Chapter 7:

Long-Term Prospects for Nuclear Missile Controls

David A. Cooper[487]

The long-term prospects for nuclear missile controls are as urgent as they are unpromising. Legacy international controls are moribund or unravelling. The paradigm of bilateral US-Russian nuclear arms control—which for decades has provided the world's only binding missile controls—is nearing the end of its rope. Meanwhile the global missile nonproliferation regime—always relatively weak—is increasingly ineffective in the face of steady missile technology diffusion and the mounting pressures of a dangerously fluid international security environment. Most alarmingly, these extant arrangements are woefully ill-equipped to control the emergence of new technologies, notably maneuverable hypersonic missiles.

The deterioration of international missile controls is nothing new. It has been happening in slow motion fits and starts for almost two decades. It is newly worrying, however, because the United States now confronts a new age of multipolar nuclear competition with a gathering missile arms race as its central feature. All the major nuclear powers are modernizing their nuclear missile forces, and most are racing to field revolutionary new types of missiles including intermediate- and intercontinental-range maneuverable hypersonic missiles, air launched ballistic missiles (ALBM), and in the case of Russia, a nuclear-armed and powered cruise missile of almost limitless

487. All views are solely those of the author and do not represent official positions of the US Naval War College, the Department of Navy, or any other agency or organization.

range. Now unshackled by the demise of the Intermediate Nuclear Forces (INF) Treaty, both Washington and Moscow are racing to deploy intermediate-range ballistic and cruise missiles—Russia having gotten a head start by blatantly violating INF—to offset China's overwhelming advantage in these dual-purpose conventional and nuclear systems. Meanwhile North Korea and Iran continue to expand and improve their already formidable arsenals of nuclear-cable missiles as they stretch toward intercontinental range. This volatile combination of missile racing among the major nuclear powers and nuclear and missile proliferation by hostile regional powers could provoke other countries to seek long-range missiles as a hedge for going nuclear later. In sum, the nuclear missile environment is deteriorating across the board with no end in sight.

This chapter explores the prospects for strengthening international controls on nuclear missiles over the next decade or more. The chapter begins by the exploring why missiles matter as organic components of nuclear forces and how this makes missile controls an essential feature of any viable nonproliferation or arms control regime. It then examines how the erosion of the post-Cold War order has opened the door for nuclear missile races in the face of increasingly contested regional and global nuclear landscapes. It then suggests the most plausible prospects for negotiating new or stronger nonproliferation and arms control measures to put guardrails on this increasingly uncontrolled global missile competition. Finally, it concludes by warning that these prospects are poor in today's fluid geopolitical and geostrategic circumstances and that the United States and its allies will need to play a long game to convince China, Russia, and others to come to the negotiating table.

Why Missiles Matter

When we talk about *nuclear weapons* we are really talking about missiles as well as the explosive warheads that they carry. Missiles are at the heart of both sides of the nuclear competition equation: new countries seeking to join the nuclear club (nuclear proliferation) and rivalry among the existing nuclear powers (nuclear pos-

tures and arms racing). Therefore, although the Nuclear Nonproliferation Treaty (NPT) does not restrict missiles, preventing nuclear proliferation nevertheless requires preventing missile proliferation. For countries like Iran and North Korea to become formidable nuclear powers they must not only obtain nuclear explosives, but also the means to deliver them. Likewise, nuclear balances among the major nuclear powers like Russia, the United States, and China are measured in large part by their missile delivery systems, and defenses against them, rather than warhead inventories *per se*. This is the case particularly for the United States and Russia, which have large reserve stockpiles of warheads and fissile materials to make more if necessary. To the extent that warheads are the focus, it is largely how many are operationally deployed on missiles. In a nutshell, nuclear delivery systems are a lynchpin of controlling nuclear dangers. President Ronald Reagan had it exactly right when he conflated things by referring to *nuclear missiles*.[488]

Ballistic and cruise missiles can have both conventional warfighting and nuclear deterrence roles. These roles tend to be defined by their ranges. Shorter-range systems are associated primarily with conventional warfighting and thus are seen as less relevant as nuclear delivery systems, although what counts as shorter-range is variously defined from below 300-1000 kilometers.[489] Medium-range systems (commonly defined as 1000-3000 kilometers) and intermediate-range systems (commonly defined as 3000-5500 kilometers) play both conventional and nuclear roles.[490] Although this may be changing, intercontinental missiles above 5500km to date have been exclusively nuclear missiles.[491] Despite these different uses, it is their

488. Ronald W. Reagan, Address to the Nation on Defense and National Security (March 23, 1983), https://www.reaganlibrary.gov/research/speeches/32383d.
489. For example, the Missile Technology Control Regime (MTCR) focuses on missiles over 300km, the Intermediate Nuclear Forces (INF) Treaty controlled missiles above 500km.
490. "Worldwide Ballistic Missile Inventories," Arms Control Association (December 2017), https://www.armscontrol.org/factsheets/missiles.
491. The US has considered using non-nuclear intercontinental ballistic missiles for Conventional Prompt Global Strike missions. However, it appears that a new generation of hypersonic boost-glide vehicles will fill this role. See: Amy F.

singular role as rapid and reliable nuclear delivery systems that sets ballistic and cruise (and now hypersonic) missiles apart from conventional weaponry, especially at longer ranges.

For this reason, the common distinction that is made between nuclear weapons and the missiles that carry them is not only misleading, but also misguided. The more inclusive concept of *nuclear forces* encompasses nuclear warheads and their delivery systems. For example, although the 1987 Intermediate Nuclear Forces (INF) Treaty was hailed as a breakthrough for nuclear disarmament, it was in fact a missile treaty that did not actually ban any nuclear weapons. Even long-range strategic bombers, like nuclear missile submarines, are really forward deployed staging platforms for long-range missiles. For example, the only reason that aging B-52s can still be effective against modern air defenses is down to the modern long-range air-launched cruise missiles (ALCMs) that they carry.[492] Indeed, other than comparatively antiquated nuclear gravity bombs intended for tactical nuclear warfighting, and Russia's new autonomous intercontinental-range nuclear torpedo (in effect an underwater missile), nuclear forces *are* missile forces. In other words, controlling nuclear forces mostly means controlling missiles.

Missile Proliferation Is Nuclear Proliferation

Despite the organic relationship between nuclear weapons and the missiles that carry them, missile nonproliferation is too often treated as separate and secondary to nuclear nonproliferation.[493] For exam-

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Woolf, "Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues," Congressional Research Service (February 14, 2020), https://crsreports.congress.gov/product/pdf/R/R41464.

492. Aaron Mehta and Jeff Martin, "Decades Late, the B-52 is Getting a New Nuclear Weapon," *Defense News* (September 15, 2019), https://www.defense-news.com/smr/global-strike/2019/09/15/decades-late-the-b-52-is-getting-a-new-nuclear-weapon/.

493. This section draws significantly on a previous opinion piece and subsequent congressional testimony by the author and some portions are adopted directly from these earlier pieces: "The Real Iran Threat (Hint: It's Not Just Nukes)," *The*

ple, the nuclear deal that the Obama administration negotiated with Iran did not include any missile controls, leaving missiles to be addressed in a separate UN Security Council Resolution (UNSCR) that merely "called upon" Iran to suspend its missile activities—a request Iran has blithely ignored without violating the core agreement.[494] More significantly, the formal multilateral institutions responsible for preventing nuclear proliferation—the Nuclear Nonproliferation Treaty (NPT) setting the rules and the International Atomic Energy Agency (IAEA) verifying and implementing them—do not address missiles. This nuclear-only nonproliferation paradigm stands in sharp contrast to the Cold War nuclear arms control paradigm that focused holistically on weapons and delivery systems.

Focusing on long-range missiles brings into sharp focus that outright nuclear proliferation along the lines of North Korea and Pakistan is the tip of a potentially larger nuclear hedging iceberg—that is, countries that are deliberately acquiring the wherewithal to quickly become a breakout nuclear power should the need arise (sometimes also referred to as nuclear latency). Missiles play a key and integral role in nuclear hedging. It has long been understood that civilian nuclear energy programs can be used for nuclear hedging. For example, leading experts believe that Saudi Arabia and Japan are rather blatantly using their nuclear energy programs to hedge against growing nuclear threats from hostile neighbors.[495] But for these and

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National Interest (March 23, 2015), https://nationalinterest.org/feature/the-real-iran-threat-hint-its-not-nukes-12461; "Iran's Enduring Missile Threat," testimony before the House Foreign Affairs Committee, (https://docs.house.gov/meetings/FA/FA13/20150610/103582/HHRG-114-FA13-Wstate-CooperD-20150610.pdf).

