



# ANALYSIS

## MISSILE DEFENSE IN A MULTIPOLAR WORLD\*

By

James Bosbotinis

Harris S. Fried

Colonel David Shank, USA (ret.)

### INTRODUCTION/BACKGROUND

The recent Department of Defense (DoD) announcement surrounding the soon to be published National Defense Strategy and efforts to initiate the Missile Defense Review in close coordination ensuring an integrated approach is a tremendous step towards a collective and synchronized approach (a Nuclear Posture Review is also underway as is a wider National Security Strategy review). This is reflected in the concept of Integrated Deterrence that the DoD is promulgating, an approach which “is multi-domain, spans numerous geographic areas of responsibility, is united with allies and partners, and is fortified by all instruments of national power.”<sup>1</sup> However, the implementation and implications of Integrated Deterrence have yet to be articulated, with Harlan Ullman suggesting that it “appears integrated deterrence so far is a slogan.”<sup>2</sup> These efforts are critical to establishing a baseline of strategic guidance across the DoD, and necessary to address the global threats to the United States and its geopolitical interests.

Continued modernization, research, development, and testing by the People’s Republic of China (PRC) and Russia clearly present significant challenges to the United States and must be addressed using the aforementioned defense documents, coupled with an increased DoD budget, a more expeditious acquisition process, and recognition that both countries are influencing global politics in a push for a change from a unipolar to a multipolar world. Although, as Øystein Tunsjø explains, the distribution of capabilities, in particular, the huge disparity between Chinese and Russian national power, indicates that a new U.S.-China bipolar system is emerging, rather than a multipolar system.<sup>3</sup> Jacques Delisle and Avery Goldstein explain in this regard: “China’s rapid rise, and the absence of any other state following a similar trajectory, brought a transition from the post-Cold War condition of

---

\*The authors would like to express their gratitude to the Hon. David Trachtenberg at the National Institute for Public Policy for taking the time to review several drafts of this paper and for his insightful and invaluable comments and suggestions. The contents and views expressed herein are our own.

<sup>1</sup> Terri Moon Cronk, “DOD Official Says Integrated Deterrence is Call to Action,” U.S. DoD, 28 September 2021, available at <https://www.defense.gov/News/News-Stories/Article/Article/2791589/dod-official-says-concept-of-integrated-deterrence-is-call-to-action/source/GovDelivery/>.

<sup>2</sup> Harlan Ullman, “‘Integrated Deterrence’ Must be a Strategy, Not a Slogan,” *UPI*, 20 October 2021, available at <https://www.upi.com/Voices/2021/10/20/Harlan-Ullman-integrated-deterrence-defense-lloyd-austin/3151634653636/>.

<sup>3</sup> Øystein Tunsjø, *The Return of Bipolarity in World Politics: China, the United States, and Geostructural Realism* (New York: Columbia University Press, 2018), pp. 77-78 and pp. 180-181.



unipolarity, marked by the United States' position as a peerless superpower, to what seems likely to become a bipolar world sometime in the first half of the twenty-first century."<sup>4</sup>

Both Russia and the PRC are challenging the world order, which has not been observed since the end of the Cold War, and notwithstanding, Iran, North Korea, and non-state actors will continue to challenge international norms and the United States. This requires the United States to act, and act now in a more deliberate, methodical way introducing a comprehensive strategy and well thought out policies to deter adversaries from negatively impacting the current world order. If not, smaller, less influential nations will be required to 'pick sides' in order to survive, impacting regional and ultimately global stability.

During the last 15-20 years since the U.S. invasions of Afghanistan and Iraq, the DoD has been fighting a counter insurgency war while adversaries (specifically the PRC and Russia) have been modernizing, researching, and testing technological advancements of kinetic and non-kinetic weapon capabilities across all domains. Meanwhile, the United States has spent greater than one trillion dollars towards the global war on terrorism and now faces significant challenges to maintain legitimacy and international norms as the world power leading both economically and militarily when required.

The most striking development in the international system is the shift in the global balance of power from the Euro-Atlantic to the Asia-Pacific, most vividly demonstrated by the rise of China, and the emergence of major regional powers, including Japan and South Korea. North Korea's development of nuclear weapons and an increasingly diverse range of missile systems, including a nascent intermediate-range and intercontinental ballistic missile capability, poses a potent challenge to regional and international security. The growth of the Chinese economy – as of 2020, China's GDP was \$14.7 trillion compared to the United States' \$20.9 trillion,<sup>5</sup> and with it, wider Chinese national power and influence, is heralding, arguably, the return of a bipolar international system.<sup>6</sup>

Russia, although remaining a peer of the United States in terms of nuclear weapons, and a potent military threat, in particular through its growing investment in long-range precision strike capabilities, lacks the economic foundation to fully realize its ambitions of being a distinct pole in a multipolar system. Russia's GDP in 2019 was \$1.68 trillion, having declined from a 2013 peak of \$2.29 trillion,<sup>7</sup> and although Moscow is developing, for example, the PAK DA strategic stealth bomber, hypersonic weapons, and has ambitions to rebuild its navy, it faces massive economic constraints. However, whilst Russia is aware of its economic weaknesses, it is also cognizant of the West's vulnerability to economic disruption, and thus would in the event of conflict, focus on the extensive targeting of Western critical economic

---

<sup>4</sup> Jacques Delisle and Avery Goldstein, 'Rivalry and Security in a New Era for US-China Relations', in Jacques Delisle and Avery Goldstein (eds.), *After Engagement: Dilemmas in U.S.-China Security Relations* (Washington, D.C.: Brookings Institution Press, 2021), pp. 1-49.

<sup>5</sup> Data from the World Bank, available at <https://data.worldbank.org/country>.

<sup>6</sup> Tunsjø, *The Return of Bipolarity in World Politics*, pp. 50-75.

<sup>7</sup> "Russian Federation," available at <https://data.worldbank.org/country/russian-federation?view=chart>.

infrastructure.<sup>8</sup> It warrants emphasizing, that while Russia without fundamental economic reform cannot approach the United States or China in terms of aggregate national capabilities, Moscow nonetheless remains committed to pursuing its great power ambitions and possesses a diverse range of capabilities with which it can challenge, in particular, the balance of power in the Euro-Atlantic.

