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14. ABSTRACT

New Chinese missile technology, such as anti-ship ballistic missiles, hypersonic weapons, and the proliferation of ballistic missile systems poses a growing threat to U.S. interests in INDOPACOM and challenge existing missile defense systems. A missile warning/missile warning integrated architecture is necessary to ensure the U.S. is poised to counter a Chinese missile attack in the South China Sea. This paper explores China's increasing offensive missile capability, current U.S. missile warning/missile defense architectures, and advocates for integration of strategic and tactical warning systems as well as allies and partners.

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“By bolstering and defending our unparalleled network of allies and partners, and making smart defense investments, we will also deter Chinese aggression and counter threats to our collective security, prosperity, and democratic way of life.” -Interim National Security Strategy, 2022

INTRODUCTION

In 2021, China launched a fractional orbital bombardment system with a hypersonic glide vehicle.¹ This was an important event that demonstrated China’s ability to project a weapon into very low earth orbit and maneuver at five times the speed of sound along an unpredictable trajectory in order to target a location in the Western Pacific or anywhere on the globe. Chairman of the Joint Chiefs, General Mark Milley stated in Bloomberg, “I don’t know if it’s quite a Sputnik moment, but I think it’s very close to that.”² However, hypersonics aren’t the only missile threat in the region. According to the Center for Strategic and International Studies, “China has the most active and diverse missile development program in the world”.³ The increasing threat is heightened by three specific developments; the fielding of Anti-Ship Ballistic Missiles or so-called “Carrier Killers”, the demonstration of hypersonic missile technology, and the proliferation of the overall Chinese ballistic and cruise missile arsenal.

Given the operational environment, legacy U.S. missile defense systems deployed in the Indo-Pacific theater may be insufficient and ill-adapted to meet the rising threat of China’s technologically advanced missile capability and it is imperative that USINDOPACOM consider options for improving the efficiency and effectivity of these systems. There are multiple ways to accomplish this objective. One near-term option is the integration of new strategic intelligence,

¹ Jonathan Marcus, “China’s Hypersonic Test - Does It Signal a New Arms Race?,” *BBC News*, October 23, 2021, sec. Asia, <https://www.bbc.com/news/world-asia-59001850>.

² Peter Martin, “U.S. General Likens China’s Hypersonic Test to a ‘Sputnik Moment,’” *www.bloomberg.com*, October 27, 2021, <https://www.bloomberg.com/news/articles/2021-10-27/milley-likens-china-s-hypersonic-weapon-test-to-sputnik-moment>.

³ “Missiles of China,” *Missile Threat* (Center for Strategic and International Studies, June 14, 2018), <https://missilethreat.csis.org/country/china/>.

surveillance, and reconnaissance (ISR) capabilities into tactical defense systems in order to improve the speed of response. A second option is to implement a combined missile defense architecture across allies and partners, as envisioned in USINDOPACOM's Integrated Air Missile Defense (IAMD) Vision 2028. Finally, new ground-breaking technologies, such as space-based interceptors and directed energy weapons should be fast-tracked for employment in the Western Pacific theater. This "Sputnik moment" as described by the Chairman should be met with an Apollo 11 response.

BACKGROUND: THE OPERATIONAL ENVIRONMENT

In the past decade, China has placed increasing emphasis on missile development. If the Biden Administration intends to adhere to its vow to defend Taiwan in the event of Chinese invasion, it is important to understand China's missile capability in the region.⁴ China's center of gravity for offensive missile capability in a Taiwan Straits scenario is the People's Liberation Army Rocket Force (PLARF), which organizes, mans, trains, and equips the PRC's strategic land-based nuclear and conventional missile forces.⁵ The PRC's 2019 Defense White Paper, asserts that the PLARF is working towards "strengthening intermediate and long-range precision strike forces, and enhancing strategic counter-balance capability, so as to build a strong and modernized rocket force."⁶ To meet these objectives, in 2015 the PLARF was elevated from an

⁴ David Brunnstrom and Trevor Hunnicutt, "Biden Says U.S. Forces Would Defend Taiwan in the Event of a Chinese Invasion World," *Reuters World* (Thomas Reuters Media Division, September 19, 2022), <https://www.reuters.com/world/biden-says-us-forces-would-defend-taiwan-event-chinese-invasion-2022-09-18/>.