494. Resolution 2231 (July 20, 2015), p. 99, Section 3, https://undocs.org/S/RES/2231(2015).

495. James L. Schoff and Richard J. Samuels, "Japan's Nuclear Hedge: Beyond 'Allergy' and Breakout," in Abraham Denmark, Ashley J. Tellis, and Travis Tanner, eds., *Asia in the Second Nuclear Age* (Seattle: The National Bureau of Asian Research, 2013): 233-266; Sarah Burkhard, Erica Wenig, David Albright, and Andrea Stricker, "Saudi Arabia's Nuclear Ambitions and Proliferation Risks," Institute for Science and International Security (March 30, 2017), https://isis-online.org/uploads/isis-reports/documents/SaudiArabiaProliferationRisks_30Mar2017_Final.pdf; Toby Dalton, "Policy Implications of Nuclear Hedging:

other NPT countries there is still the safeguard (albeit imperfect) of IAEA oversight and the prohibition against moving beyond nuclear latency. By contrast, there is no international treaty that prohibits missile proliferation. Therefore, developing long-range missile capabilities—either overtly, or covertly within a civilian space launch program—is a much less restricted aspect of nuclear hedging.

Needless to say, there are some good reasons for prioritizing preventing the spread of nuclear weapons. First and foremost, even without missiles in the equation there is a strong case that nuclear weapons in the wrong hands pose a dire risk in that they could be used in a cataclysmic terrorist attack.[496] From the standpoint of purely military use, there is still always some risk posed by bombers or short-range missiles, especially for neighboring countries. Given that the expertise, equipment, and fissile materials that are required to produce nuclear weapons are extremely difficult to attain without outside assistance, thwarting nuclear weapons programs makes sense as a top nonproliferation priority. After all, if aspiring nuclear powers can be denied the wherewithal to produce nuclear weapons, then their aspirations will come to nothing with or without long-range missiles.

By the same token, however, a country that has nuclear explosives but lacks the capability to deliver them with missiles cannot be considered a formidable nuclear power. An underappreciate aspect of preventing nuclear proliferation is preventing the means for long-range and large-scale nuclear delivery. For instance, from a US perspective, while a nuclear-armed country without long-range missiles may menace American allies or overseas forces, it still does

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Observations on East Asia," Carnegie Endowment for International Peace (October 10, 2019), https://carnegieendowment.org/2019/10/10/policy-implications-of-nuclear-hedging-observations-on-east-asia-pub-80169; Victor Gilinsky and Henry Sokolski, "To Prevent Proliferation, Stop Enrichment and Reprocessing in the Middle East," *Foreign Policy* (October 15, 2020), https://foreignpolicy.com/2020/10/15/to-prevent-proliferation-stop-enrichment-and-reprocessing-in-the-middle-east/;

496. Graham T. Allison, *Nuclear Terrorism: The Ultimate Preventable Catastrophe* (New York: St. Martin's Press, 2005).

not pose an existential threat to the American homeland. In other words, the threats posed by nuclear weapons *sans* long-range missiles boils down to local or terrorist threats. Giving short shrift to missile nonproliferation therefore makes little sense if the goal is to prevent countries like North Korea and Iran from becoming formidable entry-level nuclear powers like India and Pakistan.

How important are missiles for an aspiring nuclear power? Important enough that long-range missiles are a remarkably reliable indicator of any country's ultimate nuclear intentions. In fact, the lack of indigenous long-range missile programs is arguably the single most reliable indicator that a country does not harbor covert or latent nuclear ambitions—and vice versa. History shows that long-range missile programs tend to make military, political, and economic sense only in the broader context of an ambition to become a latent or actual nuclear power.[497] Nuclear weapons and long-range missiles go hand in glove, to the extent that no country has pursued nuclear weapons without also pursuing at least medium-range ballistic missiles. Conversely, countries that have reversed course on pursuing or possessing nuclear weapons, like South Africa and Libya, have also abandoned associated missile programs.[498]

It is difficult to overstate the correlation between long-range missiles—especially ballistic missiles—and nuclear weapons. No country without nuclear weapons or ambitions possesses intermediate-range ballistic missiles (IRBMs) or intercontinental ballistic missiles (ICBMS).[499] These longest-range systems are exclusively the domain of the existing nuclear powers and Iran.

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497. An case in point is Argentina's abortive Condor II MRBM program. This was developed in the 1980s in part for military export sales, but was abandoned in the early 1990s due to international pressure. See declassified CIA memorandum: "Status of the Condor II Ballistic Missile Program" (November 1, 1991), https://www.cia.gov/library/readingroom/docs/DOC_0001175541.pdf.
498. Robert Joseph, *Countering WMD: The Libya Experience* (Fairfax, VA: National Institute Press, 2009); "South Africa: Missile," Nuclear Threat Initiative (April 2015), https://www.nti.org/learn/countries/south-africa/delivery-systems/.
499. "Worldwide Ballistic Missile Inventories," Arms Control Association (December 2017), https://www.armscontrol.org/factsheets/missiles.

As for medium-range systems, it is vanishingly rare for a country without nuclear weapons or ambitions to seek or possess missiles at this range. The few exceptions only serve to demonstrate the rule. Saudi Arabia is the only non-nuclear country with medium range ballistic missiles (MRBMs). However, these are not indigenous systems, but instead relatively antiquated missiles that Riyadh purchased decades ago 'off the shelf' from China.[500] Tellingly, the Saudis have long been suspected of nuclear hedging—with speculation that there are covert elements to the Kingdom's civilian nuclear energy program, or that Pakistan could be on tap to supply nuclear weapons for those missiles—and in recent years the Saudis now openly threaten to acquire nuclear weapons if Iran does so.[501] The other contemporary cases are South Korea and Taiwan, both of which are developing medium-range cruise missiles.[502] Yet these governments have unique in-depth warfighting needs against hostile nuclear-armed neighbors (and perhaps these new missile programs should raise questions about nascent nuclear hedging behavior). Past cases of countries pursuing longer-range missiles while proclaiming their non-nuclear status within the NPT include Iran and North Korea. In

500. "Saudi Arabia: Missile," Nuclear Threat Initiative (August 2015), https://www.nti.org/learn/countries/saudi-arabia/delivery-systems/.
501. Yoel Guzansky, "Saudi Arabia Nuclear Hedging," Atlantic Council (December 13, 2011), https://www.atlanticcouncil.org/blogs/new-atlanticist/saudi-arabia-nuclear-hedging/; Colin H. Kahl, Matthew Irvine, and Melissa Dalton, "Atomic Kingdom: If Iran Builds the Bomb, Will Saudi Arabia Be Next?" Center for New American Security (February 19, 2013), https://www.cnas.org/publications/reports/atomic-kingdom-if-iran-builds-the-bomb-will-saudi-arabia-be-next; Kingston Reif, "Saudi Arabia Threatens to Seek Nuclear Weapons," *Arms Control Today* (June 2018), https://www.armscontrol.org/act/2018-06/news/saudi-arabia-threatens-seek-nuclear-weapons; Andrea Stricker and Behnam Ben Taleblu, "Secret Sites in the Desert: The Dangers of Saudi Arabia's Nuclear Hedging," The National Interest (September 4, 2020), https://nationalinterest.org/feature/secret-sites-desert-dangers-saudi-arabia%E2%80%99s-nuclear-hedging-168267; Saudi Minister Says Nuclear Armament Against Iran 'An Option'," Aljazeera (November 17, 2020), https://www.aljazeera.com/news/2020/11/17/saudi-minister-wont-rule-out-nuclear-armament-over-iran.
502. CSIS Missile Defense Project: "Missiles of South Korea," https://missilethreat.csis.org/country/south-korea/; "Missiles of Taiwan," https://missilethreat.csis.org/country/taiwan/.

both cases the missiles turned out to be overt leading indicators of covert nuclear ambitions.

Missiles are not only integral to nuclear proliferation, but they also pose one of the most significant hurdles for wannabe nuclear powers to overcome. As North Korea and other cases demonstrate, it is often a faster feat to develop nuclear explosives than long-range missiles capable of reliably delivering them to distant targets. North Korea conducted successful nuclear tests before fielding what it claims are ICBMs that can hit the continental United States, and even those claims remain in serious doubt including whether these missiles can even carry a nuclear warhead.[503] This helps explain why, when Iran suspended its nuclear weapons program under the 2015 Joint Comprehensive Plan of Action (JCPOA), it eschewed missile constraints to continue to press forward on improving its missile capabilities.[504] Because building reliable and accurate long-range missiles that can carry nuclear weapons is as challenging as building those nuclear weapons. Indeed, one of the biggest *nuclear* challenges for new nuclear entrants like North Korea is designing nuclear warheads that are actually small and hardy enough to be delivered by ballistic missiles.[505] This ranking of difficulty tracks with the initial arc of nuclear history, in which the atomic age dates to the 1940s, the thermonuclear age to the 1950s, and the nuclear missile age to the 1960s.

