR and position, navigation, and timing data.

Summary: China's new conventional regional strike weapons, as well as qualitative improvements to its naval operations and C4ISR systems, provide Beijing with the ability to hold U.S. forces and installations on Guam at greater risk than in the past, despite remaining challenges and gaps that indicate the level of risk is still low. At present, the DF-26 IRBM headlines this ability, although it likely will remain extremely inaccurate until China

extends its precision strike capabilities. China could employ surface- and submarine-launched ASCM attacks, should the platforms be able to move into range undetected; while air-launched ASCM and LACM attacks could reach Guam more quickly, but with a high risk of the bombers being detected and intercepted by U.S. aircraft and anti-aircraft systems. The DF-26 ASBM is still unproven, and China has yet to develop a sea-launched LACM capability. Overall, the efficiency/vulnerability tradeoff between China's air and naval forces probably factors into why China pursued a third option by developing DF-26 ballistic missiles. Beijing is working to advance its regional strike capabilities across the board, however, indicating concerns will be posed by ground-, air-, and sea-launched types going forward.

Implications for the United States

Guam's position within the expanding range of China's regional strike forces presents several implications for U.S. interests.

Direct Military Implications

Guam is of vital importance to the U.S. force posture in the Asia Pacific. The island is home to two U.S. military facilities, Apra Naval Base and Andersen Air Force Base, and hosts a total of about 6,000 military personnel.[89] Four SSNs and one of the United States' few submarine support ships (with a second to be added) are homeported at Apra Naval Base.[90] Three Global Hawk unmanned aerial vehicles are stationed at Andersen,[91] while rotations of B1, B-2, and B-52 bombers provide a continuous bomber presence[92] and a new rotation of 12 F-16 fighters is planned for early 2016 (other temporary deployments of F-15, F-16, and F-22 fighters have occurred in the past).[93] Further, as Andrew Erickson and Justin D. Mikolay, former speechwriter to the U.S. Secretary of Defense, noted in 2014, "[Guam] offers … ample facilities for the U.S. Air Force, including its largest aviation fuel storage depots (66 million gallons) and its largest Pacific weaponry storage (100,000 bombs), and a naval magazine capable of holding considerable amounts of conventional and nuclear munitions."[94] Finally, a Terminal High Altitude Area Defense (THAAD) missile battery has been deployed to Guam since April 2013, with the purpose of intercepting ballistic missile launches from North Korea as well as other missile threats to the island.[95]

Guam is also crucial to U.S. preparations for responding to crises, as well as to its larger Asia Pacific strategy. "The United States needs a secure airfield to which it cannot be denied access" for missions requiring rapid response to regional contingencies, according to Dr. Erickson and Mr. Mikolay.[96] Andersen can hold more aircraft than Kadena Air Base or Misawa Air Base in Japan, and would contribute vitally to overall U.S. regional basing capacity in a contingency, according to RAND[97]—particularly important if the U.S. needed to pull back valuable assets from within China's precision strike A2/AD range. The United States additionally plans to enhance its military presence on Guam in the future as an important component of the Rebalance strategy, as well as the endeavor to anchor the U.S. regional force posture on sovereign territory to reduce long-term dependence on foreign bases.[98] The redeployment of 5,000 U.S. Marines to Guam to reduce the U.S. presence on Okinawa, long delayed, is now projected to begin in 2020.[99] The importance of Guam to U.S. strategic interests and any potential warfighting operations in the Asia Pacific is thus growing, even as China's ability to strike the island is increasing.

Given the island's importance, the direct military implications of China's growing ability to strike Guam are clear: in a contingency in which Beijing sought to deny or slow a U.S. intervention and was able to fire sufficient numbers of IRBMs and LACMs (as well as ASBMs and ASCMs against ships operating nearby), the bases and assets located on Guam would be held at risk. Besides potentially depriving the United States of specific strike assets, such attacks could disrupt its region-wide response effort—closing runways, reducing aerial and naval basing capacity,[*] complicating the operating environment for U.S. ships, and shutting down key logistics and repair infrastructure.

[*] For example, an open source assessment by the RAND Corporation (based on a hypothetically more accurate IRBM) estimates that "with an inventory of just 50 IRBMs, China could keep Andersen AFB closed to large aircraft for more than eight days (assuming missile reliability of 75 percent and eight-hour repair times), even if the PLA is denied battle damage assessment … With 100 IRBMs, the PLA could make a full sweep of all unsheltered aircraft parking areas and then use the rest of its inventory to keep Andersen shut to large aircraft for 11 days." Eric Heginbotham et al., "The U.S.-China Military Scorecard: Forces, Geography, and the Evolving Balance of Power 1996-2017," *RAND Corporation*, 2015, 64-65.
http://www.rand.org/content/dam/rand/pubs/research_reports/RR300/RR392/RAND_RR392.pdf.

Importantly, even if few actual losses were inflicted on U.S. forces transiting into the theater, they could be forced to expend time and munitions in accounting for and defending against these threats, ultimately slowing deployment timetables and reducing their effectiveness upon arrival.[100]

The inaccuracy of China's IRBMs and vulnerability of its platforms that would be transiting to Guam indicate that the risk currently posed by China's conventional regional strike capabilities to U.S. forces on Guam in a conflict would be low. The primary concern would be the potential for China to fire massive numbers of DF-26 missiles (to compensate for their inaccuracy) or move its submarines into range in hopes that some would escape detection. U.S. policymakers and warfighters should thus observe the number of DF-26 missiles China deploys as well as qualitative improvements to China's precision strike capabilities, bomber fleet, in-air refueling capability, and submarine quieting technology, to monitor this risk going forward.

Implications for Stability

Beyond the military challenges presented by the employment of China's growing regional strike capabilities in a potential conflict, it can be argued the very existence of these capabilities increases the likelihood of such a conflict. Some scholars and experts have noted that deterrence is more likely to fail in a crisis if a potential attacker thinks it is possible to win a quick and decisive victory.[101] The ability of the U.S. regional force posture to deter actors from escalating a crisis involving a regional flashpoint (i.e. Taiwan, a South China Sea land feature, or a Senkaku island) into a full-blown military conflict may be affected by Beijing's growing ability to hold key bases at risk. In other words, China's leaders could be more willing to resort to military force in such a crisis if they believed they could successfully neutralize Guam—the perceived linchpin of the regional U.S. force structure—for enough time to inhibit a timely U.S. intervention; or that the mere threat of such attacks and a prolonged struggle could keep the United States from intervening at all.

The clear A2/AD component within PLA missions, identification of locations such as Guam as focal points, and stated role for platforms such as the DF-26 indicate that deterring or denying U.S. forces has of course been contemplated in Beijing. However, it is difficult to determine the degree to which the promise of greater operational effectiveness would affect the willingness of China's leaders to seriously consider threatening or authorizing strikes on Guam. Regardless, clear statements by the United States that an attack on a regional U.S. base, particularly one located on U.S. territory inhabited by U.S. citizens, would be viewed as an attack on the United States itself and have broader strategic and political implications could help prevent Beijing's capabilities from altering its risk calculations in such a dispute.

U.S. Responses

Several options proposed by U.S. experts and analysts could help mitigate these military and stability concerns:

Hardening Facilities on Guam: Investing in improved protection for U.S. assets on Guam could increase the costliness and uncertainty of conventional ballistic and cruise missile strikes against these facilities, and thereby work to disincentivize a first strike and increase regional stability, as noted by the Commission in its 2015 Report to Congress.[102] However, this approach is complicated by the likely high costs of such investments,[103] and the potential for China to counter them with an even further buildup of its missile arsenal.