Russia demonstrated significant challenges to the United States during the Syrian conflict and Islamic State campaign, experimenting and testing new military capabilities while leveraging a multi domain approach. It is the PRC, though, that continues to develop and expand offensive long-range capabilities alongside the ongoing first island chain construction presenting grave challenges to the United States, its allies and partners.

U.S. superiority was in large measure derived from its advantageous geographical position: the Atlantic and Pacific oceans isolated the United States from most threats. Given the availability of new missile technologies available to a broad range of actors who have demonstrated the willingness to rapidly adopt and deploy them to their advantage makes this no longer the case. The United States is confronted by a growing conventional precision strike threat (it has been vulnerable to Soviet/Russian nuclear attack since the 1950s) that has significant implications for U.S. military posture and strategy both in peacetime and in the event of conflict. This new dynamic and the evolving threat spectrum will make wise policy making all the more critical in the next few years.

## THE EVOLVING THREAT ENVIRONMENT

The following is a summary of the key capabilities either deployed or under development in Russia, China, North Korea and Iran. It is not an exhaustive list, rather it seeks to highlight the core trends driving missile force developments, namely, the development of robust long-range precision strike capabilities, hypersonic weapon systems, strategic force modernization in Russia and China, and the growing capabilities of Iran and North Korea.

### Russia

Russia possesses highly potent air and missile forces, encompassing the spectrum of short-range conventional systems through to strategic nuclear capabilities. Russia is also developing and deploying a robust conventional long-range precision strike capability and hypersonic weapons, including the Kinzhal air-launched ballistic missile (ALBM), and Avangard hypersonic glide vehicle (HGV). Hypersonic cruise missiles are also forthcoming, namely the 3K22 Tsirkon which will equip surface ships and submarines and the air-

---

<sup>8</sup> See, for example, James Bosbotinis, "Fire for Effect': Russia's Growing Long Range Strike Capabilities," *The Wavell Room*, 5 September 2018, available at <https://wavellroom.com/2018/09/05/fire-for-effect-russias-growing-long-range-strike-capabilities-and-its-implications/>.

launched Kh-95.<sup>9</sup> A ground-launched hypersonic missile with intermediate range is also under development;<sup>10</sup> this may be a ground-launched variant of the Tsirkon. Russia's development of long-range precision strike systems poses a substantial threat, in particular to critical economic and military infrastructure and allied forces in the Euro-Atlantic, with a growing ability to threaten the United States itself.<sup>11</sup> This is part of a large-scale rearmament effort intended to modernize the Russian armed forces; on 10 November 2021, at a meeting of the Russian Military-Industrial Commission, President Putin stated that "the share of up-to-date weapons and equipment in the strategic nuclear forces exceeds 80 percent, and in the general-purpose forces, it is above 70 percent."<sup>12</sup> Moreover, Putin added that:

We need to focus on introducing advanced information, bio- and cognitive technology, hypersonic arms, weapons based on new physical principles, as well as cutting-edge reconnaissance, navigation, communications and control systems. We should enhance the utility and combat sustainability of military products, partly through artificial intelligence and, of course, extensive use of robotics.<sup>13</sup>

The core of Russia's conventional long-range strike capabilities are provided by air and sea-launched cruise missiles, namely, the Kh-50, AS-23A/B (Kh-101/Kh-102), and SS-N-30 Kalibr (with ranges of 1,500, 4,500 and 2,000 km respectively); the Kh-95 may be related to the reported GZUR, with a range of 1,500 km, capable of Mach 6 and sized to fit within the bomb bay of a Tupolev Tu-95MS Bear.<sup>14</sup> An enlarged derivative of the Kalibr, the Kalibr-M, is also under development and will feature an increased range of 4,500 km, and due to enter service in the mid-2020s.<sup>15</sup> It will equip surface ships and submarines, with a ground-launched variant also under development. Russia also operates supersonic anti-ship cruise missiles with a secondary land-attack capability: the 3M55 Oniks and Kh-32 (replacing the Kh-22/AS-4 Kitchen). The Oniks has a range of 450 km and 350 km in the land attack and anti-ship roles respectively. In September 2019, it was reported that an extended-range (800 km) variant of the Oniks, Oniks-M, is under development.<sup>16</sup>

---

<sup>9</sup> "Russia Developing New Kh-95 Long-Range Hypersonic Missile", *TASS*, 3 August 2021, available at <https://tass.com/defense/1322211>.

<sup>10</sup> "Russia Starts Developing Land-Based Hypersonic Missile With Intermediate Range, Says Putin", *TASS*, 2 February 2019, available at <https://tass.com/defense/1042977>.

<sup>11</sup> John Grady, "Russia is Top Military Threat to U.S. Homeland, Air Force General Says," *USNI News*, 18 August 2021, available at <https://news.usni.org/2021/08/18/russia-is-top-military-threat-to-u-s-homeland-air-force-general-says>.

<sup>12</sup> President of Russia, "Military-Industrial Commission Meeting," 10 November 2021, available at <http://en.kremlin.ru/events/president/news/67093>.

<sup>13</sup> *Ibid.*

<sup>14</sup> Piotr Butowski, *Russia's Air-Launched Weapons: Russian-made Aircraft Ordnance Today* (Houston: Harpia Publishing, 2017), pp. 18, 22.

<sup>15</sup> "New Kalibr-M Cruise Missile With Range of Over 4,500 km in Development in Russia – Source," *TASS*, 8 January 2019, available at <https://tass.com/defense/1039123>.

<sup>16</sup> "Russia Develops Seaborne Cruise Missile with Increased Range Capability — Sources," *TASS*, 25 September 2019, available at <https://tass.com/defense/1079734>.