As of now only the five recognized NPT nuclear powers have nuclear missiles at intercontinental ranges over 5500 kms, but others are

503. Choe San-Hun, "North Korea Unveils What Appears to Be New ICBM During Military Parade, *The New York Times* (November 27, 2020), https://www.nytimes.com/2020/10/10/world/asia/north-korea-icbm.html.
504. For an excellent analysis of the Iran missile challenge and potential remediation see: Robert Einhorn and Vann H. Van Diepen, "Constraining Iran's Missile Capabilities," The Brookings Institution (March 2019), https://www.brookings.edu/research/constraining-irans-missile-capabilities/.
505. Michelle Nichols, "North Korea has 'Probably' Developed Nuclear Devices to Fit Ballistic Missiles, U.N. Report Says," *Reuters* (August 3, 2020), https://www.reuters.com/article/us-northkorea-sanctions-un/north-korea-has-probably-developed-nuclear-devices-to-fit-ballistic-missiles-u-n-report-says-idUSKCN24Z2PO.

on a path to join this club.[506] India, Iran, North Korea, and Pakistan already deploy robust medium- and/or intermediate-range ballistic missile forces below the intercontinental threshold.[507] But deploying nuclear-armed ICBMs would put countries like Iran and North Korea in a different league in terms of being able to hold the American homeland at risk. In sum, the argument here is that nuclear and missile proliferation are effectively two sides of the same coin.

A Dangerous New Nuclear Missile Race

Preventing and countering nuclear proliferation by hostile regional powers has been the top priority of American nuclear policy for almost three decades. But now this focus is changing. In the coming decade worries about nuclear and missile proliferation are likely to be supplanted by a more existential global concern: the return of nuclear competition among the major nuclear powers. This is not to say that nuclear and missile proliferation are likely to recede in the years ahead, to the contrary. It is rather to say that despite the potential for regional proliferation spirals—particularly in the Greater Middle East and East Asia—these regional nuclear threats will be dwarfed by nuclear weapons' return to the center stage of international relations in a new multipolar era of great power competition. This is likely to be a qualitative technology race more than a numbers competition between the United States and Russia (although a narrower quantitative race could emerge for novel capabilities like long-range hypersonic missiles.) However, China and others such as

506. Sergio Pecanha and Keith Collins, "Only 5 Nations Can Hit Any Place on Earth With a Missile. For Now." *The New York Times* (February 7, 2018), https://www.nytimes.com/interactive/2018/02/07/world/asia/north-korea-missile-proliferation-range-intercontinental-iran-pakistan-india.html.
507. Defense Intelligence Ballistic Missile Analysis Committee, *2017 Ballistic and Cruise Missile Threat* (Wright-Patterson AFB, OH: National Air and Space Intelligence Center, June 2017); Kelsey Davenport, "Worldwide Ballistic Missile Inventories," Arms Control Association (December 2017), https://www.armscontrol.org/factsheets/missiles; CSIS, "Missiles of the World," CSIS Missile Defense Project, https://missilethreat.csis.org/missile/ (accessed September 26, 2020).

India and Pakistan are likely to continue racing to both modernize and expand and diversify their nuclear forces.[508]

Within American strategic circles it has been widely understood for half a decade or so that a new nuclear arms race is underway and gathering steam.[509] This is the first global nuclear arms race since the Cold War and only the second in nuclear history. However, it is utterly unprecedented in its character as the world's first tripolar nuclear arms race—between the United States, Russia, and China—in which *each* country is competing against *both* others. In fact, it can more properly be categorized as a multipolar arms race, because France and Britain are also competing with Russia (and potentially China) and India is also competing with China (as well as Pakistan). This unprecedented nuclear multipolarity is described by some as the dawn of a *third nuclear age*.[510] The realization that the world is facing a new nuclear arms race—and a perilous new *kind* of arms race—is even starting to seep into the popular imagination after decades of public inattention to nuclear dangers.[511] What is less ap-

508. *SIPRI Yearbook 2020: Armaments and International Security* (Oxford: Oxford University Press, 2020).
509. Author interviews in 2018-19 with nearly thirty former and current US officials. Also for an excellent overview of expert views on the current state of US-Russian arms racing see: Amy F. Woolf, "Russia's Nuclear Weapons: Doctrine, Forces, and Modernization," Congressional Research Service (July 2020), https://crsreports.congress.gov/product/pdf/R/R45861.
510. Patrick J. Garrity, "The Third Nuclear Age?" *Claremont Review of Books* (April 2015), https://www.claremont.org/download_pdf.php?file_name=2142Nuclear.pdf; Karl-Heinz Kamp, "Welcome to the Third Nuclear Age," *The National Interest* (May 2, 2016), https://nationalinterest.org/feature/welcome-the-third-nuclear-age-16020; Michal Smetana, "A Nuclear Posture Review for the Third Nuclear Age," *The Washington Quarterly* 41, no. 3 (Fall 2018): 137-157; Steven E. Miller, "A Nuclear World Transformed: The Rise of Multilateral Disorder, *Dædalus* 149 (special issue on "Meeting the Challenges of a New Nuclear Age"), no. 2 (Spring 2020): 17-36.
511. See for example: David Wroe, "Nuclear Club's Rival Weapons and Agendas Pushing Us Into Uncertain New World," *Sydney Morning Herald* (October 27, 2017), https://www.smh.com.au/politics/federal/nuclear-clubs-rival-weapons-and-agendas-pushing-us-into-uncertain-new-world-20171027-gz9jkq.html; Eric Schlosser, "The Growing Dangers of the New Nuclear-Arms Race," The New Yorker (May 24, 2018), https://www.newyorker.com/news/news-desk/

preciated, however, is that this new tripolar-cum-multipolar nuclear arms race mostly boils down to a missile technology race.

As in the Cold War nuclear arms race but even more so, today's calculations about adversarial nuclear balances—especially strategic forces capable of attacking a rival's homeland—center on quantity, quality, and capabilities (types) of nuclear delivery systems and defenses against them. To be sure, missiles have military uses other than nuclear. This has been increasingly the case for missiles with rangers over 500 kilometers that until recently were banned for the United States and Russia under the Intermediate Nuclear Forces (INF) Treaty. For example, China deploys thousands of such systems for area denial, most of which are thought to be for conventional warfighting.[512] For its part the United States has long been pursuing Conventional Prompt Global Strike (CPGS) capabilities—essentially intercontinental range conventional systems.[513] However, the race for new and better nuclear missiles lies at the heart of current long-range missile racing dynamics.

As of this writing, the New START Treaty appears set to be extended for a few more years as the last vestige of bilateral nuclear arms control. However, this brief and temporary reprieve will do little to alter the fundamental dynamics of a globe-spanning missile race that is for all intents already uncontrolled, New START notwithstanding. Not just Russia and the United States, but all the other existing

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the-growing-dangers-of-the-new-nuclear-arms-race; William J. Perry and Tom Z. Collina, *The Button: The New Nuclear Arms Race and Presidential Power from Truman to Trump* (Dallas: BenBella Books, 2020); Andreas Kluth, "This Nuclear Arms Race Is Worse Than the Last One," Bloomberg (June 18, 2020), https://www.bloomberg.com/opinion/articles/2020-06-18/this-nuclear-arms-race-is-worse-than-the-last-one.

512. Robert Kobza, "Another Tool in the Toolbox: Using Intermediate-Range Missiles to Counter Chinese A2/AD in the Pacific," *Georgetown Security Studies Review* (December 2, 2019), https://georgetownsecuritystudiesreview.org/2019/12/02/another-tool-in-the-toolbox-using-intermediate-range-missiles-to-counter-chinese-a2-ad-in-the-pacific/.

513. James M. Acton, *Silver Bullet? Asking the Right Questions About Conventional Prompt Global Strike* (Washington, DC: Carnegie Endowment for International Peace, 2013), https://carnegieendowment.org/files/cpgs.pdf.

nuclear powers are moving aggressively to modernize their nuclear missile forces. Russia and China are also deploying new generations of road-mobile heavy intercontinental ballistic missiles (ICBMs) armed with multiple independent reentry vehicles (MIRVS) as well as exotic new missile variants such as air-launched ballistic missiles (ALBMs) and, in Moscow's case, a nuclear-powered and armed cruise missile capable of virtually unlimited range.[514] Moscow also claims that it has started to deploy its monster new Sarmat ICBM (also known as the Satan-2), which Russian state television boasts will be able to carry enough high-yield MIRVs for a single missile to obliterate the entire state of Texas or nation of France.[515]

Although Beijing is thought to have up to no more than a few hundred nuclear warheads to arm its much larger and mostly conventional missile forces, this estimate has long been contested by some prominent Russian analysts.[516] In any case, Beijing now fields a

514. Joseph Trevithick, "Russia Tests Modified RS-24 Ballistic Missile With an 'Experimental Warhead'," *The War Zone* (October 6, 2017), https://www.thedrive.com/the-war-zone/14941/russia-tests-modified-rs-24-ballistic-missile-with-an-experimental-warhead; Ankit Panda, "Revealed: China's Nuclear-Capable Air-Launched Ballistic Missile," *The Diplomat* (April 10, 2018), https://thediplomat.com/2018/04/revealed-chinas-nuclear-capable-air-launched-ballistic-missile/; Missile Defense Project, "DF-41 (Dong Feng-41 / CSS-X-20)," *Missile Threat* (August 12, 2016, last modified October 8, 2019), https://missilethreat.csis.org/missile/df-41/; Matthew Kroenig, Mark Massa, and Christian Trotti, "Russia's Exotic Nuclear Weapons and Implications for the United States and NATO," The Atlantic Council (March 2020), https://www.atlanticcouncil.org/wp-content/uploads/2020/07/Russias-Exotic-Nuclear-Weapons.pdf.