⁵ Office of the Secretary of Defense, "Annual Report to Congress: Military and Security Developments Involving the People's Republic of China," *Department of Defense*, October 1, 2020, <https://media.defense.gov/2020/Sep/01/2002488689/-1/-1/1/2020-DOD-CHINA-MILITARY-POWER-REPORT-FINAL.PDF>.

⁶ Office of the Secretary of Defense, "Annual Report to Congress: Military and Security Developments Involving the People's Republic of China," *Department of Defense*, October 1, 2020, <https://media.defense.gov/2020/Sep/01/2002488689/-1/-1/1/2020-DOD-CHINA-MILITARY-POWER-REPORT-FINAL.PDF>.

independent branch to full service following several PRC reform initiatives.⁷ These reform efforts supported the rapid modernization of Chinese A2AD capability by streamlining decision authority and providing a national mandate. Beijing views its “missile forces as playing a pivotal role in neutralizing U.S. forward-deployed forces and so preventing Washington from rapidly intervening in a crisis or conflict involving China.”⁸

Characterizing the Threat

One noteworthy capability is the PLARF’s Dong Feng 21D (DF-21D) CSS-5 Mod-5 Anti-Ship Ballistic Missile (ASBM) program, the so-called “Carrier Killer”. The DF-21D has a range of up to 1,550 km and can target a CVN class U.S. Navy aircraft carrier with 20-meter accuracy.⁹ China possesses air-based (CH-AS-X-13) and sea-based (CSS-5) variants as well.^{10,11} The availability of this weapons class will likely shape U.S. decision calculus in Taiwan Strait scenarios, given the political ramifications of a highly lethal attack on a carrier, and could ultimately give China the upper hand in Sea Denial in the South China Sea.

Additionally, the emergence of hypersonic weapons will significantly shorten missile warning/missile defense operational response timelines. The National Aeronautics and Space Administration defines “hypersonic” speed as above Mach 5 or roughly 64 miles per minute.¹² For reference, it is approximately 144 nautical miles- or roughly 2 minutes and 25 seconds- from China’s Pingtan launch site to Taipei. Conventional ballistic missiles take significantly longer,

⁷ Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China, 55.

⁸ Blake Herzinger et al., “Defending Guam,” *Hudson Institute* (Washington, DC: Hudson Institute Inc., July 1, 2022), <https://www.hudson.org/research/17933-defending-guam>.

⁹ Henry Hendrix, “At What Cost a Carrier?,” *Center for New American Security*, March 2013, <https://www.cnas.org/publications/reports/at-what-cost-a-carrier>.

¹⁰ H.I. Sutton, “China’s New Aircraft Carrier Is the World’s Largest Air-Launched Missile,” *Naval News*, November 20, 2020, <https://www.navalnews.com/naval-news/2020/11/chinas-new-aircraft-carrier-killer-is-worlds-largest-air-launched-missile/>.

¹¹ Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China, 73.