Moscow can be expected to deploy a robust ground-launched long-range strike capability, including subsonic, supersonic and hypersonic cruise missiles, and precision-guided ballistic missiles. It warrants highlighting that, as part of its wider efforts to develop a long-range strike capability, Russia developed a variety of ground-launched systems that either already violated the now defunct INF Treaty whilst ostensibly bound by the Treaty, or provided a rapid breakout capability. Russia's principal ground-launched strike system is the Iskander theatre tactical missile system, comprising the Iskander-M precision-guided short-range ballistic missile and the Iskander-K cruise missile. The Iskander-M has an official range of no more than 500 km in order to comply with the INF Treaty, but may in fact be closer to 700 km, with the potential to be extended further, perhaps up to 1,000 km.<sup>17</sup> An anti-ship capability has recently been added, utilizing technologies developed for the Kinzhal.<sup>18</sup> A replacement for Iskander-M is being developed.<sup>19</sup>

Russia is modernizing its bomber forces and intends to resume production of the Tupolev Tu-160 Blackjack; production of the upgraded Tu-160M2 is due to commence in 2023, with a requirement for at least 50 new aircraft to be acquired.<sup>20</sup> The avionics and other systems under development for the Tu-160M2 will also be utilized in the Tu-22M3M. The modernised Backfire will reportedly regain an air-to-air refuelling capability,<sup>21</sup> removed under U.S.-Soviet arms control arrangements, which together with the potential integration of the Kh-101, will enable the Backfire to operate in the strategic strike role. The operational reach of a Backfire with the Kh-101 would, depending on mission profile, potentially exceed 8,000 km. Current plans call for 30 Backfires to be upgraded.<sup>22</sup> The implications are outlined by Mark B Schneider:

The Backfire bomber is now not classified as a heavy bomber subject to limitations under the New START Treaty. Yet, the upgrades being reported in Russian state media would make it a heavy bomber under the New START Treaty. Failure to declare it as a heavy bomber would be a violation of the New START Treaty.<sup>23</sup>

---

<sup>17</sup> Stefan Forss, "The Russian Operational-Tactical Iskander Missile System," (Finnish National Defence University, Department of Strategic Studies *Working Papers* No.42), pp.13-15.

<sup>18</sup> "Iskander-M Adjusted to Hit Marine Targets," *Interfax: Russia and CIS Military Newswire*, 3 August 2018 (accessed via EBSCO Discovery Service).

<sup>19</sup> "Russia Developing New Weapon to Replace Iskander Tactical Missile System," *TASS*, 19 November 2020, available at <https://tass.com/defense/1225451>

<sup>20</sup> Piotr Butowski, *Russia's Warplanes Vol. 2: Russian-made Military Aircraft and Helicopters Today* (Houston: Harpia Publishing, 2017), p. 68.

<sup>21</sup> "Tupolev Tu-22M3 To Be Refueled [sic] in Mid-Air, Operate on Longer Range," *Interfax*, 3 October 2018, available at <https://interfax.com/newsroom/top-stories/22590/>.

<sup>22</sup> "Russia's Upgraded Tu-22m3 Strategic Missile-Carrying Bomber Gets Artificial Intelligence," *TASS*, 16 August 2018, available at <https://tass.com/defense/1017454>.

<sup>23</sup> Mark B. Schneider, "Russia's Modernization Programs for Strategic Bombers," *Real Clear Defense*, 24 March 2020, available at [https://www.realcleardefense.com/articles/2020/03/24/russias\\_modernization\\_programs\\_for\\_strategic\\_nuclear\\_bombers\\_115141.html](https://www.realcleardefense.com/articles/2020/03/24/russias_modernization_programs_for_strategic_nuclear_bombers_115141.html).

Following on from the Tu-160M2, Russia intends to start production of its next-generation long-range bomber, the PAK DA - Prospective Aviation Complex for Long Range Aviation - in the late 2020s. The PAK DA is envisioned to be a subsonic, flying-wing low-observable bomber, with a range in excess of 9,000 miles, and armed with a variety of advanced weapons, including long-range cruise missiles, hypersonic missiles, and potentially, air-to-air weapons.<sup>24</sup>

Alongside its precision strike capabilities, Russia continues to modernize its strategic nuclear forces. The Avangard HGV is slowly being deployed, equipping SS-19 intercontinental ballistic missiles (ICBMs), and eventually the SS-X-29, or Sarmat, a developmental heavy ICBM intended to replace the SS-18. The SS-27 Mods 1 and 2 constitute the core of Russia's ICBM force with a new ICBM, the Kedr, under development. Russia's naval strategic nuclear forces are also in the midst of a major modernization effort, centered on the re-equipping of its SSBN force with 10 Borei/Borei-A-class boats, each armed with 16 SS-N-32 Bulava submarine-launched ballistic missiles (SLBMs). It also warrants mention that the aforementioned cruise missile systems operated by the Russian Navy and Aerospace Forces are believed to be dual-capable, that is, capable of being armed with conventional and nuclear warheads. In addition to the potential issues surrounding the Tu-22M3M and arms control, two other Russian developmental systems may lay outside the remit of the New START, that is, the *Poseidon* nuclear-powered, nuclear-armed intercontinental autonomous underwater vehicle and the SSC-X-9 Skyfall nuclear-powered intercontinental cruise missile.<sup>25</sup>

In the context of Russia's growing long-range strike capabilities, the majority of the systems discussed above are dual-capable, and results in a 'blurring' of the distinction between conventional and nuclear weapons and brings with it the problem of discrimination.<sup>26</sup> This is compounded by Russian exercises which include scenarios involving nuclear use,<sup>27</sup> and its concept of de-escalation, or which as Katarzyna Zysk suggests, could be applied as "escalate to win."<sup>28</sup> It does warrant mention that the development of long-range precision strike systems (particularly hypersonic weapons) are seen as potentially offering, in the long-term, a means to reduce reliance on nuclear weapons in strategic deterrence.

---

<sup>24</sup> "Prospective long-range aircraft's equipment to include hypersonic weapons, air-to-air missiles – sources," *Interfax: Russia and CIS Military Newswire*, 14 August 2017 (accessed via EBSCO Discovery Service).

<sup>25</sup> Timothy J. Wright, "Russia's *Poseidon* Poser for Arms Control and Naval Defence," *IISS Military Balance Blog*, 3 July 2020, available at <https://www.iiss.org/blogs/military-balance/2020/07/russia-poseidon-arms-control-naval-defence>.

<sup>26</sup> Katarzyna Zysk, "Escalation and Nuclear Weapons in Russia's Military Strategy," *RUSI Journal*, Vol. 163, No. 2, April/May 2018, pp. 4-15.

<sup>27</sup> For example, see James Bosbotonis, "The Russian Federation Navy: An Assessment of its Strategic Setting, Doctrine and Prospects," Special Series (Defence Academy of the United Kingdom), 10/10, September 2010; and Zysk, pp. 8-9.