515. David Brennan, "Russia's 'Invulnerable' Satan 2 Nuclear Missile Will Be Ready to Fire by the End of 2020, Space Agency Official Says," *Newsweek* (July 8, 2019), https://www.newsweek.com/russia-satan-2-nuclear-missile-rs-28-sarmat-ready-fire-2020-1447994.

516. Victor Yesin, "China's Nuclear Capability," in Alexei Arbatov, Vladimir Dvorkin and Sergey Oznobishchev, eds., *Prospects of China's Participation in Nuclear Arms Limitations* (Moscow: Institute of World Economy and International Relations, 2012); Stockholm International Peace Research Institute, *SIPRI Yearbook 2019: Armaments, Disarmament, and International Security* (Stockholm: SIPRI, 2019); Office of the Secretary of Defense, Military and Security Developments Involving the People's Republic of China: Annual Report to Congress (September 2020), https://media.defense.gov/2020/

modern strategic nuclear triad and is on track to double its nuclear weapons arsenal over the next decade.[517] Moreover, senior US officials have indicated that China is driving toward nuclear parity with the United States.[518] China already enjoys an overwhelming advantage in intermediate-range ballistic and cruise missiles. Although these are mostly thought to be conventionally armed, many are dual-capable to carry either conventional or nuclear weapons.[519] This has Russia and the United States scrambling to develop and deploy new intermediate-range systems now that neither is constrained by the INF Treaty.[520]

Far more significant than modernizing and expanding existing types of long-range missile forces is the breakneck race among several major nuclear powers—China, Russia, the United States, France, and India—to develop and deploy intermediate- and intercontinental-range hypersonic missiles. Technically known as maneuverable hypersonic vehicles (MHVs), these systems can come in either

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517. Office of the Secretary of Defense, Military and Security Developments Involving the Peoples Republic of China.

518. Ibid. (Office of the Secretary of Defense); "Transcript: Special Presidential Envoy Marshall Billingslea on the Future of Nuclear Arms Control," Hudson Institute (May 22, 2020), https://www.hudson.org/research/16062-transcript-special-presidential-envoy-marshall-billingslea-on-the-future-of-nuclear-arms-control; David Vergun, "China, Russia Nearing Status as US Nuclear Peers, Stratcom Commander Says," DOD News (July 30, 2020), https://www.defense.gov/Explore/News/Article/Article/2294574/china-russia-nearing-status-as-us-nuclear-peers-stratcom-commander-says.

519. Office of the Secretary of Defense, Military and Security Developments Involving the Peoples Republic of China.

520. Matthew Bodner, "Russia Bids Farewell to INF Treaty with Fresh Nuclear Development Plans," Defense News (February 6, 2019), https://www.defensenews.com/smr/nuclear-arsenal/2019/02/06/russia-bids-farewell-to-inf-treaty-with-fresh-nuclear-development-plans/; Kingston Reif and Shannon Bugo, "US Aims to Add INF-Range Missiles," *Arms Control Today* (October 2020), https://www.armscontrol.org/act/2020-10/news/us-aims-add-inf-range-missiles. Sydney J. Freedberg, Jr., "Army Seeks New Mid-Range Missile Prototype By 2023," *Breaking Defense* (September 8, 2020), https://breakingdefense.com/2020/09/army-seeks-new-mid-range-missile-prototype-by-2023/.

boost-glide (launched by missiles or planes and then gliding to target) or air-breathing cruise-missile varieties. MHVs combine the speed of a ballistic missile with the maneuverability of a cruise missile.[521] Hence, MHVs can reach targets faster and with less warning, and, even more important, they are virtually invulnerable to existing missile defense technologies.[522] Put bluntly, these systems promise to eclipse the capabilities of today's ballistic and cruise missiles. It is therefore no exaggeration that the coming hypersonic revolution puts global and regional nuclear balances completely up for grabs. Hypersonic missiles are therefore arguably the single most destabilizing aspect of the burgeoning new nuclear arms race.

It should be noted that only Russia has announced a strategic nuclear strike role for MHVs. In fact Moscow claims already to have started deploying what ultimately will be a force of sixty *Avangard* boost-glide MHVs on ICBMs, each armed with massive 2-megaton nuclear warheads.[523] Moscow also plans to begin arming its submarine-launched ballistic missiles (SLBMs) with nuclear MHVs by 2024, and may even deploy nuclear hypersonic missiles across its entire navy fleet.[524] Washington and Beijing also plan to deploy MHVs

521. It appears that some boost-glide MHVs will be able to fly faster than ICBMs. However, even ballistic missiles that can reach higher absolute speeds during the midcourse reentry phase of their flights will be slower to target than boost-glide MHVs due to their longer boost phase through the atmosphere.
522. Richard H. Speier, George Nacouzi, Carrie A. Lee, and Richard M. Moore. *Hypersonic Missile Nonproliferation Hindering the Spread of a New Class of Weapons* (Santa Monica: The RAND Corporation, 2017).
523. Russia Deploys Avangard Hypersonic Missile System," BBC (December 27, 2019), https://www.bbc.com/news/world-europe-50927648; Kyle Mizokami, "Russia's New Hypersonic Weapon Flies at Mach 27, Popular Mechanics (December 30, 2019), https://www.popularmechanics.com/military/weapons/a30346798/russia-new-hypersonic-weapon-mach-27/.
524. Amanda Macias, "Russian Submarine Fleet Capable of Launching Missiles Armed with Hypersonics and Nukes Will Be Ready for War by 2024," CNBC (September 21, 2018), https://www.cnbc.com/2018/09/21/russia-sub-fleet-capable-of-launching-hypersonics-will-be-ready-by-2024.html; "Andrew Osborn, Putin Says Russian Navy to Get Hypersonic Nuclear Strike Weapons," *US News and World Report* (July 26, 2020), https://www.usnews.com/news/world/articles/2020-07-26/putin-says-russian-navy-to-get-hypersonic-nuclear-strike-

at intermediate and intercontinental ranges.[525] Chinese hypersonic programs remain shrouded in secrecy and its intentions remain opaque in terms whether its MHVs will have a nuclear strike role. For its part Washington plans to deploy an array of MHVs starting in 2022-23 including road-mobile systems and MHVs launched from strategic bombers and fast-attack nuclear submarines.[526] Although it is unclear if any of these systems will be nuclear-armed there are indications that this possibility is at least being considered.[527] India and France round out the race for hypersonic missiles by nuclear powers, the latter moving quickly to deploy what is thought to be intended as new hypersonic nuclear delivery system.[528]

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weapons.

525. John A. Tirpak, "Roper: Hypersonics Capability Less Than Two Years Away," *Air Force Magazine* (February 7, 2019); Andrew Tate, "China testing hypersonic weapon with intercontinental Range, Says USNORTHCOM Commander, Jane's Defense Weekly (February 18, 2020), https://www.janes.com/article/94373/china-testing-hypersonic-weapon-with-intercontinental-range-says-usnorthcom-commander; Kyle Mizokami, "Air Force Accidently Reveals It Wants a Hypersonic Nuke," *Popular Mechanics* (August 21, 2020), https://www.popularmechanics.com/military/weapons/a33657991/air-force-accidentally-reveals-interest-hypersonic-weapon-system/.

526. Colin Clark, "More B-21s Likely; B-1s to Carry Up To 8 Hypersonic Weapons," Breaking Defense (September 17, 2019), https://breakingdefense.com/2019/09/more-b-21s-likely-b-1s-to-carry-up-to-8-hypersonic-weapons/; Megan Eckstein, "Navy Confirms Global Strike Hypersonic Weapon Will First Deploy on Virginia Attack Subs," USNI News (February 18, 2020), https://news.usni.org/2020/02/18/navy-confirms-global-strike-hypersonic-weapon-will-first-deploy-on-virginia-attack-subs; Jen Judson, "How the DoD Plans to Meet its Ambitious Hypersonic Missile Test Schedule," *Defense News* (August 5, 2020), https://www.defensenews.com/digital-show-dailies/smd/2020/08/05/heres-how-the-dod-plans-to-meet-its-ambitious-hypersonic-missile-test-schedule/.