Dispersing U.S. Regional Military Facilities: A greater dispersion of U.S. military facilities throughout the Asia Pacific, or access to an increased number of alternate regional ports and airfields, would multiply the number of targets against which China might employ missile strikes and complicate its ability to disrupt U.S. operations in a contingency, particularly through a first strike.[104] This approach does face high financial costs, the possibility that China might respond with further missile deployments, and potential difficulties in obtaining approval and financial support from host countries.[105] It also runs counter to efforts to reduce long-term dependence on foreign bases. The United States has nonetheless been able to take steps towards this objective, recently securing access to facilities in the Philippines and entering discussions regarding access to airfields in Australia.[106]

Investments in New Missile Defense Capabilities: Continued U.S. investments in "next-generation" missile defense initiatives such as directed energy and rail gun technologies, as recommended in the Commission's 2015 Report to Congress,[107] could yield better options for defending U.S. bases and platforms from China's conventional

ballistic and cruise missiles. While current missile defense systems such as THAAD—already stationed on Guam—and PAC-3 (the upgraded Patriot missile system) may help to an extent, they are intended to stop North Korean missiles and, according to Dr. Erickson and Mr. Mikolay, "would likely not provide complete protection against a Chinese attack."[108]

Revisiting the Intermediate-Range Nuclear Forces (INF) Treaty: China's missile force modernization has contributed to a U.S. policy debate regarding the United States' participation in the INF Treaty,[*] particularly given Russia's recent violations of its Treaty obligations.[109] As China has engaged in a relatively low-cost buildup of land-based theater-range conventional missiles, including the DF-26, the United States has been prevented under the Treaty from doing so. Some analysts have thus argued for exploring modifications to the Treaty, such as altering it to allow ground-based theater-range missile deployments only in Asia; this proposed revision theoretically would allow the United States to deploy its own inexpensive ground-based conventional missiles, or could instead incentivize China to join a wider INF Treaty and reduce its missile deployments. Other analysts, skeptical that the United States would benefit from the opportunity to re-introduce ground-based theater-range missiles and noting the continued benefits of the Treaty,[†] advocate for the maintenance of the status quo.[110]

As policymakers weigh the costs and benefits of continued U.S. participation in the INF Treaty, three potential U.S. government actions would allow the United States to carefully explore these questions while remaining in full compliance with the Treaty. First, as proposed in the Commission's 2015 Report to Congress, the U.S. Department of Defense could prepare a report examining the potential benefits and costs of incorporating ground-launched short-, medium-, and intermediate-range conventional cruise and ballistic missile systems into the United States' defensive force structure in the Asia Pacific, in particular assessing whether such systems might allow for a more cost-effective deterrence posture.[111] Second, the United States could undertake research and development activities for conventional INF-accountable cruise and ballistic missiles in preparation for possible changes to the Treaty.[112] Third, the United States could broach important questions with its regional allies: whether they would be open to hosting such systems,[113] whether they would consider building conventional INF-accountable missiles themselves should the security situation in the Asia Pacific continue to worsen,[114] and whether they would be willing to participate in advocating for a broadened treaty at the multilateral or even global level.[115]

Maintaining Superiority in Regional Strike Capabilities: The United States could invest in maintaining its ability to strike an adversary's launchers and support networks as part of its deterrence posture in the Asia Pacific, aiming to prevent conflicts from beginning and to protect U.S. regional assets should one begin.[116] Some experts have specifically noted the high number of LACMs carried by some U.S. attack submarines[117] and the potential for U.S. procurement programs such as the Long Range Strike Bomber and Virginia payload module (which increases the missile capacity of the Virginia-class SSN) to provide a higher volume of firepower at a more affordable rate than ground-launched missile forces.[118] Policymakers could continuously monitor the performance and sustainability of these and other aspects of the U.S. regional force posture to ensure the United States maintains its military edge.

[*] Signed by the United States and Soviet Union in 1987, the INF Treaty required "destruction of both parties' ground-launched ballistic and cruise missiles with ranges between 500 and 5,500 kilometers (310 and 3,418 miles), along with their launchers and associated support structures and support equipment," altogether eliminating 846 U.S. and 1,846 Soviet missiles. Although titled a "Nuclear Forces" treaty, INF's prohibition of conventional systems is the substance of the current debate, as China's buildup of conventional intermediate-range ballistic and cruise missiles has been a driving force behind concerns regarding the Treaty in recent years. U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "China's Offensive Missile Forces," in *2015 Annual Report to Congress*, November 2015, 370.

[†] The treaty is regarded by many as both a keystone of U.S.-Russia security relations and an arms control success. It eliminated an entire class of weapons between the United States and Russia, limiting each nation's nuclear missile arsenal to its strategic deterrent of ICBMs and removing the need to compete in deploying INF-accountable systems. Moreover, the treaty is essential to NATO's deterrence posture, preventing Russia, at least in legal terms, from deploying inexpensive short- and medium-range ballistic and cruise missiles on its European border for purposes of political coercion, as China has done on the Taiwan Strait. U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "China's Offensive Missile Forces," in *2015 Annual Report to Congress*, November 2015, 370.

Endnotes

[1] U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "China's Offensive Missile Forces," in *2015 Annual Report to Congress,* November 2015, 372; Andrew S. Erickson, "Showtime: China Reveals Two 'Carrier-Killer' Missiles," *National Interest,* September 3, 2015; and Richard D. Fisher, Jr., "DF–26 IRBM May Have ASM Variant, China Reveals at Military Parade," *Jane's Defence Weekly*, September 2, 2015.

[2] Open Source Enterprise, "PRC Military Sciences Academy Explains Need for Developing the DF-26 Anti-Ship Missile," November 30, 2015. ID: CHL2015113079474896; Andrew S. Erickson, "Showtime: China Reveals Two 'Carrier-Killer' Missiles," *National Interest,* September 3, 2015. *http://nationalinterest.org/feature/showtime-china-reveals-two-carrier-killer-missiles-13769*; Wendell Minnick, "China's Parade Puts U.S. Navy on Notice," *Defense News,* September 3, 2015. *http://www.defensenews.com/story/defense/naval/2015/09/03/chinas-parade-puts-us-navy-notice/71632918/*; Charles Clover, "China Unveils 'Guam Express' Advanced Anti-Ship Missile," *Financial Times,* September 5, 2015. *http://www.ft.com/intl/cms/s/0/8847ddd0-5225-11e5-8642-453585f2cfcd.html#axzz3uKTMR2rn;* and Franz-Stefan Gady, "Revealed: China for the First Time Publicly Displays 'Guam Killer' Missile," *National Interest,* August 31, 2015. *http://thediplomat.com/2015/08/revealed-china-for-the-first-time-publicly-displays-guam-killer-missile/*.

[3] Robert Lawrence Kuhn, "Xi Jinping's Chinese Dream," *New York Times,* June 4, 2013. *http://www.nytimes.com/2013/06/05/opinion/global/xi-jinpings-chinese-dream.html?_r=0*.

[4] Alastair Iain Johnston, "The Evolution of Interstate Security Crisis Management Theory and Practice in China," *Naval War College Review* 69:1 (2016), 40; Edward Wong, "Security Law Suggests a Broadening of China's 'Core Interests,'" *New York Times,* July 2, 2015. *http://www.nytimes.com/2015/07/03/world/asia/security-law-suggests-a-broadening-of-chinas-core-interests.html*; Open Source Enterprise, "MOD: 'Defense Ministry's Regular Press Conference on Nov 26,'" November 26, 2015. ID: CHL2015112714373063; and Caitlin Campbell et al., "China's 'Core Interests' and the East China Sea," *U.S.-China Economic and Security Review Commission,* May 10, 2013, 1-5. *http://www.uscc.gov/sites/default/files/Research/China's%20Core%20Interests%20and%20the%20East%20China%20Sea.pdf*.