<sup>28</sup> *Ibid.*, p. 6.

## China

China possesses robust and broad-based air and missile forces, centered on a potent long-range precision strike capability utilizing short, medium and intermediate-range precision guided ballistic and cruise missiles deployed across land-, air-, and sea-based platforms. This provides an expansive regional strike capability, capable of targeting U.S. bases and forces and allies across East Asia, in particular Japan and Guam. Moreover, the range of certain systems, in particular the DF-26, and air and sea-launched systems, would enable China to prosecute targets in the Indian Ocean, Middle East and even eastern Mediterranean, including from within Chinese territory. The development of new long-range bombers, and the deployment of sea-launched cruise missiles, in particular on the forthcoming Type 095 submarine, will also provide China with the means to prosecute targets globally. China is also developing a more robust and survivable strategic nuclear deterrent capability, centered on particularly the new DF-41 ICBM, and the forthcoming Type 096 SSBN armed with the JL-3 SLBM, and H-20 strategic bomber.

The core of China's long-range strike capability is currently provided by the precision-guided ballistic missiles operated by the People's Liberation Army Rocket Force (PLARF), and a growing cruise missile capability, centered on the PLARF CJ-10,<sup>29</sup> the People's Liberation Army Air Force's (PLAAF) CJ-20-equipped H-6K Badger bomber, and the People's Liberation Army Navy (PLAN) with a growing number of submarines and ships (such as the Type 093 SSN and Type 052D *Luyang III* and Type 055 *Renhai*-class destroyers), equipped with either a naval variant of the CJ-10 or the YJ-18.

The PLARF currently operates four ballistic missile systems capable of long-range strikes: the 600-900 km range DF-15; the 800-1,000 km range DF-16; the 2,100 km range DF-21C; and the 4,000 km range DF-26.<sup>30</sup> The PLARF also operates the 1,500 km range DF-21D anti-ship ballistic missile (ASBM); the DF-26 is also capable of operating in the ASBM role. Moreover, in 2019, China unveiled two new theatre strike systems: the DF-17 and the DF-100. The DF-17 is a ballistic missile equipped with an HGV – the DF-ZF – and intended for precision strikes against medium and close-range targets. It is likely that the DF-ZF HGV that equips the DF-17 will be integrated with other missiles such as the DF-26. The DF-100, also referred to as the CJ-100, is a supersonic cruise missile offering long range, high precision and quick responsiveness. An air-launched variant of the CJ-100 high-speed cruise missile may equip the H-6N.<sup>31</sup> China is investing in a broad-based hypersonic technology base for

---

<sup>29</sup> "DF-10/CJ-10/DH-10 Surface to Surface Cruise Missile," *Army Recognition*, available at <https://www.armyrecognition.com/china-chinese-army-missile-systems-vehicles/df-10-cj-10-dh-10-cruise-missile-surface-to-surface-technical-data-sheet-specifications-pictures-video-12301163.html>.

<sup>30</sup> For detailed information on the respective missile systems, see "China," *Missile Threat*, CSIS, available at <https://missilethreat.csis.org/country/china/>.

<sup>31</sup> Minnie Chan and Liu Zhen, "China's new supersonic arsenal could give H-6N bomber force greater reach, military experts say," *South China Morning Post*, November 10, 2019, available at <https://www.scmp.com/news/china/military/article/3036994/chinas-new-supersonic-arsenal-could-give-h-6n-bomber-force>.

military and other applications;<sup>32</sup> interest in an air-launched hypersonic strike capability has been reported,<sup>33</sup> and is likely to emerge in the near-term.

Alongside its missile assets, China is investing in the development of its air capabilities, including a new strategic stealth bomber – the H-20, and a regional bomber.<sup>34</sup> Although China's current H-6K bombers are capable of prosecuting long-range stand-off missile strikes, they are not capable of operating in defended airspace. In contrast, the H-20, with an expected combat radius of 5,000 km, and designed to be stealthy with an advanced electronic warfare capability to enhance survivability, will likely be capable of operating in the face of an adversary's air defenses. The H-6N, the newest variant of the H-6 bomber, may be capable of launching an ALBM.<sup>35</sup> China is believed to be developing at least one dual-capable ALBM, designated the CH-AS-X-13, which is believed to have a range of 3,000 km.<sup>36</sup>

Although the 2019 defense whitepaper, *China's National Defense in the New Era*, states that China is committed to a minimal nuclear deterrent, and a policy of no-first use,<sup>37</sup> China is engaged in a broad-based modernization of its strategic nuclear forces which could enable a significant shift in nuclear posture. At present, the core of China's strategic nuclear deterrent is provided by silo-based DF-5, road-mobile DF-31/A/AG and DF-41 ICBMs, and six Type 094 *Jin*-class SSBNs each armed with 12 JL-2 SLBMs.<sup>38</sup> The DF-41 is likely to also be deployed in silos and possibly as a rail-based system.<sup>39</sup> The discovery of at least two potential ICBM silo fields under construction in China could result in a significant expansion in China's ICBM capabilities, as Matt Korda and Hans Kristensen explain: "If the new silos are loaded with the new MIRVed DF-41 ICBMs, then Chinese ICBMs could potentially carry more than 875 warheads (assuming 3 warheads per missile) when the Yumen and Hami missile silo fields are completed."<sup>40</sup> The DF-41 may however, be capable of delivering up to 10 MIRVs per missile,<sup>41</sup> and thus enabling a much more robust Chinese strategic nuclear capability.

---

<sup>32</sup> James Bosbotonis, "International Hypersonic Strike Weapons Projects Accelerate," *Aviation Week*, June 15, 2020, available at <https://aviationweek.com/defense-space/missile-defense-weapons/international-hypersonic-strike-weapons-projects-accelerate>.

<sup>33</sup> Liu Xuanzun, "China's H-6K bomber expected to be armed with hypersonic weapons," *Global Times*, August 6, 2019, available at <https://www.globaltimes.cn/content/1160495.shtml>.

<sup>34</sup> James Bosbotonis, "China's Regional Bomber and its Implications," *The Central Blue*, March 17, 2019, available at <http://centralblue.williamsfoundation.org.au/chinas-regional-bomber-and-its-implications-james-bosbotinis/>.