527. Kyle Mizokami, "Air Force Accidently Reveals It Wants a Hypersonic Nuke," *Popular Mechanics* (August 21, 2020), https://www.popularmechanics.com/military/weapons/a33657991/air-force-accidentally-reveals-interest-hypersonic-weapon-system/; Alan Cummings, "High Speed, Low Yield: A US Dual-Use Hypersonic Weapon," *War on the Rocks* (September 17, 2020), https://warontherocks.com/2020/09/high-speed-low-yield-a-u-s-dual-use-hypersonic-weapon/.

528. Michael Peck, "Now France Wants Hypersonic Missiles by 2021," *The National Interest* (February 4, 2019), https://nationalinterest.org/blog/buzz/

Meanwhile, today's nuclear missile race is not happening in splendid isolation. There is an accelerating military space race that threatens to give Russia and China antisatellite capabilities that could impact nuclear command and control..[529] Rapid developments in the cyber and artificial intelligence domains could also impact nuclear targeting, command and control, and crisis stability.[530] Meanwhile in a direct spinoff of the missile race, the threat of long-range hypersonic missiles is leading Washington to pursue space-based missile defenses against them.[531] But perhaps the most significant spinoff as this uncontrolled nuclear missile race accelerates could be to spark a new wave of nuclear missile proliferation. Controlling the nascent nuclear arms race and controlling nuclear proliferation thus may turn out to be intersecting goals.

There is every reason to suppose that a multipolar nuclear missile race could sooner or later provoke other great and/or regional powers to seek or expand their own missile arsenals as a nuclear hedge or even to breakout with nuclear weapons to arm them. This could include countries that currently rely on others to deter nuclear coer-

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now-france-wants-hypersonic-missiles-2021-43202; H.I. Sutton, "India Goes Hypersonic: New Missile Technology May Be Answer To China's Navy," *Forbes* (September 8, 2020), https://www.forbes.com/sites/hisutton/2020/09/08/india-goes-hypersonic-new-missile-technology-may-be-answer-to-chinas-navy/#673ef44cd937.

529. Michael R. Gordon, "Russia Tests an Anti-Satellite Weapon, US Officials Say," *The Wall Street Journal* (July 23, 2020), https://www.wsj.com/articles/russia-tests-an-anti-satellite-weapon-u-s-officials-say-11595545670; Office of the Secretary of Defense, *Military and Security Developments Involving the Peoples Republic of China* (September 1, 2020), https://media.defense.gov/2020/Sep/01/2002488689/-1/-1/1/2020-DOD-CHINA-MILITARY-POWER-REPORT-FINAL.PDF.

530. Stephen J. Cimbala, "Nuclear Deterrence in Cyber-ia: Challenges and Controversies," *Air & Space Power Journal* 30:3 (Fall 2016): 54-62; James Johnson and Eleanor Krabill, "AI, Cyberspace, and Nuclear Weapons," *War on the Rocks* (January 31, 2020), https://warontherocks.com/2020/01/ai-cyberspace-and-nuclear-weapons/.

531. Kris Osborn, "The Pentagon Has Plans to Defend Against Hypersonic Missiles," *The National Interest* (October 10, 2020), https://nationalinterest.org/blog/buzz/pentagon-has-plans-defend-against-hypersonic-missiles-170543.

cion against them—e.g., allies under Washington's nuclear umbrella of extended deterrence—should they lose confidence in relying on others for nuclear security guarantees. A ramped up nuclear missile race could thus expand missile and nuclear proliferation beyond NPT scofflaws like Iran and North Korea to countries ranging from Australia, Germany, Japan, South Korea, Saudi Arabia, and Turkey.[532] For example Japan, which has long been seen to have a nuclear hedging strategy, is now developing an indigenous hypersonic missile.[533] It also has an extremely unusual three-stage, solid-fuel space launch vehicle that some experts believe gives Tokyo latent ICBM capabilities.[534] In other words, today's burgeoning nuclear missile race may herald the start of wider missile rivalries within and across key regions of geostrategic competition.

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532. Matthew Karnitschnig, "German Bomb Debate Goes Nuclear," *Politico* (April 19, 2019), https://www.politico.eu/article/german-bomb-debate-goes-nuclear-nato-donald-trump-defense-spending/; Mark Fitzpatrick, "How Japan Could Go Nuclear," *Foreign Affairs* (October 3, 2019), https://www.foreignaffairs.com/articles/asia/2019-10-03/how-japan-could-go-nuclear; Byong-Chul Lee, "Don't Be Surprised When South Korea Wants Nuclear Weapons," *Bulletin of the Atomic Scientists* (October 23, 2019), https://thebulletin.org/2019/10/dont-be-surprised-when-south-korea-wants-nuclear-weapons/; Shannon Bugos, Turkey Shows Nuclear Weapons Interest," *Arms Control Today* (October 2019), https://www.armscontrol.org/act/2019-10/news/turkey-shows-nuclear-weapons-interest; Hugh White, *How to Defend Australia* (Carlton, Australia: La Trobe University Press, 2019); Emma Graham-Harrison, Stephanie Kirchgaessner and Julian Borger, "Revealed: Saudi Arabia May Have Enough Uranium Ore to Produce Nuclear Fuel," *The Guardian* (September 17, 2020), https://www.theguardian.com/world/2020/sep/17/revealed-saudi-arabia-may-have-enough-uranium-ore-to-produce-nuclear-fuel.

533. Mike Yeo, "Japan Unveils Its Hypersonic Weapons Plans," *Defense News* (March 13, 2020), https://www.defensenews.com/industry/tech-watch/2020/03/13/japan-unveils-its-hypersonic-weapons-plans/.

534. Saadia M. Pekkanen, "The Next-Generation Rockets that Japan Could Use to Protect Itself," *Forbes* (December 17, 2016), https://www.forbes.com/sites/saadiampekkanen/2016/12/17/the-next-generation-rockets-that-japan-could-use-to-protect-itself/?sh=5abac0dd40a3; Doug Tsuruoka, "Can Japan's Epsilon rocket be used as an ICBM?" *Asia Times* (23 January 2018), https://asiatimes.com/2018/01/can-japans-epsilon-rocket-used-icbm/.

The Need and Difficulties for New Controls

Preserving and strengthening the few existing guardrails on nuclear missile proliferation and arms racing faces daunting hurdles and negotiating new controls even more so due to broader and structural geopolitical and geostrategic trends. The systemic forces that are driving today's intensifying nuclear rivalries among the major nuclear powers—and which could exacerbate tomorrow's nuclear proliferation spirals—are part of a wider transition of the international system to a new era of great power competition. While not a unanimous consensus, disparate voices from across the ideological spectrum are converging on acceptance that the post-Cold War era of American global hegemony is over, or at the very least eroding beyond the point of no return.[535] But what new international order will replace the *Pax Americana* that has reigned since the Cold War ended three decades ago? This is the question that will shape the prospects and contours of nuclear competition and controls over the coming decade and beyond.

The question revolves mostly around the rise of China. The United States now believes that China is seeking to supplant it as the world's top economic and military power with malign designs on American interests and those of the wider liberal international order.[536] At the same time Russia is increasingly aligning with China geopolitically to work against the United States and its allies. Washington thus faces the challenge of competing against two rival great powers that are working together to undermine its global standing. Yet Moscow

535. Fareed Zakaria, "The Self Destruction of American Power: Washington Squandered the Unipolar Moment," *Foreign Affairs* 98, no. 4 (July/August 2019), https://www.foreignaffairs.com/articles/2019-06-11/self-destruction-american-power; Mathew J. Burrows, *Global Risks 2035 Update: Decline or New Renaissance?* (Washington, DC: Atlantic Council, 2019); Daniel Larison, "Please Tell The Establishment That US Hegemony is Over," *The American Conservative* (April 23, 2020), https://www.theamericanconservative.com/articles/somebody-tell-the-establishment-that-american-hegemony-is-over/.
536. Policy Planning Staff, "Elements of the China Challenge," Office of the Secretary of State (November 2020), https://www.state.gov/wp-content/uploads/2020/11/20-02832-Elements-of-China-Challenge-508.pdf.

and Beijing still have latent geostrategic tensions with each other. Some experts argue that superficial Sino-Russian cooperation masks deeper fissures that will erode this geopolitical marriage of convenience over time.[537] There is therefore still a tripolar nuclear rivalry underlying a nascent bipolar alignment that may or may not endure through the swirl of broader global power realignments.