¹² National Aeronautics and Space Administration Glenn Research Center, “Speed Regimes,” NASA Glenn Research Center, May 13, 2021, <https://www.grc.nasa.gov/www/k-12/BGP/lowhyper.html>.

given their parabolic trajectory. Speed alone does not give hypersonic weapons a strategic advantage. In fact, ballistic missiles, such as the submarine-launched Trident II D5, achieve speeds in excess of Mach 16.¹³ However, new hypersonic systems can maneuver in flight and fly much higher than subsonic missiles but lower than intercontinental ballistic missiles, thereby challenging traditional defense systems.¹⁴ According to Former Under Secretary of Defense for Research and Development Mark Lewis, hypersonic weapons can “overfly our air defense systems and underfly our missile defense systems. So China has, over the last decade, with great care, [become] capable of ... holding our forward-based assets at risk.”¹⁵

RAND assesses that China's conventional inventory has increased almost 1,000 fold—comprised of roughly 1,400 ballistic missiles and hundreds of cruise missiles.¹⁶ For reference, Missile Defense Agency has 150 Standard Missile-3IA and 182 Standard Missile-3IBs deployed across the Navy's Aegis BMD-capable cruisers, destroyers, and Aegis Ashore sites.¹⁷ The 2020 China Military Power Report assesses that in 2019 the PRC launched “more ballistic missiles for testing and training than the rest of the world combined.”¹⁸ With the increased lethality, speed, range, and quantity of China's missile systems, it's appropriate to reevaluate missile defense architectures and consider paths for improvement moving forward.

¹³ Noah Shachtman, “Hypersonic Cruise Missile: America's New Global Strike Weapon,” *Popular Mechanics*, December 3, 2006. <https://www.popularmechanics.com/military/a1101/4203874/>.

¹⁴ Iain Boyd, “How Hypersonic Missiles Work and the Unique Threats They Pose -an Aerospace Engineer Explains,” *The Conversation*, April 15, 2022. <https://theconversation.com/how-hypersonic-missiles-work-and-the-unique-threats-they-pose-an-aerospace-engineer-explains-180836>.

¹⁵ John Tirpak, “The Great Hypersonic Race,” *Air & Space Forces Magazine*, June 27, 2017, <https://www.airandspaceforces.com/article/the-great-hypersonic-race/>.

¹⁶ Michael Nixon et al., “The U.S.-China Military Scorecard,” *Rand Corporation*, 2017, https://www.rand.org/pubs/research_reports/RR392.html#download.

¹⁷ “Missiles of China,” *Missile Threat* (Center for Strategic and International Studies, June 14, 2018), <https://missilethreat.csis.org/country/china/>.

¹⁸ Annual Report to Congress: Military and Security Developments Involving the People's Republic of China, 55.

Legacy Missile Defense Architectures

The technical complexity of missile defense architectures is only surpassed by the technical challenge they have to solve. Consider the game of Major League Baseball. Pitchers average around 90 miles per hour for a fastball. Batters must anticipate the timing and location of an incoming ball within milliseconds of a pitcher's release. Successful major league batters make contact about 30% of the time. Now, imagine that pitch was traveling at roughly 3,836 miles per hour and the batter needs to throw the bat at the incoming pitch. Missile defense systems must solve complex physics problems with probability of kill ratios much higher than 30%. The Israeli Defense Force asserts that the Iron Dome is approximately 90% effective against incoming rockets.¹⁹

Current Missile Warning and Missile Defense architectures are comprised of four key elements: intelligence, surveillance, and reconnaissance (ISR); detection and tracking; weapons control; and engagement.²⁰ Missile Warning entails strategic ISR (i.e., space-based sensors) for detection and tracking while Missile Defense, is comprised of tactical ISR (i.e., phased array radar) for detection and tracking, weapons control and engagement technologies. Missile warning data is sent to CONUS operations centers like USSPACECOMMAND Missile Warning Center and NORAD's Cheyenne Mountain Complex, and down range to the Army's Joint Tactical Ground System (JTAGS).²¹ The problem is that these systems are bifurcated with long lines of communication between the satellite and targeted system. In the age of ASBMs and hypersonic weapons, speed is of the essence.

¹⁹ Anshel Pfeffer, "The Costly Success of Israel's Iron Dome," *The Atlantic Global*, May 24, 2021, <https://www.theatlantic.com/international/archive/2021/05/iron-dome-israel-netanyahu-hamas/618973/>.