<sup>35</sup> Greg Waldron, "Chinese H-6N Appears with Mysterious Ballistic Missile," *Flight Global*, 19 October 2020, available at <https://www.flightglobal.com/defence/chinese-h-6n-appears-with-mysterious-ballistic-missile/140671.article>.

<sup>36</sup> Ankit Panda, "Revealed: China's Nuclear-Capable Air-Launched Ballistic Missile," *The Diplomat*, 10 April 2018, available at <https://thediplomat.com/2018/04/revealed-chinas-nuclear-capable-air-launched-ballistic-missile/>.

<sup>37</sup> The State Council Information Office of the People's Republic of China, *China's National Defense in the New Era*, (Beijing: Foreign Languages Press Co. Ltd., 2019), p.9.

<sup>38</sup> Hans Kristensen & Matt Korda, *Chinese Nuclear Forces, 2020*, Bulletin of the Atomic Scientists, 76:6, pp. 443-457.

<sup>39</sup> *Ibid.*, p. 448.

<sup>40</sup> Matt Korda and Hans Kristensen, "China is Building a Second Nuclear Missile Silo Field," *Federation of American Scientists*, 26 July 2021, available at <https://fas.org/blogs/security/2021/07/china-is-building-a-second-nuclear-missile-silo-field/>.

<sup>41</sup> "DF-41 (Dong Feng-41/CSS-X-20)," available at <https://missilethreat.csis.org/missile/df-41/>.



The annual *Military and Security Developments Involving the Peoples' Republic of China* 2021 states with regard to Chinese ICBM developments:

The PRC is developing new intercontinental ballistic missiles (ICBMs) that will significantly improve its nuclear-capable missile forces and will require increased nuclear warhead production, partially due to the incorporation of multiple independently targetable reentry vehicle (MIRV) capabilities. The PRC has commenced building at least three solid-fueled ICBM silo fields, which will cumulatively contain hundreds of new ICBM silos.<sup>42</sup>

The deployment in the coming decade of the JL-3-armed Type 096 submarine and H-20 strategic bomber will provide China with a credible triad and much greater choice with regard to posture and strategy.<sup>43</sup> On 16 October 2021, it was reported that China had conducted in August 2021, a test of a fractional orbital bombardment system (FOBS) utilizing a hypersonic glide vehicle; China has denied that it tested such a system and that the test in question was of a reusable space vehicle.<sup>44</sup> On 29 November 2021, Lieutenant General Chance Saltzman, deputy commander of the U.S. Space Force, confirmed that China had indeed tested a FOBS that deployed an HGV payload.<sup>45</sup> FOBS are intended to counter missile defense systems and in contrast to a traditional ballistic missile, place a warhead into low Earth orbit, which can then be delivered via an unexpected or unpredictable approach. The Soviet Union deployed a FOBS capability in 1969, remaining in service until 1983.<sup>46</sup> According to the U.S. DoD, "The accelerating pace of the PRC's nuclear expansion may enable the PRC to have up to 700 deliverable nuclear warheads by 2027. The PRC likely intends to have at least 1,000 warheads by 2030, exceeding the pace and size the DoD projected in 2020."<sup>47</sup> However, as David Trachtenberg has noted, the significant expansion of Chinese ICBM silo numbers together with the MIRVed DF-41, could provide "a force of some 300 Chinese ICBM silos containing missiles with 10 warheads apiece," which "would amount to

---

<sup>42</sup> Office of the Secretary of Defense, *Military and Security Developments Involving the People's Republic of China*, 2021, p. VII, available at <https://media.defense.gov/2021/Nov/03/2002885874/-1/-1/0/2021-CMPR-FINAL.PDF>.

<sup>43</sup> Aaron Mehta, "STRATCOM Chief Warns of Chinese 'Strategic Breakout,'" *Breaking Defense*, 12 August 2021, available at [https://breakingdefense.com/2021/08/stratcom-chief-warns-of-chinese-strategic-breakout/?utm\\_campaign=Breaking%20News&utm\\_medium=email&hsmi=149095555&hsenc=p2ANqtz-9bBcjQ1dPEpYbb7YOqNjP0CIIZhPkRjLABsjuySScn7Pi93IISmx9vcCxSMiZbuRH7OzK5BpQX58Wc2UusyMO1\\_ix-6UhM-X1OpJivL21azQLzqz18&utm\\_content=149095555&utm\\_source=hs\\_email](https://breakingdefense.com/2021/08/stratcom-chief-warns-of-chinese-strategic-breakout/?utm_campaign=Breaking%20News&utm_medium=email&hsmi=149095555&hsenc=p2ANqtz-9bBcjQ1dPEpYbb7YOqNjP0CIIZhPkRjLABsjuySScn7Pi93IISmx9vcCxSMiZbuRH7OzK5BpQX58Wc2UusyMO1_ix-6UhM-X1OpJivL21azQLzqz18&utm_content=149095555&utm_source=hs_email).

<sup>44</sup> Theresa Hitchens, "After China's 'Hypersonic' Test, US Alarm And Many Unanswered Questions," *Breaking Defense*, 19 October 2021, available at <https://breakingdefense.com/2021/10/questions-linger-over-chinas-reported-hypersonic-space-weapon-test/>.

<sup>45</sup> Theresa Hitchens, "It's a FOBS, Space Force's Saltzman Confirms Amid Chinese Weapons Test Confusion," *Breaking Defense*, 29 November 2021, available at <https://breakingdefense.com/2021/11/its-a-fobs-space-forces-saltzman-confirms-amid-chinese-weapons-test-confusion/>.

<sup>46</sup> Braxton Brick Eisel, "The FOBS of War," *Air Force Magazine*, 1 June 2005, available at <https://www.airforcemag.com/article/0605fobs/>.