The difficulty for analysts and statesmen alike is that almost everything about the rise of China and its potential geostrategic reverberations remains up in the air. Will China rise to surpass the United States as the world's leading power as many assume or is it already showing signs of faltering as some contrarians suggest?[538] If China does become the leading global power, then could its ambitions be checked by other powers that bandwagon with the United States to balance against it? Or will a bipolar order emerge akin to the Cold War with China and the United States leading opposing ideological coalitions? Or might all this turn into a more fluid multipolar system akin to the 19th Century's Concert of Europe as various powers bandwagon with or balance against China and the United States to preserve a balance of power? Within these scenarios will Russia

537. Jack Farchy, "China's Great Game: In Russia's Backyard," *Financial Times* (October 14, 2015); Michal Makocki and Nicu Popescu, *China and Russia: An Eastern Partnership in the Making?* (Chaillot Paper no. 140) (Paris: European Union Institute for Security Studies, December 2016), www.iss.europa.eu/sites/default/files/EUISSFiles/CP_140_Russia_China.pdf; Andrew McCormick, "Russia is Using Its Military to Become a Major Player in China's Backyard, and it Could Mean Trouble if Moscow Pushes Too Far," *South China Morning Post* (September 5, 2018); Leon Aron, "Are Russia and China Really Forming An Alliance? The Evidence is Less Than Impressive," *Foreign Affairs* (April 4, 2019), www.foreighaffairs.com/articles/china/2019-04-04/are-russia-and-china-really-forming-alliance; Elizabeth Buchanan, "There's No (New) China–Russia Alliance," *The Strategist* (June 26, 2020), https://www.aspistrategist.org.au/theres-no-new-china-russia-alliance/.

538. Michael Beckley, "The United States Should Fear a Faltering China: Beijing's Assertiveness Betrays Its Desperation," *Foreign Affairs* (October 28, 2019), https://www.foreignaffairs.com/articles/china/2019-10-28/united-states-should-fear-faltering-china; Andrew Latham, "Has China Peaked?" *The National Interest* (November 19, 2020), https://nationalinterest.org/feature/has-china-peaked-172911.

continue to be drawn further into the Chinese orbit or will historic tensions reemerge between the two land giants of Asia? Will Europe finally coalesce as a unified superpower to rival the United States and China or will it fracture into less significant geostrategic parts? Will India rise to become a major axis of global influence as a first-tier great power? As all of this plays out will America's allies feel confident continuing to rely on Washington for their security or will they increasingly feel the need to fend more for themselves?

Because such basic questions about the emerging world order are unanswerable with any high degree of certainty, hedging behavior and security dilemmas are likely to abound among the major global and regional powers until a clearer picture comes into focus. Given that most of the primary players in this great power jockeying other than Japan are already major nuclear powers—America, China, Russia, Europe (Britain and France) and India—this is not a good recipe for a preserving a stable nuclear landscape; all the more so because today's nuclear multipolarity is asymmetric and misaligned relative to broader measures of global power. Russia is the poorest and militarily weakest of the leading great powers but also has the world's largest and most formidable nuclear arsenal. This includes a massive advantage in tactical systems designed for nuclear warfighting rather than strategic deterrence. The United States still has a large strategic nuclear force but has fallen far behind Russia and China on strategic modernization. China is rising to become the world's leading power but still is presumed to have much smaller nuclear forces than either Washington or Moscow even as it presses forward with aggressive nuclear expansion. Again, these asymmetries do not augur well for nuclear cooperation or stability.

The upshot is that none of the major nuclear powers, or nuclear aspirants, or countries that may prefer to leave the door open to acquiring long-range missiles for nuclear hedging purposes, have common or even similar incentives to cooperate on new missile controls. This makes any multilateral missile nonproliferation treaty about as far-fetched as a sweeping disarmament agreement among the major nuclear powers to reduce or eliminate their nuclear arsenals. The most realistic approach in these unpromising circumstances is to focus on preserving what can be preserved and seeking modest

and/or narrow new measures to address the most urgent gathering perils. This may require bringing sustained international pressure to bear on reluctant nuclear powers like China—which has a mixed record in supporting nuclear nonproliferation and rejects participating in nuclear arms control out of hand—and other countries pursuing long-range missile programs. The most optimistic long-term goals would be to strengthen the existing missile nonproliferation regime while in parallel reinventing the bilateral Cold War nuclear arms control paradigm to fit today's asymmetric tripolar-cum-multipolar nuclear arms race.

Strengthening Missile Nonproliferation

The international missile nonproliferation regime primarily comprises a pair of rather weak arrangements, one an informal supply-side mechanism to coordinate export controls and the other a feeble global norm against ballistic missile proliferation. The supply-side of this equation is a loose arrangement among thirty-five partner countries called the Missile Technology Control Regime (MTCR). The demand-side is a broad multilateral agreement open to all countries called the Hague Code of Conduct (HCOC) Against Ballistic Missile Proliferation (sometimes also known as the International Code of Conduct or ICOC). While neither of these arrangements are especially robust, the MTCR is by far the more effective of the two.[539] The question is whether these existing missile nonproliferation pillars can be strengthened and if there are workable prospects for any new controls to augment them.

There is certainly some scope to strengthen the MTCR, although probably only on the margins. By contrast HCOC is likely too thin a reed to build upon as such. That said, it could provide a useful

539. For an excellent discussion of their relative strengths and weaknesses see: Andrew Feickert, "Missile Technology Control Regime (MTCR) and International Code of Conduct Against Ballistic Missile Proliferation (ICOC): Background and Issues for Congress," Congressional Research Service (April 8, 2003), https://crsreports.congress.gov/product/pdf/RL/RL31848/3.

starting point as a venue in which to elevate the profile of missile nonproliferation. The best opportunity to bolster nuclear missile nonproliferation, however, may be to try to try to negotiate a new, narrowly focused, global nonproliferation regime to nip the longest-range hypersonic missiles in the bud. Finally, the looming proliferation challenges suggest the need to look beyond diplomatic solutions to bolster extended deterrence by the United States (and perhaps others) to provide a disincentive for certain non-nuclear great and regional powers such as Japan, South Korea, and Germany to pursue long-range missiles as a nuclear hedge. These are limited and imperfect options, but they are worth exploring.

Strengthening the MTCR is low hanging fruit. This export control arrangement arose from a US initiative with six of its close allies in the 1980s to coordinate national export controls on missiles and related dual-use technology.[540] The regime comprises a set of agreed guidelines that provide for a "strong presumption of denial" on exports of any missile that can carry a 300kg payload to ranges above 500km and vigilance on exporting periodically updated lists of dual-use materials and technologies that could contribute to such missiles.[541] The MTCR has worked reasonably well as far as it goes, but its long-term potential suffers from partners that are not always on the same political page. This is not surprising considering that it has expanded over the years to include countries that often do not see eye to eye with the United States and its allies on various issues, such as Russia, South Africa, and Brazil. Because the MTCR operates by strict consensus, any of these countries can block any proposal intended to tailor, expand, or strengthen the scope of con-

540. For details on the early history of the MTCR see Ibid. and: David A. Cooper, "The United States and the Evolution of Supply-Side Missile Non-Proliferation Controls," in *Missile Proliferation and Defense: Problems and Prospects* (Monterey, CA: James Martin Center for Nonproliferation Studies, 2001): 15-20, https://www.jstor.org/stable/resrep09897.8?seq=1#metadata_info_tab_contents.
541. MTCR Guidelines for Sensitive Missile-Relevant Transfers, https://mtcr.info/guidelines-for-sensitive-missile-relevant-transfers/; MTCR Equipment, Software and Technology Annex (October 11, 2019), https://mtcr.info/wordpress/wp-content/uploads/2019/10/MTCR-TEM-Technical_Annex_2019-10-11-1.pdf.

trols. Moreover, enforcement relies on good faith interpretation and implementation by each partner country, which naturally invites potential differences. Even the United States itself has been reluctant to enforce some MTCR rules, although Washington argues that this is because inertia has prevented these from being updated to reflect current technological and national security realities.[542] In effect the MTCR is a useful technical regime that is often stymied by political inertia and the looseness of its structure and rules.

One obvious workaround for some of these issues would be to retain the MTCR while in parallel the United States seeks to organize a smaller caucus of its closest and most important allies to see if there is scope for this core group to go further amongst themselves than the more unwieldy larger group is willing or able. This would amount to creating a new regime within a regime. Such an *informal core group* could meet initially at higher political levels to scope out areas for enhanced cooperation. These could include going beyond what is strictly required by the MTCR rules in order to impose stricter controls on certain missiles, for example stealthy, hypersonic, or longer-range systems. Core group members could implement these among themselves while working as a unified caucus to encourage to wider group to follow suit. A core group could also agree among themselves to subject countries of particular proliferation concern like Iran to additional scrutiny. They could also agree to enhanced implementation of the existing MTCR rules by subjecting especially sensitive export licenses to *post-licensing verification* through export license terms that require recipients to allow on-site inspections to guard against items being diverted to improper uses. This is an underutilized verification technique that currently only the United States implements in any significant way. None of these are new ideas.[543] Nor are they especially dramatic. Instead, they are

542. Daryl G. Kimball, "US Reinterprets MTCR Rules," *Arms Control Today* (September 2020), https://www.armscontrol.org/act/2020-09/news/us-reinterprets-mtcr-rules.