²⁰ Warren Boord and John Hoffman, *Air and Missile Defense Systems Engineering* (CRS Press, 2016), 23–29.

²¹ Theresa Hitchens, "Army May Transfer Missile Warning Capabilities to Space Ops Command: Official," *Breaking Defense*, September 19, 2022, <https://breakingdefense.com/2022/09/army-may-transfer-missile-warning-capabilities-to-space-ops-command-official/>.

IMPROVING EFFICIENCY & EFFECTIVITY OF TACTICAL SYSTEMS WITH STRATEGIC ISR

Current missile warning and missile defense architectures could be improved by streamlining communication channels of strategic ISR directly into tactical nodes. When a heat signature from a launch in the Western Pacific is detected by a Space Force satellite sensor, an alert message is sent from the satellite to a ground control station, then to U.S. Strategic Command and USINDOPACOM, who in turn send messages to Army forces afield and Navy ships afloat.²² This process occurs very quickly- within minutes of event identification. As previously discussed, the timeline from missile launch to target strike can be very short- especially in the case of hypersonics.

The recent decommissioning of two ISR satellites is likely to have implications for the U.S. missile defense architecture. The Space Tracking and Surveillance System (STSS) satellite vehicles 1 and 2 were retired on March 8, 2022.²³ These satellites, operated by the Office of the Secretary of Defense Research and Engineering's Missile Defense Agency (MDA), were integrated directly into its fielded ballistic missile defense systems.²⁴ Missile Defense Agency plans to launch a follow-on satellite constellation, Hypersonic and Ballistic Tracking Space Sensor (HBTSS) in late 2023.²⁵ If the launch schedule remains on track, there will likely be a three to six period of on-orbit checkout before the system becomes operationally available.

²² U.S. Department of Defense Missile Defense Agency, "The Ballistic Missile Defense System," The System, July 21, 2021, <https://www.mda.mil/system/system.html>.

²³ Sandra Erwin, "DoD Decommissions Two Missile-Tracking Satellites after 12 Years in Orbit," Space News, March 14, 2022, <https://spacenews.com/dod-decommissions-two-missile-tracking-satellites-after-12-years-in-orbit/>.

²⁴ U.S. Department of Defense Missile Defense Agency, "The Ballistic Missile Defense System," The System, July 21, 2021, <https://www.mda.mil/system/system.html>.

²⁵ Theresa Hitchens, "After Space Tests, DoD to Decide on Hypersonic Tracking Sats in Late '23," Breaking Defense, March 29, 2022, <https://breakingdefense.com/2022/03/after-space-tests-dod-to-decide-on-hypersonic-tracking-sats-in-late-23/#:~:text=The%20two%20Hypersonic%20and%20Ballistic>.

In the interim, U.S. Space Force assets such as the Space-Based Infra-Red System (SBIRS) could provide strategic ISR and detection and tracking for ballistic missile launches directly to tactical nodes. In fact, STSS and SBIRS were originally designed to be one system.²⁶ STSS operated in Low Earth Orbit while SBIRS includes satellites in Geosynchronous Earth Orbit (GEO) and Highly Elliptical Orbit (HEO) for global coverage. As SBIRS faced schedule overruns, the STSS system was broken off and transitioned to MDA.²⁷ With the launch of GEO-6 in August 2022, the planned SBIRS constellation is now complete.²⁸ The MDA space-based sensor suite is comprised of three platforms; STSS, Space-based Kill Assessment, and the Near Field Infrared Experiment (NFIRE).²⁹ Both Space-based Kill Assessment and NFIRE are prototypes. With the decommissioning of STSS, SBIRS is the next best readily available option for integrating strategic ISR into weapons systems in the near-term. The SBIRS missile warning/missile defense notification process could be expedited by providing data directly to Patriot batteries and AEGIS systems on Carriers, like STSS did. Tightly coupling this communication chain would provide operational commanders greater lead time in preparing for and executing a response.