[5] U.S. Department of Defense, *Annual Report to Congress on the Military Power of the People's Republic of China*, May 2012, 6; U.S.-China Economic and Security Review Commission, *Hearing on The Implications of China's Naval Modernization for the United States*, written testimony of Cortez A. Cooper, June 11, 2009. *http://www.rand.org/content/dam/rand/pubs/testimonies/2009/RAND_CT332.pdf*; U.S.-China Economic and Security Review Commission, *Hearing on China's Military and Security Activities Abroad*, written testimony of Daniel M. Hartnett, March 4, 2009. *http://www.uscc.gov/sites/default/files/3.4.09Hartnett.pdf*; and Bernard D. Cole, *The Great Wall at Sea: China's Navy in the Twenty-First Century,* Naval Institute Press, 2010, 179-180.

[6] China's State Council Information Office, *China's Military Strategy,* May 2015. *http://eng.mod.gov.cn/Database/WhitePapers/2014.htm*.

[7] U.S.-China Economic and Security Review Commission, *Hearing on the Implications of China's Naval Modernization for the United States,* written testimony of Cortez A. Cooper, June 11, 2009. *http://www.rand.org/content/dam/rand/pubs/testimonies/2009/RAND_CT332.pdf*.

[8] Andrew S. Erickson, "Showtime: China Reveals Two 'Carrier-Killer' Missiles," *National Interest,* September 3, 2015. *http://nationalinterest.org/feature/showtime-china-reveals-two-carrier-killer-missiles-13769*; David Lai and Marc Miller, "Introduction," in Roy Kamphausen, David Lai, and Andrew Scobell, eds., *Beyond the Strait: PLA Missions Other than Taiwan,* Strategic Studies Institute, 2009, 9-10; David Shambaugh, *Modernizing China's Military: Progress, Problems, and Prospects,* University of California Press, 2002, 4-5; and Harry J. Kazianis, America's Air-Sea Battle Concept: An Attempt to Weaken China's A2/AD Strategy," *China Policy Institute*, 2014, 2. *http://www.nottingham.ac.uk/cpi/documents/policy-papers/cpi-policy-paper-2014-no-4-kazianis.pdf*.

[9] Tai Ming Cheung et al., "Chinese State Programs for Civilian and Defense Science, Technology, Energy, and Industrial Development and the Implications for the United States," (Prepared for the U.S.-China Economic and Security Review Commission by the University of California Institute on Global Conflict and Cooperation, forthcoming), 22; Harry J. Kazianis, America's Air-Sea Battle Concept: An Attempt to Weaken China's A2/AD Strategy," *China Policy Institute*, 2014, 2. *http://www.nottingham.ac.uk/cpi/documents/policy-papers/cpi-policy-paper-2014-no-4-kazianis.pdf;* U.S.-China Economic and Security Review Commission, *Hearing on the Implications of China's Naval Modernization for the United States*, written testimony of Cortez A. Cooper, June 11, 2009. *http://www.rand.org/content/dam/rand/pubs/testimonies/2009/RAND_CT332.pdf;* and Toshi Yoshihara and James R. Holmes, *Red Star over the Pacific: China's Rise and the Challenge to U.S. Maritime Strategy,* Naval Institute Press, 2010, 11.

[10] White House Office of the Press Secretary, *Fact Sheet: Advancing the Rebalance to Asia and the Pacific*, November 15, 2015. *https://www.whitehouse.gov/the-press-office/2015/11/16/fact-sheet-advancing-rebalance-asia-and-pacific*; Andrew S. Erickson and Justin D. Mikolay, "Guam and American Security in the Pacific," in Andrew S. Erickson and Carnes Lord, eds., *Rebalancing U.S. Forces: Basing and Forward Presence in the Asia-Pacific,* Naval Institute Press, 2014, 17, 25; and Andrew J. Nathan and Andrew Scobell, *China's Search for Security,* Columbia University Press, 2012, 357.

[11] Alastair Iain Johnston, "The Evolution of Interstate Security Crisis Management Theory and Practice in China," *Naval War College Review* 69.1, 2016, 34; Harry J. Kazianis, "America's Air-Sea Battle Concept: An Attempt to Weaken China's A2/AD Strategy," *China Policy Institute*, 2014, 1-2. *http://www.nottingham.ac.uk/cpi/documents/policy-papers/cpi-policy-paper-2014-no-4-kazianis.pdf*; Open Source Enterprise, "PRC Article Urges PLA to Boost Air-Sea Force Building for Breaking U.S. 'Island Chain' Strategy," November 19, 2013. ID: CHR2013112909732345; Toshi Yoshihara and James R. Holmes, *Red Star over the Pacific: China's Rise and the Challenge to U.S. Maritime Strategy*, Naval Institute Press, 2010, 20; and Open Source Enterprise, "People's Daily Website on Changes in U.S. Military Deployments in Asia-Pacific," August 13, 2004. ID: CPP20040823000025.

[12] Open Source Enterprise, "PRC Military Sciences Academy Explains Need for Developing the DF-26 Anti-Ship Missile," November 30, 2015. ID: CHL2015113079474896; Toshi Yoshihara, "Japanese Bases and Chinese Missiles," in Andrew S. Erickson and Carnes Lord, eds., *Rebalancing U.S. Forces: Basing and Forward Presence in the Asia-Pacific*, Naval Institute Press, 2014, 45; Open Source Enterprise, "PRC Article Urges PLA to Boost Air-Sea Force Building for Breaking U.S. 'Island Chain' Strategy," November 19, 2013. ID: CHR2013112909732345; Gideon Rachman, "Obama and Xi Must Halt the Rise of a Risky Rivalry," *Financial Times*, June 3, 2013. *http://www.ft.com/intl/cms/s/0/db366e3e-ca06-11e2-8f55-00144feab7de.html#axzz3uKTMR2rn*; Open Source Enterprise, "China: A Review of the International Strategic Situation in 2012," February 28, 2013. ID: CHR2013090460093322; Open Source Enterprise, "China: Security Governance of the 'Global Commons' and China's Choice," July 26, 2012. ID: CPP20130509440007; Open Source Enterprise, "RMRB Article Discusses 'Roadmap' for U.S. Military Bases in Asia-Pacific Region," April 23, 2012. ID: CPP20120423787003; Aaron L. Friedberg, "A Contest for Supremacy: China, America, and the Struggle for Mastery in Asia," *W.W. Norton & Company*, 2011, 137; Open Source Enterprise, "PRC Scholar Analyzes U.S. 'Adjustment' of East Asia Policy," February 20, 2011. ID: CPP20110418671004; Open Source Enterprise, "PRC Scholar Analyzes Evolution of U.S. Strategy Toward China and Taiwan," November 1, 2008. ID: CPP20090127671003; Open Source Enterprise, "Modern Navy Magazine Says Taiwan Essential to China's Island Chain," October 1, 2007. ID: CPP20080103436010; and Open Source Enterprise, "China's National Security Handbook for Citizens Drafting Committee, Public Handbook on National Security," January 1, 2003. ID: CPP20070911320005.

[13] Toshi Yoshihara, "Japanese Bases and Chinese Missiles," in Andrew S. Erickson and Carnes Lord, eds., *Rebalancing U.S. Forces: Basing and Forward Presence in the Asia-Pacific*, Naval Institute Press, 2014, 45; Open Source Enterprise, "PRC Article Urges PLA to Boost Air-Sea Force Building for Breaking U.S. 'Island Chain' Strategy," November 19, 2013. ID: CHR2013112909732345; Open Source Enterprise, "RMRB Article Discusses 'Roadmap' for U.S. Military Bases in Asia-Pacific Region," April 23, 2012. ID: CPP20120423787003; Open Source Enterprise, "PRC Article Surveys China's Naval Rivals, Challenges," January 6, 2012. ID: CPP20120109671003; Open Source Enterprise, "PRC Scholar Analyzes U.S. 'Adjustment' of East Asia Policy," February 20, 2011. ID: CPP20110418671004; Bernard D. Cole, *The Great Wall at Sea: China's Navy in the Twenty-First Century*, Naval Institute Press, 2010, 174-176; Open Source Enterprise, "CCTV-7 'Defense Review Week' 09 Aug Discusses U.S. First Island Chain Strategy," August 9, 2009. ID: CPP20090810119001; Open Source Enterprise, "PRC Scholar Analyzes Evolution of US Strategy Toward China and Taiwan," November 1, 2008. ID: CPP20090127671003; and Open Source Enterprise, "Modern Navy Magazine Says Taiwan Essential to China's Island Chain," October 1, 2007. ID: CPP20080103436010.