<sup>47</sup> Office of the Secretary of Defense, *Military and Security Developments Involving the People's Republic of China* 2021, p. VIII.

a greater number of ICBM warheads than the total number of deployed U.S. strategic nuclear weapons.”<sup>48</sup>

## North Korea

North Korea has developed an extensive short and medium-range missile capability that can hold at risk U.S. forces across South Korea and Japan, with a nascent ability to prosecute strikes against regional targets, in particular Guam.<sup>49</sup> Pyongyang has also successfully tested the Hwasong-14 and 15 ICBMs and unveiled in October 2020, the Hwasong-16 ICBM.<sup>50</sup> Any North Korean ICBM capability, will at present, be most limited.<sup>51</sup> North Korea continues to enhance its missile forces, including efforts to develop precision strike and counter-missile defense capabilities through, for example, the use of maneuvering warheads and in-flight aerodynamic control: the KN-23<sup>52</sup> and KN-24<sup>53</sup> are notable examples of new North Korean tactical ballistic missiles offering enhanced survivability and potentially precision strike capabilities.<sup>54</sup>

North Korea has tested two intermediate-range ballistic missiles (IRBMs), the BM-25 Musudan and the Hwasong-12, both of which are road-mobile, liquid fueled, and likely capable of delivering a nuclear warhead.<sup>55</sup> In August 2017, North Korea threatened to launch Hwasong-12s toward Guam with projected aimpoints 30-40 km off the island.<sup>56</sup> Although the Musudan and Hwasong-12 could also deliver conventional warheads, neither missile could be employed in the precision strike role. North Korea is also pursuing the development of a submarine-launched ballistic missile (SLBM) capability, centered on the 1,900 km-range Pukguksong-3 and associated *Sinpo-class* diesel-electric ballistic missile submarine (SSB).<sup>57</sup>

---

<sup>48</sup> David J. Trachtenberg, “Back to the Future: A Misguided Understanding of China’s Nuclear Intent,” National Institute for Public Policy *Information Series*, Issue No. 507, November 4, 2021, available at [https://nipp.org/information\\_series/david-j-trachtenberg-back-to-the-future-a-misguided-understanding-of-chinas-nuclear-intent-no-507-november-4-2021/](https://nipp.org/information_series/david-j-trachtenberg-back-to-the-future-a-misguided-understanding-of-chinas-nuclear-intent-no-507-november-4-2021/).

<sup>49</sup> James Bosbotonis, Harris S. Fried and David Shank, “Guam: A Critical Line of Defense – Threats and Means to Deter and Defend,” National Institute for Public Policy *Information Series*, Issue No. 498, 4 August 2021, available at [https://nipp.org/information\\_series/james-bosbotonis-harris-s-fried-david-shank-guam-a-critical-line-of-defense-threats-and-means-to-deter-and-defend-no-498-august-4-2021/](https://nipp.org/information_series/james-bosbotonis-harris-s-fried-david-shank-guam-a-critical-line-of-defense-threats-and-means-to-deter-and-defend-no-498-august-4-2021/).

<sup>50</sup> For detailed analysis of the Hwasong-16 and its viability, see Michael Elleman, ‘Does Size Matter: North Korea’s Newest ICBM’, *38 North*, 21 October 2020, available at <https://www.38north.org/2020/10/melleman102120/>.

<sup>51</sup> “DPRK Strategic Capabilities and Security on the Korean Peninsula: Looking Ahead,” A Joint study by the Center for Energy and Security Studies (CENESS) and the International Institute for Strategic Studies (IISS), 2021, pp. 54-55.

<sup>52</sup> “KN-23,” available at <https://missilethreat.csis.org/missile/kn-23/>.

<sup>53</sup> “KN-24,” available at <https://missilethreat.csis.org/missile/kn-24/>.

<sup>54</sup> “DPRK Strategic Capabilities and Security on the Korean Peninsula: Looking Ahead,” pp. 57-58.

<sup>55</sup> See <https://missilethreat.csis.org/missile/musudan/> and <https://missilethreat.csis.org/missile/hwasong-12/>.

<sup>56</sup> “North Korea Guam missile strike plan 'ready by mid-August',” *BBC News*, August 10, 2017, available at <https://www.bbc.com/news/world-asia-40883372>.

<sup>57</sup> See <https://missilethreat.csis.org/missile/pukguksong-3/> and H. I. Sutton, “Unusual Submarine Likely To Increase Threat From North Korea,” *Naval News*, October 2, 2020, available at <https://www.navalnews.com/naval-news/2020/10/unusual-submarine-likely-to-increase-threat-from-north-korea/>.

In January 2021, North Korea unveiled a new SLBM, the Pukguksong-5, which may have a range of 3,000 km.<sup>58</sup> Moreover, Kim Jong-Un stated in an address on 9 January that Pyongyang was developing a nuclear-powered submarine, as well as hypersonic glide vehicles, and a conventionally armed intermediate-range cruise missile.<sup>59</sup> On 13 September 2021, North Korea confirmed that it had successfully tested a ground-launched cruise missile, which flew a distance of 1,500 km, and is likely intended to be nuclear-capable.<sup>60</sup> With a range in excess of 1,500 km, the new cruise missile will be capable of prosecuting targets across South Korea and Japan, and complement North Korea's arsenal of ballistic missiles, providing a multi-axis strike capability, and thereby complicating defensive efforts, for example, through evading missile defense systems. Moreover, if North Korea deploys a conventionally armed version of the cruise missile, it would provide a significantly enhanced precision strike capability. On 28 September 2021, North Korea tested, what it describes as a "newly-developed hypersonic missile Hwasong-8", equipped with a "detached hypersonic gliding warhead".<sup>61</sup>

## Iran

Iran has deployed a potent arsenal of short and medium-range rocket and ballistic missiles and is developing a burgeoning unmanned air and cruise missile capability. The 14 September 2019 cruise missile and drone, and 8 January 2020 ballistic missile attacks on Saudi oil infrastructure and Iraqi bases hosting U.S. forces respectively, provide a tangible demonstration of Iran's growing air and missile threat. Whilst in July 2021, Iran conducted at least two attacks against merchant vessels using UAVs. Iran has also developed and deployed anti-ship ballistic missiles; the Khalij Fars, Hormuz-1 and Hormuz-2, all of which are variants of the solid-fuel, road-mobile Fateh-110 ballistic missile, with a range of 300 km. The Khalij Fars is believed to utilize a terminal electro-optical guidance system, whilst the Hormuz-1 is an anti-radar variant. In January 2021, Iran launched multiple medium-range ballistic missiles (MRBMs), namely the Emad, Sejil and Ghadr, as part of its "Great Prophet 15" exercises, at ranges in excess of 1,000 miles and ostensibly testing their use in an anti-

---

<sup>58</sup> Michael Elleman, "North Korea's Newest Submarine-Launched Ballistic Missile, Same as the Old One?," *38 North*, January 15, 2021, available at <https://www.38north.org/2021/01/north-koreas-newest-submarine-launched-ballistic-missile-same-as-the-old-one/>.