MDA may be resistant to the incorporation of SBIRS GEO and HEO into tactical nodes, out of concern that it may jeopardize future HBTSS funding. That is, if Congress views the ‘patched’ architecture as sufficient, they may descope future HBTSS satellite vehicles. Ultimately, HBTSS is the optimum solution for strategic warning of hypersonics and ballistic missiles. In the interim, INDOPACOM should take full advantage of fielded systems.

²⁶ Sandra Erwin, “DoD Decommissions Two Missile-Tracking Satellites”.

²⁷ “SBIRS,” Lockheed Martin, August 9, 2022, <https://www.lockheedmartin.com/en-us/products/sbirs.html>.

²⁸ Lisa Sodders, “SBIRS GEO-6 Launch Closes out Two Decades of Progress in Missile Warning, Tracking and Det,” Space Systems Command (Space Force, August 22, 2022), <https://www.ssc.spaceforce.mil/Newsroom/Article-Display/Article/3124862/sbirs-geo-6-launch-closes-out-two-decades-of-progress-in-missile-warning-tracki>.

²⁹ Missile Defense Agency, “System Elements, Sensors,” mda.mil, 2014, <https://www.mda.mil/system/sensors.html>.

INTEGRATED REGIONAL MISSILE DEFENSE ARCHITECTURE

Another way to counter China's aggressive weapons build up is through the unification of allies & partner missile defense systems in the region. USINDOPACOM's Integrated Air and Missile Defense Vision 2028 calls for area of responsibility (AOR)-wide integrated sensor coverage along with combined battle management and engagement coordination.³⁰ Conceptually, this would network the missile defense architectures of various allies like Australia, South Korea, and the Philippines for an integrated defense architecture. This would be an ambitious endeavor, given the complexity of interfacing joint service programs from different countries at various classification regimes. However, it would be very advantageous given the sheer volume of Chinese missiles.

Integrated Air and Missile Defense Vision 2028 advocates for the integration of regional partners into a broader mesh network of missile defense to cover the large AOR. It recognizes that allies and partners in the Indo-Pacific region may be better positioned with sensor coverage to observe launches in the southern and western Pacific. This is appropriate based on theater geometry. Other nations may also be better suited to target and intercept ballistic missiles from China. Countries would need agreement on classified information-sharing policies before an AOR-wide IAMD vision could be implemented. It may be advantageous for willing parties to procure individual commercial-off-the-shelf (COTS) systems like Israel's Iron Dome. In fact, in November 2021, the Army conducted a test of the Iron Dome system in White Sands for future

³⁰ Col Lynn Savage, "US INDOPACOM's Integrated Air and Missile Defense Vision 2028," *Journal of Indo-Pacific Affairs* 5, no. 1 (January 28, 2022): 5–7, <https://www.airuniversity.af.edu/JIPA/Display/Article/2915508/us-indopacoms-integrated-air-and-missile-defense-vision-2028-integrated-deterre/>.

deployment in Guam.³¹ Networking the same system in various locations would undoubtedly be less complex than integrating home-grown missile defense systems.

Barriers to implementation include national resistance sharing data, past conflicts and disagreements between nations, China's likely intervention, concerns over cyber intrusion, and the technical challenges of developing an integrated system with multiple stakeholders.³² A COTS system could be considered; however, countries may be unwilling or unable to afford the cost. Given the urgent need for an integrated system in the AOR and challenges of implementing IAMD Vision 2028, a Presidential executive order mandating the utilization of all instruments of power, to include financial incentives for foreign military sales to allies and partners, could help make this vision a reality.

FAST-TRACKING OTHER TECHNOLOGY SOLUTIONS

In a missile attack scenario, the aggressor is advantaged because achieving intercept is challenging, there is a limited quantity of interceptors, and missiles have counter-defense capabilities to confuse defense systems. USINDOPACOM should look for additional technologies to complement legacy systems. Two technology developments that offer some promise are space-based interceptors and directed energy weapons. Artificial intelligence and machine learning are also propitious, but are beyond the scope of this assessment.