[14] Andrew S. Erickson and Joel Wuthnow, "Barriers, Springboards and Benchmarks: China Conceptualizes the Pacific 'Island Chains,'" *China Quarterly*, January 21, 2016, 5-6, 11-13, 16. *http://journals.cambridge.org/abstract_S0305741016000011*; Open Source Enterprise, "PRC Article Urges PLA to Boost Air-Sea Force Building for Breaking U.S. 'Island Chain' Strategy," November 19, 2013. ID: CHR2013112909732345; Open Source Enterprise, "PRC: Japan Should "Get Used to" PLA Navy Blue Water Training," October 22, 2012. Open Source Enterprise transcription. ID: CPP20121022787007; Toshi Yoshihara and James R. Holmes, *Red Star over the Pacific: China's Rise and the Challenge to U.S. Maritime Strategy,* Naval Institute Press, 2010, 20; Bernard D. Cole, *The Great Wall at Sea: China's Navy in the Twenty-First Century*, Naval Institute Press, 2010, 174-176; and Open Source Enterprise, "CCTV-7 'Defense Review Week' 09 Aug Discusses U.S. First Island Chain Strategy," August 9, 2009. ID: CPP20090810119001.

[15] Bernard D. Cole, *The Great Wall at Sea: China's Navy in the Twenty-First Century*, Naval Institute Press, 2010, 178; Open Source Enterprise, "Modern Navy Magazine Says Taiwan Essential to China's Island Chain," October 1, 2007. ID: CPP20080103436010.

[16] Aaron L. Friedberg, "A Contest for Supremacy: China, America, and the Struggle for Mastery in Asia," *W.W. Norton & Company*, 2011, 137-138; Open Source Enterprise, "PRC Scholar Analyzes Evolution of U.S. Strategy Toward China and Taiwan," November 1, 2008. ID: CPP20090127671003.

[17] Tim Kane, "Global U.S. Troop Deployment, 1950-2003," *Heritage Center for Data Analysis*, October 27, 2004. *http://www.heritage.org/research/reports/2004/10/global-us-troop-deployment-1950-2003*.

[18] Open Source Enterprise, "People's Daily Website on Changes in U.S. Military Deployments in Asia-Pacific," August 13, 2004. ID: CPP20040823000025.

[19] Andrew S. Erickson and Joel Wuthnow, "Barriers, Springboards and Benchmarks: China Conceptualizes the Pacific 'Island Chains,'" *China Quarterly*, January 21, 2016, 9. *http://journals.cambridge.org/abstract_S0305741016000011*; Toshi Yoshihara and James R. Holmes, *Red Star over the Pacific: China's Rise and the Challenge to U.S. Maritime Strategy*, Naval Institute Press, 2010, 20-21; Open Source Enterprise, "PRC Scholar Analyzes Evolution of U.S. Strategy Toward China and Taiwan," November 1, 2008. ID: CPP20090127671003; and Open Source Enterprise, "Modern Navy Magazine Says Taiwan Essential to China's Island Chain," October 1, 2007. ID: CPP20080103436010.

[20] Open Source Enterprise, "People's Daily Website on Changes in U.S. Military Deployments in Asia-Pacific," August 13, 2004. ID: CPP20040823000025.

[21] Open Source Enterprise, "Japan Should 'Get Used to' PLA Navy Blue Water Training," October 22, 2012. ID: CPP20121022787007.

[22] Open Source Enterprise, "ZQB: Japan and the U.S. Revise the Defense Cooperation Guidelines to Build the Global Military Alliance," May 22, 2015. ID: CHR2015070906922503; Open Source Enterprise, "PRC Article Urges PLA to Boost Air-Sea Force Building for Breaking U.S. 'Island Chain' Strategy," November 19, 2013. ID: CHR2013112909732345; Open Source Enterprise, "RMRB Article Discusses 'Roadmap' for U.S. Military Bases in Asia-Pacific Region," April 23, 2012. ID: CPP20120423787003.

[23] Open Source Enterprise, "PRC Magazine Views Need, Performance of 'Guam Killer' DF-26 Intermediate-range Ballistic Missile," December 31, 2014. ID: CHR2015012168995763; Open Source Enterprise, "PRC Media Assert Planned Deployment of 4th SSN to Guam Designed to Further U.S. Rebalance, Contain China," February 27, 2014. ID: FBS20140227569688; Open Source Enterprise, "PRC Scholar Notes U.S. Efforts to Build up Second Island Chain," September 30, 2013. ID: CHL2013093017886926; Open Source Enterprise, "China: A Review of the International Strategic Situation in 2012," February 28, 2013. ID: CHR2013090460093322; Open Source Enterprise, "China: Security Governance of the 'Global Commons' and China's Choice," July 26, 2012. ID: CPP20130509440007; Open Source Enterprise, "PRC Scholar Analyzes 'Changes' in U.S. Asia-Pacific Strategic Redeployment," May 20, 2011. ID: CPP20110725671006; Open Source Enterprise, "PRC Scholar Analyzes U.S. 'Adjustment' of East Asia Policy," February

20, 2011. ID: CPP20110418671004; Open Source Enterprise, "Modern Navy Magazine Says Taiwan Essential to China's Island Chain," October 1, 2007. ID: CPP20080103436010; and Open Source Enterprise, "JFJB Introduces Guam as 'Best Equipped Strategic Forward Base' on West Pacific," June 16, 2003. ID: CPP20030619000057.

[24] Open Source Enterprise, "PRC Daily: Permanent Deployment of 2nd U.S. Aircraft Carrier in West Pacific Likely," July 21, 2004. ID: CPP20040721000104.

[25] Open Source Enterprise, "PRC Military Commentator Says U.S. Retreating to 2nd Island Chain, China Needs Weapons to Reach Guam," October 8, 2014. ID: CHR2014101048054021.

[26] Andrew S. Erickson and Joel Wuthnow, "Barriers, Springboards and Benchmarks: China Conceptualizes the Pacific 'Island Chains,'" *China Quarterly,* January 21, 2016, 9. *http://journals.cambridge.org/abstract_S0305741016000011*; Open Source Enterprise, "PRC Scholar Notes U.S. Efforts to Build up Second Island Chain," September 30, 2013. ID: CHL2013093017886926; Open Source Enterprise, "RMRB Article Discusses 'Roadmap' for U.S. Military Bases in Asia-Pacific Region," April 23, 2012. ID: CPP20120423787003; and Open Source Enterprise, "Modern Navy Magazine Says Taiwan Essential to China's Island Chain," October 1, 2007. ID: CPP20080103436010.

[27] Andrew S. Erickson and Joel Wuthnow, "Barriers, Springboards and Benchmarks: China Conceptualizes the Pacific 'Island Chains,'" *China Quarterly,* January 21, 2016, 9. *http://journals.cambridge.org/abstract_S0305741016000011*; Open Source Enterprise, "RMRB Article Discusses 'Roadmap' for U.S. Military Bases in Asia-Pacific Region," April 23, 2012. ID: CPP20120423787003; Open Source Enterprise, "CCTV-7 'Defense Review Week' 09 Aug Discusses US First Island Chain Strategy," August 9, 2009, ID: CPP20090810119001; and Open Source Enterprise, "People's Daily Website on Changes in U.S. Military Deployments in Asia-Pacific," August 23, 2004. ID: CPP20040823000025.