543. David A. Cooper, "Hedging the Iran Nuclear Bet: Reinvigorate Supply-Side Nonproliferation," *The Washington Quarterly* 39, no. 3 (2016): 41-59, https://www.tandfonline.com/doi/abs/10.1080/0163660X.2016.1232633?journalCode=rwaq20.

modest technical and process improvements. But that is the nature of multilateral export controls— the unglamorous workhorses of supply-side nonproliferation. It is also as much as the political traffic of thirty-five disparate partner countries is likely to bear. These incremental supply-side improvements could nonetheless be useful to impede the further diffusion of missile technology and in any case are more likely to bear fruit than anything on the normative side of the equation.

There is no global missile nonproliferation treaty. Nor is there likely to be one for the foreseeable future given the reliance of the NPT nuclear weapons states (and nuclear powers outside NPT) on long-range missiles, in conjunction with the reluctance of many other countries to agree to another discriminatory treaty along the lines of the NPT that provides for haves and have-nots. The closest thing to a demand-side global norm is the HCOC, but it is an utterly feckless arrangement that has no enforcement mechanisms and, in any case, does not actually prohibit much of anything and does not even address cruise or hypersonic missiles.[544] It is at most a normative confidence building measure to demonstrate hortatory support for ballistic missile nonproliferation. For all of these conspicuous shortcomings though, it could still be used as a platform to stir international attention on missile proliferation. What is offers in this regard are annual meetings of a majority of the world's countries pledging to work together against ballistic missile proliferation. Although HCOC now boasts 140 subscribing states, there are key countries that are conspicuous by their absence, including China, Egypt, India, Iran, Israel, Saudi Arabia, and Pakistan.[545] *Elevating the level of HCOC meetings* could provide opportunities to advance ideas that would bring helpful political pressure to bear on these holdouts. Annual HCOC meetings have always been obscure bureaucratic af-

544. United Nations General Assembly Document A/57/724 (February 6, 2003), https://us02web.zoom.us/j/85384886824?pwd=VjRxMjBKRVQrUHBGazliTm16SThIdz09.

545. Bureau of International Security and Nonproliferation, "The Hague Code of Conduct Against Ballistic Missile Proliferation," US Department of State (April 2019), https://www.state.gov/hague-code-of-conduct-against-ballistic-missile-proliferation-hcoc/.

fairs, but this need not be the case. The United States could easily up its representation in coordination with other key players to introduce ambitious proposals that align with the goals and purposes of the agreement.

One such initiative might be to work with Moscow to use HCOC as a vehicle to revive a 2007 joint US-Russian proposal to *globalize the now defunct INF Treaty* that called on all countries to join them in "renunciation of ground-launched ballistic and cruise missiles with ranges between 500 and 5,500 kilometers, leading to the destruction of any such missiles, and the cessation of associated programs."[546] The United States and Russia in effect would offer to rejoin the INF Treaty—with its basic terms non-negotiable—but only if others follow suit. To be clear this proposal would stand no chance of gaining traction given that China enjoys a huge advantage in these types of systems and that they represent the mainstay of the missile forces of countries like Iran, North Korea, and India. However, an actual treaty could be negotiated with willing countries by incorporating a provision into the relevant INF prohibitions that would require all countries with prohibited missiles or programs to join before the treaty enters into force, along the lines of a similar provision in the Comprehensive Test Ban Treaty (CTBT). This would allow the United States to adopt a 'we'll sign if you do' stance with those already deploying systems that would be banned.[547] This would set the stage for a long-term norm-building effort. By offering to reconstitute INF as a global missile nonproliferation and disarmament treaty, such an initiative could provide a rare point of alignment between Washington and Moscow against Beijing. It would afford Washington the

546. Office of the Spokesman, "Joint US-Russian Statement on the Treaty on the Elimination of Intermediate-Range and Shorter-Range Missiles at the 62nd Session of the UN General Assembly (October 25, 2007)," US Department of State Archive, http://2001-2009.state.gov/r/pa/prs/ps/2007/oct/94141.htm.

547. Washington might even opt to go so far as to sign but not ratify as it has done with CTBT. The complication here is that a treaty signatory is bound to refrain from actions that would undermine the object and purpose of that treaty. In order to sign (or sign and ratify), the treaty would need to be negotiated to explicitly permit intermediate-range missile deployments pending its entry into force.

nonproliferation high ground while shining the spotlight on China and others as the root problem, even as Washington and Moscow reconstitute their own post-INF intermediate missile forces. This is a longstanding idea that has never gone anywhere and there is a good chance that even Russia might now shy away for fear of straining its cozy relations with Beijing. Then again, Russia has more reason to be concerned about these Chinese missiles—which can hit it territory but not the United States—and this was initially a high-profile proposal by President Vladimir Putin that he might find difficult to disavow.[548]

Another nonproliferation initiative urgently worth considering is seeking to negotiate a *global ban on long-range and nuclear-armed MHVs*. At this point only a few countries have long-range hypersonic missile programs in advanced stages of development and all of them other than Japan are existing nuclear powers. Because the most feasible nonproliferation measures are prophylactic this should be an urgent priority before other countries join the hypersonic race. This technology is likely to prove too critical for conventional warfighting—like cruise missiles in times past—to make a complete ban practicable. However, there is no more reason for non-nuclear states to have long-range MHVs than there is for them to have long-range ballistic missiles. This would be simple to verify for states that do not have MHVs in the form of a test ban. The real challenge is that the nuclear powers may insist on retaining intermediate- and intercontinental MHVs as nuclear delivery systems. If so, this would necessitate a discriminatory 'NPT-like' approach that exempts the NPT nuclear weapons states and/or countries that are already in advanced stages of developing such systems. This would be an extremely tough sell to everyone else. It would also necessitate leaving out the non-NPT nuclear powers or else conferring de facto legitimacy on their nuclear status (always assuming that the NPT itself does not unravel if states harboring nuclear ambitions ever threaten or opt to withdraw). Perhaps the best way to navigate this would be to follow the NPT model of exempting only countries that have al-

548. David A. Cooper, "Globalizing Reagan's INF Treaty: Easier Done Than Said?" *The Nonproliferation Review* 20, no. 1 (2013): 145-163.

ready tested long-range MHVs. In any case, this scheme could only work if the pot could be sweetened for prospective have-nots by having exempted countries undertake a parallel arms control measure to cap their deployments of long-range and/or nuclear-armed MHVs (more on this idea below).

Finally, the dubious prospects for any of these initiatives suggests the importance to pursue another means to strengthen missile nonproliferation that lies beyond the realm of diplomacy: *repairing and expanding extended deterrence*. As noted already, a serious long-term risk for missile proliferation might come not only from the usual rogue suspects but also American allies. If these countries lose confidence in Washington's security guarantees, then they might pursue long-range missiles as part of a nuclear hedging or break-out strategy. Extended deterrence has always been the secret sauce of nuclear nonproliferation by reassuring most American allies that they do not need their own nuclear forces. Unfortunately, faith in the US nuclear umbrella has been undermined over the past decade; first by the Obama administration's perceived anti-nuclear stance including public flirtations with 'sole use' and 'no first use' doctrines, then by the Trump administration's perceived anti-alliance stance including flirtations with withdrawing or disavowing the automaticity of promises to respond to attacks against allies (e.g., NATO Article 5).

It is left to the Biden administration and its successors to repair this damage. But this may be challenging if President Biden seeks to revisit 'sole use' or 'no first use' declaratory policies, as he will doubtless be prevailed upon to do by dovish factions within his party. As noted, extended deterrence has been buffeted from different directions by the last two administrations. What is therefore needed is to couple rebuilding allied confidence in American support for NATO and its other key alliances (as President Biden has pledged) with not only a strongly reaffirmation of existing nuclear guarantees, but even expanding these judiciously through steps like declaring Australia unambiguously under the American nuclear umbrella. There could even be useful scope for other nuclear powers to use extended deterrence to calm skittish allies. There are already suggestions that France should consider extending its own independent nuclear guarantees to the rest of Europe to compensate for worries about

NATO, and President Emmanuel Macron has articulated a tough-minded nuclear posture that does not seem to rule out this possibility.[549] Would it even be so crazy to think that formal Chinese nuclear guarantees to Pyongyang might be part of a solution to the elusive North Korean denuclearization puzzle?