Space-Based Interceptors

As the SM-3 and Aegis are employed for land and sea domains, a defensive option for the space is worth consideration. In the 1980's the Strategic Defense Initiative (SDI) aimed to develop a space-based missile defense program to counter intercontinental ballistic missiles from

³¹ "US Army Deploys Iron Dome Missile Defense System to Guam," AP News, November 17, 2021, <https://apnews.com/article/technology-guam-us-army-b5cc9812c7a29a1cda3c104d042dbed1>.

³² Col Lynn Savage, "US INDOPACOM's Integrated Air and Missile Defense Vision 2028", 2.

Russia.³³ Although the program was ultimately terminated amid technical challenges and diplomatic negotiations with Russia, some argued that the system would make ballistic missiles obsolete.³⁴ While reestablishing the SDI program is a politically untenable, the re-envisioning of some attributes could be worth investigating, given the complexity of the missile defense problem in the Western Pacific. In 2018, Thomas Roberts argued in the *Bulletin of the Atomic Scientists* that although a space-based sensor architecture is plausible, a space-based intercept layer would be inefficient and cost prohibitive, based on the number of missiles required for global coverage.³⁵ Although this is likely true for global coverage, a space-based regional augmentation would be more economically feasible due to the smaller constellation size. In August 2022, Roberts described a viable orbital regime for regional space-based interceptors, revising his earlier position.³⁶ Advances in technology make this capability more technically achievable today than in 1980's, but policy concerns would need to be resolved prior to implementation.

Directed Energy Weapons

Additionally, recent technological advances in Directed Energy Weapons (DEWs) may increase their capability against hypersonic weapons. DEWs, comprised of various types of lasers to microwave weapons, have the destructive power of military weapons but operate at the speed of light. New research in free electron and fiber lasers have increased laser power while

³³ U.S. Department of State, "Strategic Defense Initiative (SDI), 1983," *U.S. Department of State Archives*, January 9, 2009, <https://2001-2009.state.gov/r/pa/ho/time/rd/104253.htm>.

³⁴ U.S. Department of State, "Strategic Defense Initiative (SDI), 1983," *U.S. Department of State Archives*, January 9, 2009, <https://2001-2009.state.gov/r/pa/ho/time/rd/104253.htm>.

³⁵ Thomas G. Roberts, "Why a Space-Based Missile Interceptor System Is Not Viable," *Bulletin of the Atomic Scientists* 74, no. 4 (June 28, 2018): 238–42, <https://doi.org/10.1080/00963402.2018.1486597>.

³⁶ Thomas Roberts, "Aerospace Security Space-Based Missile Defense: How Much Is Enough?," *Aerospace Security* (Center for Strategic and International Studies, August 4, 2022), <https://aerospace.csis.org/data/space-based-missile-defense-interceptors/>.

reducing their size.^{37,40} The DoD is investigating these potential advantages for incorporation into future combat systems. In FY23, the Department requested \$605 million dollars for DEW research and development.³⁸ DEWs would provide an asymmetric advantage against China's hypersonic weapons in boost phase, neutralizing the threat before targeting becomes more challenging.³⁹

In summary, both space-based interceptors and directed energy weapons offer complementary missile defense capabilities that are worthy of exploration. Only DEWs were funded in President's Budget for Fiscal Year 2023.⁴⁰ While some may argue that existing missile defense technology is adequate, this claim is not substantiated based off the development of maneuverable hypersonic weapons which follow unconventional flight paths. In a war with China, having diversified methods of layered missile defense capabilities would be extremely advantageous.