[28] Open Source Enterprise, "ZQB: Why Do U.S. Forces Want to Deploy the B-1B Strategic Bomber in Australia?" May 22, 2015. ID: CHR2015070906922503; Open Source Enterprise, "PRC Magazine Views Need, Performance of 'Guam Killer' DF-26 Intermediate-range Ballistic Missile," December 31, 2014. ID: CHR2015012168995763; Open Source Enterprise, "China: Security Governance of the 'Global Commons' and China's Choice," July 26, 2012. ID: CPP20130509440007; Open Source Enterprise, "RMRB Article Discusses 'Roadmap' for U.S. Military Bases in Asia-Pacific Region," April 23, 2012. ID: CPP20120423787003; Open Source Enterprise, "CCTV-7 'Defense Review Week' 09 Aug Discusses U.S. First Island Chain Strategy," August 9, 2009, ID: CPP20090810119001; and Open Source Enterprise, "People's Daily Website on Changes in U.S. Military Deployments in Asia-Pacific," August 23, 2004. ID: CPP20040823000025.

[29] Open Source Enterprise, "China: Security Governance of the 'Global Commons' and China's Choice," July 26, 2012. ID: CPP20130509440007; Open Source Enterprise, "RMRB Article Discusses 'Roadmap' for U.S. Military Bases in Asia-Pacific Region," April 23, 2012. ID: CPP20120423787003; and Open Source Enterprise, "CCTV-7 'Defense Review Week' 09 Aug Discusses US First Island Chain Strategy," August 9, 2009, ID: CPP20090810119001.

[30] Open Source Enterprise, "ZQB: Why Do U.S. Forces Want to Deploy the B-1B Strategic Bomber in Australia?" May 22, 2015. ID: CHR2015070906922503; and Open Source Enterprise, "PRC Magazine Views Need, Performance of 'Guam Killer' DF-26 Intermediate-range Ballistic Missile," December 31, 2014. ID: CHR2015012168995763.

[31] Aaron L. Friedberg, "A Contest for Supremacy: China, America, and the Struggle for Mastery in Asia," *W.W. Norton & Company,* 2011, 138.

[32] Aaron L. Friedberg, "A Contest for Supremacy: China, America, and the Struggle for Mastery in Asia," *W.W. Norton & Company,* 2011, 138; Open Source Enterprise, "People's Daily Website on Changes in U.S. Military Deployments in Asia-Pacific," August 23, 2004. ID: CPP20040823000025.

[33] Open Source Enterprise, "Modern Navy Magazine Says Taiwan Essential to China's Island Chain," October 1, 2007. ID: CPP20080103436010.

[34] Open Source Enterprise, "RMRB Article Discusses 'Roadmap' for U.S. Military Bases in Asia-Pacific Region," April 23, 2012. ID: CPP20120423787003.

[35] Open Source Enterprise, "PRC Article: U.S. Turns Guam into Strategic Center for Controlling Asia-Pacific," January 6, 2012. ID: CPP20120106787007.

[36] Open Source Enterprise, "PRC Media Assert Planned Deployment of 4th SSN to Guam Designed to Further U.S. Rebalance, Contain China," February 27, 2014. ID: FBS20140227569688.

[37] Open Source Enterprise, "PRC Military Commentator Says U.S. Retreating to 2nd Island Chain, China Needs Weapons To Reach Guam," October 8, 2014. ID: CHR2014101048054021.

[38] Open Source Enterprise, "PRC Military Commentator Says U.S. Retreating to 2nd Island Chain, China Needs Weapons To Reach Guam," October 8, 2014. ID: CHR2014101048054021.

[39] Open Source Enterprise, "PRC Magazine Views Need, Performance of 'Guam Killer' DF-26 Intermediate-Range Ballistic Missile," December 31, 2014. ID: CHR2015012168995763; Open Source Enterprise, "PRC Military Commentator Says U.S. Retreating to 2nd Island Chain, China Needs Weapons to Reach Guam," October 8, 2014. ID: CHR2014101048054021; Andrew S. Erickson and Justin D. Mikolay, "Guam and American Security in the Pacific," in Andrew S. Erickson and Carnes Lord, eds., *Rebalancing U.S. Forces: Basing and Forward Presence in the Asia-Pacific,* Naval Institute Press, 2014, 16; Toshi Yoshihara, "Japanese Bases and Chinese Missiles," in Andrew S. Erickson and Carnes Lord, eds., *Rebalancing U.S. Forces: Basing and Forward Presence in the Asia-Pacific,* Naval Institute Press, 2014, 49-50, 54; Aaron L. Friedberg, "A Contest for Supremacy: China, America, and the Struggle for Mastery in Asia," *W.W. Norton & Company,* 2011, 219; Toshi Yoshihara and James R. Holmes, *Red Star over the Pacific: China's Rise and the Challenge to U.S. Maritime Strategy,* Naval Institute Press, 2010, 94, 101, 104-105, 108; and Harry J. Kazianis, America's Air-Sea Battle Concept: An Attempt to Weaken China's A2/AD Strategy," *China Policy Institute,* 2014, 1-2. *http://www.nottingham.ac.uk/cpi/documents/policy-papers/cpi-policy-paper-2014-no-4-kazianis.pdf.*