<sup>59</sup> Gabriel Dominguez and Dae Young Kim, "North Korea developing nuclear-powered submarine, tactical nuclear missiles, says Kim Jong-un," *Janes*, January 11, 2021, available at <https://www.janes.com/defence-news/news-detail/north-korea-developing-nuclear-powered-submarine-tactical-nuclear-missiles-says-kim-jong-un>.

<sup>60</sup> Thomas Newdick, "Everything We Know About North Korea's New 'Strategic' Cruise Missile Test," *The War Zone*, 13 September 2021, available at <https://www.thedrive.com/the-war-zone/42349/everything-we-know-about-north-koreas-strategic-cruise-missile>.

<sup>61</sup> "Newly-Developed Hypersonic Missile Test-Fired," *KCNA Watch*, 29 September 2021, available at <https://kcnawatch.org/newstream/1632909730-439459665/newly-developed-hypersonic-missile-test-fired>; also see Joseph Trevithick, "North Korea Claims to have Tested A Hypersonic Missile (Updated)," *The War Zone*, 28 September 2021, available at <https://www.thedrive.com/the-war-zone/42560/north-korea-claims-to-have-tested-a-hypersonic-missile>.

ship role. It warrants mention that the development of a credible long-range ASBM capability will be dependent on the possession of the supporting intelligence, surveillance, and reconnaissance (ISR) kill chain to provide the necessary targeting data for the missiles.

Iran is working on improving its arsenal of ballistic missiles and heavy caliber rockets, in particular through such measures as the incorporation of terminal guidance systems, maneuvering re-entry vehicles, improved rocket engines and solid-fuel propulsion for ballistic missiles. The Emad MRBM is equipped with a maneuvering re-entry vehicle, whilst the Sejil utilizes solid fuel. A longer-range (3,000 km) variant of the Sejil, the Sejil 3, has been reported. If /when Iran develops a nuclear capability, the Sejil would provide an ideal delivery system. Being solid fueled, the missile does not require a lengthy fueling process before launch, easing transportability, and with a range of 2,000 km, has sufficient range to threaten Israel, U.S. interests and other regional geopolitical targets. In the *2020 Ballistic and Cruise Missile Threat* report, the U.S. National Air and Space Intelligence Center/Defense Intelligence Ballistic Missile Analysis Committee stated that:

Tehran's desire to have a strategic counter to the United States could drive it to field an ICBM. Progress in Iran's space program could shorten a pathway to an ICBM, because space launch vehicles (SLV) use inherently similar technologies. Since 2008, Iran has conducted multiple launches of the two-stage Safir SLV, and the larger two-stage Simorgh SLV, which could serve as a test bed for developing ICBM technologies.<sup>62</sup>

Iran also provides considerable material support, including the provision of rocket, missile and drone technologies to militant proxies, most notably the Lebanon-based Hezbollah, Palestinian Hamas and the Yemen-based Houthi rebels. Tehran also provides significant support to the Bashar Al-Assad regime in Syria. Further, Iran and North Korea cooperate in the development of ballistic missile systems.

## **CONCLUSION: IMPLICATIONS AND RECOMMENDATIONS**

The proliferation of advanced air and missile threats poses distinct tactical, operational and strategic challenges. From the proceeding discussion of Russian, Chinese, North Korean and Iranian missile force developments, several key trends are discernible. Firstly, there is a growing emphasis on the development of conventional long-range precision strike capabilities, most dramatically illustrated by Russian and Chinese systems (such as the Russian AS-23 extended-range cruise missile and the Chinese DF-100 supersonic cruise missile). Secondly, countering missile defense systems is a major driver, both through means such as speed (hypersonic weapons), evasion (for example, maneuvering warheads), and

---

<sup>62</sup> National Air and Space Intelligence Center (NASIC) and Defense Intelligence Ballistic Missile Analysis Committee, *2020 Ballistic and Cruise Missile Threat* (Wright-Patterson AFB: OH, July 2020), p. 2, available at [https://media.defense.gov/2021/jan/11/2002563190/-1/-1/1/2020%20BALLISTIC%20AND%20CRUISE%20MISSILE%20THREAT\\_FINAL\\_20CT\\_REDUCEDFILE.PDF?source=GovD](https://media.defense.gov/2021/jan/11/2002563190/-1/-1/1/2020%20BALLISTIC%20AND%20CRUISE%20MISSILE%20THREAT_FINAL_20CT_REDUCEDFILE.PDF?source=GovD)

through multi-directional, multi-domain, complex attacks. Third, Russia and China are developing and deploying hypersonic weapons, including conventional and nuclear systems, whilst North Korea has expressed its intention to develop an HGV. The Chief of the Russian General Staff, Valery Gerasimov stated in March 2018 that: “In the long term, an increase of capacities of high-precisions [sic] weapons, including hypersonic ones, will allow moving the main part of strategic deterrence to the non-nuclear sector from the nuclear one.”<sup>63</sup> Fourth, Russia and China continue to modernize their strategic nuclear forces, whilst North Korea is developing a nascent ICBM capability. China’s nuclear force developments, in particular its “massive increase of silo-based ICBM forces” and “novel nuclear-powered capabilities,”<sup>64</sup> have raised concerns that Beijing may be seeking nuclear parity with Russia and the United States, with Lieutenant General Thomas Bussiere, the deputy commander of U.S. Strategic Command, suggesting that China will in the near-term surpass Russia as the principal nuclear threat to the United States.<sup>65</sup>

In this context, DoD’s 2021 annual report on Chinese military developments states: “The PRC is also supporting this expansion by increasing its capacity to produce and separate plutonium by constructing fast breeder reactors and reprocessing facilities,”<sup>66</sup> which as Kristensen and Korda discuss, could enable China to acquire “significant stocks of plutonium.”<sup>67</sup> That is, China is expected to substantially increase the size of its nuclear arsenal over the next decade or so.<sup>68</sup>

Responding to the evolving air and missile threat environment requires a multi-faceted approach, which would include:

- an emphasis on distributed and cross-domain operations;
- passive measures including dispersal, hardening and deception (the U.S. Air Force’s Agile Combat Employment concept is a notable example in this regard<sup>69</sup>);

---

<sup>63</sup> “Improvement of hypersonic weapons to allow moving main part of strategic deterrence to non-nuclear sector - General Staff chief,” *Interfax: Russia and CIS Military Newswire*, 26 March 2018 (accessed via EBSCO Discovery Service).