POTENTIAL ARMS RACE

China may view significant U.S. investment in theater missile warning/missile defense systems as an aggressive maneuver to assert regional dominance and increase development in counter systems to overcome U.S. missile defense capabilities accordingly. In the 2019 Chinese Defense White Paper, China claimed that the "deployment of the Terminal High Altitude Area Defense (THAAD) system in the Republic of Korea (ROK) by the U.S. has severely undermined

³⁷ Jon Harper, "U.S. Challenged to Defend against Chinese Missiles," www.nationaldefensemagazine.org, March 7, 2022, <https://www.nationaldefensemagazine.org/articles/2022/3/7/us-challenged-to-defend-against-chinese-missiles>.

³⁸ "Department of Defense Fiscal Year 2023 Budget Request Defense Budget Overview," *Office of the Secretary of Defense (Comptroller)/Chief Financial Officer*, March 2022, https://comptroller.defense.gov/Portals/45/Documents/defbudget/FY2023/FY2023_Budget_Request.pdf.

³⁹ Henry Jeffress, "Countering Hypersonic Threats with Directed Energy," *Over the Horizon Journal* (Air University, January 24, 2018), <https://othjournal.com/2018/01/24/countering-hypersonic-threats-with-directed-energy/>.

⁴⁰ "Department of Defense Fiscal Year 2023 Budget Request Defense Budget Overview," *Office of the Secretary of Defense (Comptroller)/Chief Financial Officer*, March 2022, https://comptroller.defense.gov/Portals/45/Documents/defbudget/FY2023/FY2023_Budget_Request.pdf.

the regional strategic balance and the strategic security interests of regional countries.”⁴¹ China perceives U.S. development of ballistic missile defenses as an American strategy to “softly contain China and to police the world.”⁴² While China’s continued modernization of its missile force is inevitable, the fielding of advanced U.S. missile defense may shape the scope and timing of that efforts.

On the other hand, China is likely to continue to develop its offensive missile capability in pursuit of regional hegemony regardless of U.S. investment in missile defense systems. A critical feature of China’s military modernization is “its conventional ballistic missile arsenal designed to prevent U.S. military access to support regional allies and partners.”⁴³ The PLA has “achieved parity or surpassed America” in the number of deployable surface-to-air missiles and cruise and ballistic missiles.⁴⁴ The U.S. should pursue a missile defense strategy in line with rational self-defense interest, rather than fear of perceived Chinese response.

CONCLUSION

The PLARF has expanded its offensive missile capability at an alarming rate. Current missile warning and missile defense architectures in the Western Pacific may be unable to counter hypersonic vehicles or match China’s prolific missile arsenal. Time will be a critical factor in a South China Sea conflict. Integrating SBIRS into forward-based assets would inject the threat warning where it needs to be- on the tactical edge. Interoperability with allies and partners increases probability of success in a Taiwan Straits scenario and IAMD Vision 2028

⁴¹ Anthony H. Cordesman, “China’s New 2019 Defense White Paper,” Center for Strategic and International Studies, July 24, 2019, <https://www.csis.org/analysis/chinas-new-2019-defense-white-paper>.

⁴² George Lewis, Lisbeth Gronlund, and David Wright, “National Missile Defense: An Indefensible System,” *Foreign Policy* Winter, no. 117 (1999): 120, <https://doi.org/10.2307/1149568>.

⁴³ Office of the Secretary of Defense, “Missile Defense Review,” 2019, <https://media.defense.gov/2019/Jan/17/2002080666/-1/-1/1/2019-MISSILE-DEFENSE-REVIEW.PDF>.

⁴⁴ Office of the Secretary of Defense, “Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China,” 38.

should be pursued. A Presidential executive order to employ the full spectrum of U.S. diplomatic, economic, and military power would help achieve that objective on the desired timeline. Complementary technologies such as regional space-based interceptors and Directed Energy Weapons should be fast-tracked, while noting that space-based interceptors would likely face policy challenges. Investing time and resources now to improve the missile defense architecture in the Western Pacific will provide USINDOPACOM more decision speed in the future to neutralize the threat.

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