[40] U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2015,* April 2015, 8; and U.S.-China Economic and Security Review Commission, *Hearing on China's Military Modernization and Implications for the United States,* written testimony of Lee Fuell, January 30, 2014.
[41] U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "China's Offensive Missile Forces," in *2015 Annual Report to Congress*, November 2015, 352; IHS Jane's, *Jane's Air-Launched Weapons: CJ-10 (DF-10/KD-20),* September 30, 2015, 2; Ian Easton, "China's Evolving Reconnaissance-Strike Capabilities," *Project 2049 Institute*, February 2014, 8; U.S. Department of Defense, *Annual Report to Congress: Military Power of the People's Republic of China 2009,* March 2009, 20; and Ian Easton, "The Assassin Under the Radar: China's DH–10 Cruise Missile Program," *Project 2049 Institute,* October 2009, 1.
[42] Andrew S. Erickson, "Showtime: China Reveals Two 'Carrier-Killer' Missiles," *National Interest*, September 3, 2015.
[43] Open Source Enterprise, "PRC Military Sciences Academy Explains Need for Developing the DF-26 Anti-Ship Missile," November 30, 2015. ID: CHL2015113079474896.
[44] Open Source Enterprise, "PRC Military Sciences Academy Explains Need for Developing the DF-26 Anti-Ship Missile," November 30, 2015. ID: CHL2015113079474896.
[45] Fiona S. Cunningham and M. Taylor Fravel, "Assuring Assured Retaliation: China's Nuclear Posture and U.S.-China Strategic Stability," *International Security* 40:2, Fall 2015, 42-45.
[46] Open Source Enterprise, "PRC Media: DF-26 IRBM Designed to Strike U.S. Aircraft Carriers, Bases in Guam, Diego Garcia," August 30, 2015. ID: CHL2015090371725552; Open Source Enterprise, "PRC Military Commentator Says U.S. Retreating to 2nd Island Chain, China Needs Weapons to Reach Guam," October 8, 2014. ID: CHR2014101048054021.
[47] Open Source Enterprise, "Global Times Online: New Missiles Meant for Defensive Purposes Only," September 4, 2015. ID: CHR2015091160915567.
[48] Open Source Enterprise, "PRC Military Sciences Academy Explains Need for Developing the DF-26 Anti-Ship Missile," November 30, 2015. ID: CHL2015113079474896.
[49] Open Source Enterprise, "PRC Magazine Views Need, Performance of 'Guam Killer' DF-26 Intermediate-Range Ballistic Missile," December 31, 2014. ID: CHR2015012168995763.
[50] Open Source Enterprise, "PRC Military Sciences Academy Explains Need for Developing the DF-26 Anti-Ship Missile," November 30, 2015. ID: CHL2015113079474896.
[51] IHS, *Jane's Strategic Weapons Systems: Offensive Weapons, China, DF-26*, September 11, 2015, 2.
[52] IHS, *Jane's Strategic Weapons Systems: Offensive Weapons, China, DF-15*, June 23, 2015, 4.
[53] Andrew Erickson, "How China Got There First: Beijing's Unique Path to ASBM Development and Deployment," *Jamestown Foundation*, June 7, 2013. *http://www.jamestown.org/programs/chinabrief/single/?tx_ttnews%5btt_news%5d=40994&tx_ttnews%5bbackPid%5d=25&cHash=913594fd5785c82b653cc6b00de7850c#.Ueh_F5U-aX1*; U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2013*, May 2013, 5-6, 42.
[54] Andrew S. Erickson, "Showtime: China Reveals Two 'Carrier-Killer' Missiles," *National Interest*, September 3, 2015; Richard D. Fisher, Jr., "DF-26 IRBM May Have ASM Variant, China Reveals at Military Parade," *Jane's Defence Weekly*, September 2, 2015.
[55] U.S.-China Economic and Security Review Commission, *Hearing on China's Offensive Missile Forces,* written testimony of Dennis Gormley, April 22, 2015; and Ronald O'Rourke, "China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress," *Congressional Research Service*, June 1, 2015, 6–7.
[56] Andrew S. Erickson, "Showtime: China Reveals Two 'Carrier-Killer' Missiles," *National Interest*, September 3, 2015; Richard D. Fisher, Jr., "DF-26 IRBM May Have ASM Variant, China Reveals at Military Parade," *Jane's Defence Weekly*, September 2, 2015.
[57] U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2015,* April 2015, 12, 36, 40; U.S.-China Economic and Security Review Commission, *Hearing on China's Military Modernization and Implications for the United States,* written testimony of Lee Fuell, January 30, 2014; and U.S. House Armed Services Subcommittee on Strategic Forces, *Hearing on Nuclear Weapons Modernization in Russia and China: Understanding Impacts to the United States,* written testimony of Richard D. Fisher, Jr., October 14, 2011.
[58] U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "China's Offensive Missile Forces," in *2015 Annual Report to Congress*, November 2015, 373.
[59] IHS Jane's, *Sentinel Security Assessment: China and Northeast Asia, Procurement*, December 16, 2015, 25; Open Source Enterprise, "PRC: Roundup on Military Aircraft, Armament in 2015 Victory Day Parade in Beijing," September 4, 2015. ID: CHL2015100157759040; China Military Online, "Expert: China's Bombers Embrace New Opportunities," February 25, 2015. *http://english.chinamil.com.cn/news-channels/china-military-news/2015-02/25/content_6366685.htm*; Richard D. Fisher, Jr., "Xi Jinping Visit Reveals H-6 Bomber Details," *IHS Jane's Defence Weekly,* February 21, 2015. *http://www.janes.com/article/49127/xi-jinping-visit-reveals-h-6-bomber-details*.
[60] National Institute for Defense Studies (Japan), *NIDS China Security Report 2016*, 2016, 27.
[61] Ian Easton, "China's Evolving Reconnaissance Strike Capabilities: Implications for the U.S.-Japan Alliance," *Project 2049 Institute,* February 2014, 26. *http://www2.jiia.or.jp/pdf/fellow_report/140219_JIIA-Project2049_Ian_Easton_report.pdf*.
[62] Eric Heginbotham et al., "The U.S.-China Military Scorecard: Forces, Geography, and the Evolving Balance of Power 1996-2017," *RAND Corporation,* 2015, 63. *http://www.rand.org/content/dam/rand/pubs/research_reports/RR300/RR392/RAND_RR392.pdf*.
[63] Michael Pilger, "First Modern Tanker Observed at Chinese Airbase," *U.S.-China Economic and Security Review Commission,* November 18, 2014, 1. *http://origin.www.uscc.gov/sites/default/files/Research/StaffBulletin_First%20Modern%20Tanker%20Observed%20at%20Chinese%20Airbase_0.pdf*.
[64] PLA Academy of Military Science, *Science of Military Strategy*, 2013, 223-224.

[65] Richard D. Fisher, Jr., "Chinese Bomber Exercise Affirms Air-Defense Identification Zone, Penetrates Second Island Chain," IHS Jane's Defence Weekly, November 30, 2015. *http://www.janes.com/article/56327/chinese-bomber-exercise-affirms-air-defence-identification-zone-penetrates-second-island-chain#.VlzNyWLMD8g.twitter*.

[66] Official, Japan Maritime Self Defense Force, discussion with Commission, December 7, 2015.

[67] U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "China's Offensive Missile Forces," in *2015 Annual Report to Congress*, November 2015, 357, 373.

[68] Robert Haddick, *Fire on the Water: China, America, and the Future of the Pacific*, Naval Institute Press, 2014, 93–94.

[69] Robert Haddick, "China's Most Dangerous Missile (So Far)," *War on the Rocks*, July 2, 2014.

[70] U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2014*, May 2014, 36. U.S.-China Economic and Security Review Commission, *Hearing on PLA Modernization and its Implications for the United States*, written testimony of Jesse Karotkin, January 10, 2014; Craig Murray, Andrew Berglund, and Kimberly Hsu, "China Naval Modernization and Implications for the United States," *U.S.-China Economic and Security Review Commission*, August 26, 2013. *http://origin.www.uscc.gov/sites/default/files/Research/Backgrounder_China's%20Naval%20Modernization%20and%20Implications%20for%20the%20United%20States.pdf*.

[71] U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2014*, May 2014, 36; U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2013*, May 2013, 6-7.

[72] U.S. Office of Naval Intelligence, *The PLA Navy: New Capabilities and Missions for the 21st Century*, April 2015, 16.

[73] U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2015*, April 2015, 10, 46.

[74] Ronald O'Rourke, "China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress," *Congressional Research Service*, December 21, 2015, 11. *https://www.fas.org/sgp/crs/row/RL33153.pdf*; IHS Jane's, *Jane's Strategic Weapon Systems: C–801, C–802, C–803*, July 21, 2015; U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2015,* April 2015, 46.

[75] U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "China's Offensive Missile Forces," in *2015 Annual Report to Congress*, November 2015, 356.

[76] Ronald O'Rourke, "China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress," *Congressional Research Service*, December 21, 2015, 11. *https://www.fas.org/sgp/crs/row/RL33153.pdf*; IHS Jane's, *Jane's Strategic Weapon Systems: C–801, C–802, C–803*, July 21, 2015; U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2015,* April 2015, 46.

[77] U.S. Office of Naval Intelligence, *The PLA Navy: New Capabilities and Missions for the 21st Century*, April 2015, 19; U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2015,* May 2015, 10, 46; William Murray, "Underwater TELs and China's Antisubmarine Warfare: Evolving Strength and Calculated Weakness," in Peter Dutton, Andrew Erickson, and Ryan Martinson, eds., *China's Near Seas Combat Capabilities* (Naval War College, February 2014), 19; U.S.-China Economic and Security Review Commission, *Hearing on PLA Modernization and Its Implications for the United States*, written testimony of Jesse Karotkin, January 30, 2014; and U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2010,* 2010, 3, 30.

[78] Ronald O'Rourke, "China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress," *Congressional Research Service*, December 21, 2015, 15-16; Eric Heginbotham et al., "The U.S.-China Military Scorecard: Forces, Geography, and the Evolving Balance of Power 1996-2017," *RAND Corporation*, 2015, 29. *http://www.rand.org/content/dam/rand/pubs/research_reports/RR300/RR392/RAND_RR392.pdf*.