<sup>64</sup> Bonnie Jenkins, Under Secretary for Arms Control and International Security, “Nuclear Arms Control: A New Era?,” Remarks at NATO Conference on WMD Arms Control, Disarmament, And Nonproliferation, Copenhagen, Denmark, 6 September 2021, available at <https://www.state.gov/under-secretary-bonnie-jenkins-remarks-nuclear-arms-control-a-new-era/>.

<sup>65</sup> Michael Martina, “China Will Soon Surpass Russia As A Nuclear Threat –Senior U.S. Military Official,” *Reuters*, 27 August 2021, available at <https://www.reuters.com/world/china/china-will-soon-surpass-russia-nuclear-threat-senior-us-military-official-2021-08-27/>.

<sup>66</sup> Office of the Secretary of Defense, *Military and Security Developments Involving the People’s Republic of China*, p. VIII.

<sup>67</sup> Hans M. Kristensen and Matt Korda, *Chinese nuclear weapons, 2021*, *Bulletin of the Atomic Scientists*, Vol. 77, No. 6, 2021, p. 318.

<sup>68</sup> It is possible that China’s nuclear arsenal may grow beyond what is projected by the DoD, as, for example, Mark Schneider argues, see Mark Schneider, “Why China’s Hypersonic and Nuclear Weapons Build Up is Dangerous,” 1945, December 4, 2021, available at <https://www.19fortyfive.com/2021/12/why-chinas-hypersonic-and-nuclear-weapons-build-up-is-dangerous/>.

<sup>69</sup> Theresa Hitchens, “Trilateral Cope North Exercise to Test ‘Agile’ Air Ops on Austere Airfields,” *Breaking Defense*, 27 January 2021, available at <https://breakingdefense.com/2021/01/trilateral-cope-north-exercise-to-test-agile-air-ops-on-austere-airfields/>.

- active measures including enhanced early warning, electronic and cyber warfare capabilities (for example, to deny, disrupt and destroy supporting kill chains for precision strike systems), counterforce targeting of threat systems and launch platforms, and expediting acquisition efforts for greater capability and capacity of enhanced, layered air and missile defense systems, including directed energy weapons and space-based capabilities.

Given the investment in cruise missile capabilities at both the regional and strategic levels by Russia, China, North Korea and Iran, the development of robust cruise missile defenses is critical. Russia is developing and deploying an expansive cruise missile capability across air, land and sea-based platforms, including extended-range systems such as the Kalibr-M and Kh-101, both with ranges of 4,500 km. A ground-launched variant of the Kalibr-M could, from eastern Russia (for example, Anadyr) prosecute targets across Alaska and the U.S. Pacific Northwest, whilst if deployed on the *Yasen*-class submarines, could from western Atlantic, strike targets across the majority of the United States. The Kh-101 combines extended range with stealth, thus further complicating the task of defending against it. This highlights the central challenge confronting the United States: although having faced the threat of Soviet nuclear strikes throughout most of the Cold War, it has not been confronted with the threat of an adversary capable of prosecuting large-scale conventional precision strikes against critical military and civilian infrastructure.

It warrants highlighting that credible air and missile defense capabilities will be critical to reassuring allies and maintaining access, basing and overflight rights, especially as potential adversaries develop increasingly robust precision strike forces. In this respect, Jan Van Tol cites Chinese military literature suggesting an objective for Chinese air and missile forces in the event of conflict would be to: “Threaten all US operating bases in the Western Pacific, including those in Japan, with persistent ballistic and cruise missile attacks — the concomitant ability to strike allies and partners has implications for their willingness to support US basing access...”<sup>70</sup> Likewise, Russia could also employ its long-range strike assets as a coercive instrument alongside or in support of political, economic and “activist”-based pressure to compel target states to withdraw access, basing and overflight rights. That is, the *threat* posed by precision strike systems could also be leveraged to compel states to deny access, basing and overflight rights, declare neutrality, or comply with Moscow’s demands, or be subject to kinetic strikes.

Similarly, the United States will need to possess credible homeland air and missile defenses, in particular against cruise missiles (whether low observable, supersonic or hypersonic) in order to mitigate against being deterred from intervening in a conflict by the threat of strikes against key targets in the United States. In this context, “credible air and missile defenses” would ideally mean possessing a level of capability sufficient to provide a robust defense of U.S. critical economic and military infrastructure both within the homeland, and together with allies, in the Euro-Atlantic and Asia-Pacific, especially against

---

<sup>70</sup> Jan Van Tol, *AirSea Battle: A Point-of-Departure Operational Concept*, (Center for Strategic and Budgetary Assessments, 2010), p.19, available at <https://csbaonline.org/uploads/documents/2010.05.18-AirSea-Battle.pdf>.

conventional precision strike systems. This would necessarily be focused on defending against, for example, the increasingly potent conventional strategic strike threat posed by Russia.

As the international system becomes more contested, geopolitical rivalries more intense, and the ability to conduct long-range precision strikes proliferates, the requirement for robust air and missile defense capabilities as part of a wider deterrent posture will endure. The United States is confronted by challenges to its interests in the Euro-Atlantic, Middle East and Indo-Pacific, and faces a growing conventional threat to its homeland; missile defense provides an important component of meeting the evolving and dynamic strategic environment and ensuring continued deterrence.

*James Bosbotinis is an independent specialist in defense and international affairs, and co-founder of Citadel Analytics.*

*Harris S. Fried is an international lawyer and Chairman of Citadel Air Defense Systems LLC.*

*Colonel David Shank, USA (ret.) is the Senior Land Forces Consultant with Advanced Strategic Insight, Inc., and serves on the Citadel Analytics Board of Directors.*