[79] U.S. Office of Naval Intelligence analysts, unclassified discussion with Commission staff, Washington, DC, April 2014; U.S.-China Economic and Security Review Commission, *Hearing on PLA Modernization and its Implications for the United States*, written testimony of Jesse Karotkin, January 30, 2014; Japan Maritime Self Defense Force, *Japan's National Security Faced with Challenges and Problems to Maritime Order in East Asia*, briefing to the U.S.-China Economic and Security Review Commission, Washington, DC, November 2013; U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2013,* May 2013, 39; U.S. naval intelligence data reproduced in Hans Kristensen, "Chinese Nuclear Developments Described (and Omitted) by DOD Report," *FAS Strategic Security Blog*, May 13, 2013. *http://blogs.fas.org/security/2013/05/china2013/*; U.S. Seventh Fleet, briefing to the U.S.-China Economic and Security Review Commission, Yokosuka, Japan, July 2013; and U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2011*, 2011, 15.

[80] U.S.-China Economic and Security Review Commission, *Hearing on PLA Modernization and its Implications for the United States*, written testimony of Jesse Karotkin, January 10, 2014; James Fanell, "Remarks" (WEST 2014: What about China? San Diego, CA, February 11-13, 2014); Open Source Enterprise, "PLA Navy SSF Submarine Flotilla Improves Combat Power with More, All-Hour Training," December 16, 2013. ID: CHL2014021850956262; and Open Source Enterprise, "PRC Magazine Modern Ships Discusses Problems That Need to Be Resolved to 'Beat the United States,'" July 1, 2013. ID: CHR2013090447001392.

[81] James Fanell, "Remarks" (WEST 2014: What about China? San Diego, CA, February 11-13, 2014).

[82] Open Source Enterprise, "PRC 'Ocean-1' Completes 28-Day South China Sea Trials, Heads to Indian Ocean for Scientific Mission," November 18, 2013. ID: CHR2013111868770077; U.S. Department of Defense, *Annual Report to Congress on Military and Security Developments Involving the People's Republic of China* 2013, May 2013, 39; and Senate Armed Services Committee, *Hearing on U.S. Pacific Command Posture*, testimony of Admiral Samuel J. Locklear, 113th Cong., March 5, 2013.

[83] Kyle Mizokami, "These 5 Ships Are the Real Future of the Chinese Navy," *Foreign Policy*, December 16, 2013.

http://complex.foreignpolicy.com/posts/2013/12/16/these_five_ships_are_the_real_future_of_the_chinese_navy; Zee News, "Chinese Ship Caught Spying on India," August 31, 2011. *http://zeenews.india.com/news/world/chinese-ship-caught-spying-on-india_729165.html*; Mark Valencia, "Intelligence Gathering, the South China Sea, and the Law of the Sea," *NAPSNet Policy Forum*, August 30, 2011. *http://nautilus.org/napsnet/napsnet-policy-forum/intelligence-gathering-the-south-china-sea-and-the- law-of-the-sea/*; and Peter Dutton, "Scouting, Signaling, and Gatekeeping: Chinese Naval Operations in Japanese Waters and the International Law Implications," U.S. Naval War College, February 2009, 3.

[84] Eric Pedersen, "Land- and Sea-Based C4ISR Infrastructure in China's Near Seas" in Peter Dutton, Andrew Erickson, and Ryan Martinson, eds., *China's Near Seas Combat Capabilities*, Naval War College, February 2014; Andrew Erickson, "Satellites Support Growing PLA Maritime Monitoring and Targeting Capabilities," *China Brief* 11:3 (February 10, 2011). *http://www.jamestown.org/programs/chinabrief/single/?tx_ttnews[tt_news]=37490&tx_ttnews[backPid]=25&cHash=52cd4230 55c2caf6756168155484de35#.UuZEm7Qo670*.

[85] Union of Concerned Scientists, "UCS Satellite Database."

[86] U.S.-China Economic and Security Review Commission, Chapter 2, Section 2, "China's Space and Counterspace Programs," in *2015 Annual Report to Congress*, November 2015, 317-318; U.S. Office of Naval Intelligence, *The PLA Navy: New Capabilities and Missions for the 21st Century*, 2015, 20–21.

[87] U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "China's Offensive Missile Forces," in *2015 Annual Report to Congress*, November 2015, 352.

[88] Andrew S. Erickson, "Showtime: China Reveals Two 'Carrier-Killer' Missiles," *National Interest*, September 3, 2015; Richard D. Fisher, Jr., "DF-26 IRBM May Have ASM Variant, China Reveals at Military Parade," *Jane's Defence Weekly*, September 2, 2015.

[89] Shirley A. Kan, "Guam: U.S. Defense Deployments," *Congressional Research Service,* November 26, 2014, 1. *https://www.fas.org/sgp/crs/row/RS22570.pdf*.

[90] Commander, Submarine Force, U.S. Pacific Fleet Public Affairs, "Second Submarine Tender to Be Homeported in Guam," December 23, 2015. *http://www.csp.navy.mil/Media/News-Articles/Display-News/Article/637958/second-submarine-tender-to-be-homeported-in-guam*; Dean Cheng, "China's Bomber Flight into the Central Pacific: Wake-Up Call for the United States," *War on the Rocks,* December 23, 2015. *http://warontherocks.com/2015/12/chinas-bomber-flight-into-the-central-pacific-wake-up-call-for-the-united-states/*.

[91] Shirley A. Kan, "Guam: U.S. Defense Deployments," *Congressional Research Service,* November 26, 2014, 2, 3. *https://www.fas.org/sgp/crs/row/RS22570.pdf*.

[92] Eric Heginbotham et al., "The U.S.-China Military Scorecard: Forces, Geography, and the Evolving Balance of Power 1996-2017," *RAND Corporation,* 2015, 41. *http://www.rand.org/content/dam/rand/pubs/research_reports/RR300/RR392/RAND_RR392.pdf*; Andrew S. Erickson and Justin D. Mikolay, "Guam and American Security in the Pacific," in Andrew S. Erickson and Carnes Lord, eds., *Rebalancing U.S. Forces: Basing and Forward Presence in the Asia-Pacific,* Naval Institute Press, 2014, 20.

[93] Oriana Pawlyk, "12 Air Force F-16s to Deploy to Guam," *Military Times,* January 8, 2016. *http://www.militarytimes.com/story/military/2016/01/08/12-air-force-f-16s-deploy-guam/78501546/*; Shirley A. Kan, "Guam: U.S. Defense Deployments," *Congressional Research Service,* November 26, 2014, 3. *https://www.fas.org/sgp/crs/row/RS22570.pdf*.

[94] Andrew S. Erickson and Justin D. Mikolay, "Guam and American Security in the Pacific," in Andrew S. Erickson and Carnes Lord, eds., *Rebalancing U.S. Forces: Basing and Forward Presence in the Asia-Pacific,* Naval Institute Press, 2014, 17.

[95] Wyatt Olson, "Guam Anti-Missile Unit's Main Focus Is North Korean Threat," *Stars and Stripes,* January 10, 2016. *http://www.stripes.com/news/guam-anti-missile-unit-s-main-focus-is-north-korean-threat-1.388070*; Jen Judson, "Lockheed Secures $528 Million U.S. Army Contract for More THAAD Interceptors," *Defense News,* January 4, 2016. *http://www.defensenews.com/story/defense/2016/01/04/lockheed-secures-528-million-contract-for-more-thaad-interceptors/78274842/*; Cheryl Pellerin, "Work: Guam Is Strategic Hub to Asia-Pacific Rebalance," *U.S. Department of Defense News,* August 19, 2014. *http://www.defense.gov/News-Article-View/Article/603091/work-guam-is-strategic-hub-to-asia-pacific-rebalance*; and Shirley A. Kan, "Guam: U.S. Defense Deployments," *Congressional Research Service,* November 26, 2014, 3. *https://www.fas.org/sgp/crs/row/RS22570.pdf*.

[96] Andrew S. Erickson and Justin D. Mikolay, "Guam and American Security in the Pacific," in Andrew S. Erickson and Carnes Lord, eds., *Rebalancing U.S. Forces: Basing and Forward Presence in the Asia-Pacific,* Naval Institute Press, 2014, 17.

[97] Eric Heginbotham et al., "The U.S.-China Military Scorecard: Forces, Geography, and the Evolving Balance of Power 1996-2017," *RAND Corporation,* 2015, 78-79. *http://www.rand.org/content/dam/rand/pubs/research_reports/RR300/RR392/RAND_RR392.pdf*.

[98] Shirley A. Kan, "Guam: U.S. Defense Deployments," *Congressional Research Service,* November 26, 2014, 22-23. *https://www.fas.org/sgp/crs/row/RS22570.pdf*; Cheryl Pellerin, "Work: Guam Is Strategic Hub to Asia-Pacific Rebalance," *U.S. Department of Defense News,* August 19, 2014. *http://www.defense.gov/News-Article-View/Article/603091/work-guam-is-strategic-hub-to-asia-pacific-rebalance*; Andrew S. Erickson and Justin D. Mikolay, "Guam and American Security in the Pacific," in Andrew S. Erickson and Carnes Lord, eds., *Rebalancing U.S. Forces: Basing and Forward Presence in the Asia-Pacific,* Naval Institute Press, 2014, 15, 17.

[99] Gidget Fuentes, "Navy Signs off on Plan to Move 5,000 Marines to Guam," *Military Times,* September 5, 2015. *http://www.marinecorpstimes.com/story/military/2015/09/05/navy-signs-off-plan-move-5000-marines-guam/71657614/*.

[100] Dean Cheng, "China's Bomber Flight into the Central Pacific: Wake-up Call for the United States," *War on the Rocks,* December 23, 2015. *http://warontherocks.com/2015/12/chinas-bomber-flight-into-the-central-pacific-wake-up-call-for-the-united-states/*.

[101] U.S.-China Economic and Security Review Commission, *Hearing on China's Offensive Missile Forces,* written testimony of Evan Montgomery, April 1, 2015; Jonathan F. Solomon, "Demystifying Conventional Deterrence: Great-Power Conflict and East Asian Peace," *Strategic Studies Quarterly* (Winter 2013): 118-119. *http://www.au.af.mil/au/ssq/digital/pdf/winter_13/2013winter-Solomon.pdf*; Karl P. Mueller, et al., "Striking First: Preemptive and Preventive Attack in U.S. National Security Policy," *RAND Corporation,* 2006, viii. *http://www.rand.org/content/dam/rand/pubs/monographs/2006/RAND_MG403.pdf*; and John J. Mearshimer, "Prospects for Conventional Deterrence in Europe," *Bulletin of the Atomic Scientists,* August 1985, 158.

http://mearsheimer.uchicago.edu/pdfs/A0009.pdf; John J. Mearsheimer, *Conventional Deterrence*, Cornell University Press, 1983, 23-24, 28-30.

[102] U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "China's Offensive Missile Forces," in *2015 Annual Report to Congress*, November 2015, 566.

[103] Marcus Weisgerber, "Pentagon Debates Policy to Strengthen, Disperse Bases," *Defense News*, April 13, 2014. *http://archive.defensenews.com/article/20140413/DEFREG02/304130017/*.

[104] U.S.-China Economic and Security Review Commission, *Hearing on China's Offensive Missile Forces,* written testimony of Toshi Yoshihara, April 1, 2015; Marcus Weisgerber, "Pentagon Debates Policy to Strengthen, Disperse Bases," *Defense News*, April 13, 2014. *http://archive.defensenews.com/article/20140413/DEFREG02/304130017/*; Andrew S. Erickson and Justin D. Mikolay, "Guam and American Security in the Pacific," in Andrew S. Erickson and Carnes Lord, eds., *Rebalancing U.S. Forces: Basing and Forward Presence in the Asia-Pacific*, Naval Institute Press, 2014, 25, 31.

[105] Shirley A. Kan, "Guam: U.S. Defense Deployments," *Congressional Research Service*, November 26, 2014, 11. *https://www.fas.org/sgp/crs/row/RS22570.pdf*; David J. Berteau et al., "U.S. Force Posture Strategy in the Asia-Pacific Region: An Independent Assessment," *Center for Strategic and International Studies*, August 2012, 19. *http://csis.org/files/publication/120814_FINAL_PACOM_optimized.pdf*.

[106] Armando J. Heredia, "Analysis: New U.S.-Philippine Basing Deal Heavy on Air Power, Light on Naval Support," *USNI News*, March 22, 2016. *https://news.usni.org/2016/03/22/analysis-new-u-s-philippine-basing-deal-heavy-on-air-power-light-on-naval-support*; Rob Taylor, "U.S. Air Force Seeks to Enlarge Australian Footprint," *Wall Street Journal*, March 8, 2016. *http://www.wsj.com/articles/u-s-air-force-seeks-to-enlarge-australian-footprint-1457431803*; Manuel Mogato, "Philippines Offers Eight Bases to U.S. Under New Military Deal," *Reuters*, January 13, 2016. *http://www.reuters.com/article/us-philippines-usa-bases-idUSKCN0UR17K20160113*.

[107] U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "China's Offensive Missile Forces," in *2015 Annual Report to Congress*, November 2015, 566.

[108] Andrew S. Erickson and Justin D. Mikolay, "Guam and American Security in the Pacific," in Andrew S. Erickson and Carnes Lord, eds., *Rebalancing U.S. Forces: Basing and Forward Presence in the Asia-Pacific*, Naval Institute Press, 2014, 22.

[109] Senate Armed Services Committee, *Hearing on Worldwide Threats*, statement for the record of Director of National Intelligence James R. Clapper, February 9, 2016, 7. *http://www.armed-services.senate.gov/imo/media/doc/Clapper_02-09-16.pdf*; U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "China's Offensive Missile Forces," in *2015 Annual Report to Congress*, November 2015, 370.

[110] U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "China's Offensive Missile Forces," in *2015 Annual Report to Congress*, November 2015, 370-371.

[111] U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "China's Offensive Missile Forces," in *2015 Annual Report to Congress*, November 2015, 566.

[112] U.S.-China Economic and Security Review Commission, *Hearing on China's Offensive Missile Forces*, oral testimony of Elbridge Colby, April 1, 2015; U.S.-China Economic and Security Review Commission, *Hearing on China's Offensive Missile Forces,* oral testimony of Robert Haddick, April 1, 2015.

[113] U.S.-China Economic and Security Review Commission, *Hearing on China's Offensive Missile Forces,* written testimony of Evan Montgomery, April 1, 2015.

[114] U.S.-China Economic and Security Review Commission, *Hearing on China's Offensive Missile Forces,* oral testimony of Toshi Yoshihara, April 1, 2015; U.S.-China Economic and Security Review Commission, *Hearing on China's Offensive Missile Forces,* oral testimony of Evan Montgomery, April 1, 2015.

[115] U.S.-China Economic and Security Review Commission, *Hearing on China's Offensive Missile Forces,* oral testimony of Mark Stokes, April 1, 2015.

[116] U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "China's Offensive Missile Forces," in *2015 Annual Report to Congress*, November 2015, 368-369.

[117] U.S.-China Economic and Security Review Commission, *Hearing on China's Offensive Missile Forces,* oral testimony of Dennis Gormley, April 1, 2015.

[118] U.S.-China Economic and Security Review Commission, *Hearing on China's Offensive Missile Forces,* oral testimony of Robert Haddick, April 1, 2015.