Reinventing Nuclear Arms Control

The odds for major new arms control agreements in the context of competitive and uncertain nuclear multipolarity are negligible in the near-term and even more distant prospects are not that much more encouraging. However, there are some modest interim options and aspirational long-term proposals that might help over time to stabilize deterrence relationships amid the gathering nuclear arms race. If the New START Treaty gets extended there will be a measure of transparency and predictability for at least a few more years in the adversarial nuclear relationship between the United States and Russia. This brief interval should not be squandered. It should be used to probe the scope to reinvent the longstanding model of bilateral nuclear arms control for the new circumstances of competitive nuclear multipolarity. It means setting aside any dreams of nuclear abolition, or even steep reductions, to focus on more modest measures to calm arms racing and stabilize strategic deterrence relationships. It also means that the future of nuclear arms control—which is mostly nuclear missile control—must be trilateral or plurilateral. This will require President Biden embrace and build on the legacy of his predecessor to draw China into trilateral negotiations, perhaps a bit-

549. Christian Trippe, "Could France Take the Lead in Europe's Nuclear Security?" *DW* (February 16, 2019), https://www.dw.com/en/could-france-take-the-lead-in-europes-nuclear-security/a-47549878; Emmanuel Macron, Speech of the President of the Republic on the Defense and Deterrence Strategy (February 7, 2020), https://www.elysee.fr/en/emmanuel-macron/2020/02/07/speech-of-the-president-of-the-republic-on-the-defense-and-deterrence-strategy; Ivon Dikov, "Macron Just Missed the Chance to Extend France's Nuclear Umbrella over the Post-Brexit EU," *European Views* (February 27, 2020), https://www.europeanviews.com/2020/02/macron-just-missed-the-chance-to-extend-frances-nuclear-umbrella-over-the-post-brexit-eu/.

ter political pill to swallow. However, arms control among nuclear rivals will only work if it aligns with geopolitical and geostrategic realities. This is precisely why the traditional bilateral Cold War approach withered on the vine in the unipolar post-Cold War order—it did not align with this unipolar reality. In a multipolar nuclear order, the future of arms control can only be trilateral or plurilateral.

The minimum requirement for any future nuclear arms control process is to at least cover the tripolar Sino-Russo-American core of global great power competition. It may ultimately need to expand to plurilateral arrangements if Russia continues to insist that Britain and France participate, and/or if China adopts a similar stance about India. Regardless of whether the format is trilateral or plurilateral, the salient point is that New START represents the denouement of bilateral strategic arms control. China's argument that its smaller nuclear arsenal exempts it from arms control will not wash over time. In the first place there is uncertainty about the precise size of the Chinese arsenal other than that it is growing. More important, China is now the main geopolitical and geostrategic rival of the United States. If new arms control is to happen then China must be in the mix. President Obama made this point as far back as 2009 by indicating that the purpose of the then ongoing New START negotiations was to prime the pump for expanding nuclear negotiations to the other nuclear powers.[550] Extending New START must be seen in this same light as when it was first negotiated.

China is not going to come willingly to arms control. It adamantly rebuffed the Trump administration's efforts to draw it into a trilateral negotiating process.[551] Beijing therefore needs to be pressured over time to see that participating in arms control is in its best interests. At the same time Russia will continue to be opportunistic about its

550. Barack Obama, "Remarks By President Barack Obama In Prague As Delivered," Office of the Press Secretary (April 5, 2009), https://obamawhitehouse.archives.gov/the-press-office/remarks-president-barack-obama-prague-delivered.
551. "Envoy: China Won't Take Part in US-led Trilateral Arms Control Negotiation," *CGTN* (October 14, 2020), https://newsus.cgtn.com/news/2020-10-14/Envoy-China-won-t-take-part-in-negotiating-trilateral-arms-control-Uz1nRZo2Hu/index.html.

willingness to engage in new arms control and so will also need to be incentivized. This situation requires the United States to arms race against China and Russia while holding out the offer to negotiate a trilateral or plurilateral arms control alternative. Why? Because Russia and China are only going to engage in good faith arms control negotiations if and when they believe that the only alternative is a dangerous and expensive arms race that they stand to lose (or at least that they cannot realistically hope to win).

Unfortunately, the United States is not able to negotiate from strength at the moment. Washington is behind Moscow numerically in strategic deployments (due to some disadvantageous quirks in New START's counting rules) and far behind in total nuclear deployments (due to Moscow's massive advantage in nonstrategic systems). It is likewise far behind both Russia and China in nuclear modernization. Moreover, unless the United States successfully modernizes its entire nuclear force within the next 10-15 years, senior Pentagon officials warn that the United States could cease altogether to be a credible nuclear power.[552] This lagging position is compounded by partisan political divisions that might encourage America's rivals to take a wait and see approach to arms control. Only when Washington demonstrates a sustained bipartisan commitment to nuclear modernization through one or more election cycles will we be able to see what new nuclear guardrails may be possible. The initial stance of the Biden administration will be crucial in this regard.

The Biden administration would do well to propose aspirational arms control initiatives that are nevertheless more realistic than the deep cuts and nuclear abolition goals previously pursued by the Obama administration. In parallel, Washington must continue to demonstrate that it is willing and able to: 1) continue fully to fund and execute the nuclear modernization program of record; 2) match and surpass Russian and Chinese long-range hypersonic systems absent

552. C. Todd Lopez, "'Tipping Point' Is Here for Nuclear Modernization, Defense Official Says," DOD News (September 17, 2020), https://www.defense.gov/Explore/News/Article/Article/2351959/tipping-point-is-here-for-nuclear-modernization-defense-official-says/.

new control measures; and 3) press forward with nascent plans for a space-based missile defense sensor architecture to defend against them (again, absent new control measures). Chinese resistance to intrusive verification suggests that any new initiatives should focus squarely on delivery systems, which are easier to verify than warheads. It is instructive to recall that SALT-I—lacking intrusive verification measures—mainly controlled only launchers (e.g., ICBM silos and SLBM launch tubes). What follows are some plausible suggestions for specific arms control proposals along these lines.

Washington could propose a *US-Russian intermediate-range deployment moratorium in Europe.*[553] This geographic deployment ban would prohibit range ground-launched missiles of all types (ballistic, cruise, and hypersonic) with ranges from 500-5500 kilometers from the Atlantic to the Urals. This would remove theater missiles from Western Europe and Russia's European territory. The goal would be to avoid a missile race in Europe by shifting Russian missiles and any potential US overseas deployments toward Asia. This could be achievable because, if NATO opts to deploy intermediate-range missiles to counter Russian deployments, Russia will find itself at a disadvantage relative to the United States. Why? Because these missiles will be able to hit important targets in the Russian homeland whereas Russian missiles could not target the US homeland. To move quickly and to minimize the risks posed by any potential Russian violations this could be proposed as reciprocal unilateral moratoria rather than as a formal bilateral treaty. If Russia agrees, then this would reassure NATO allies while ramping up pressure on China to negotiate trilaterally. If Russia refuses, then Washington will have lost nothing and gained political points for trying. It may or may not work, but there are really no downsides.

The Biden administration should also consider moving quickly and urgently to propose an *outright ban or low ceilings for strategic-*

553. This proposal draws on a prior opinion piece by the author: "Could a U.S.-Russian Deployment Ban Avoid a Nuclear Arms Race in Europe?" *The National Interest* (April 2, 2019), https://nationalinterest.org/feature/could-us-russian-deployment-ban-avoid-nuclear-arms-race-europe-50457.

range and/or nuclear-armed MHVs. As noted earlier, preemptive controls are typically the most negotiable. It is too late to preemptively negotiate a total ban on all types and ranges of MHVs given that several nuclear powers have made great strides already in developing such systems including China, Russia, the United States, France, and India.[554] MHVs are also too potentially useful for conventional strike missions for a total ban to be workable, especially at shorter ranges. However, a narrower ban on strategic-range (either intermediate or intercontinental) and/or nuclear-armed MHVs would not seem to be out of the question. Russia might balk at a total ban given that it claims already to have started to deploy such systems. The United States may also be reluctant to give up on plans to use MHVs for conventional global strike. China may hope that it can cling to the leading edge in developing new hypersonics. But none of these programs are far enough along to rule out a narrow ban. If a total ban proves out of reach, then national ceilings for strategic-range and/or nuclear-armed MHVs could still enhance deterrence stability, especially if these were negotiated below the level that any country thought would put its nuclear deterrent it at risk from a first strike. Low enough ceilings might also convince the rest of the world to renounce such systems for purposes of missile nonproliferation as discussed above.

In addition to overall long-range MHV ceilings there could be *ceilings on multiple reentry vehicles* encompassing both multi-MHV boosters and traditional MIRVs. This could be achieved by an overall ceiling on deployed warhead numbers relative to the number of strategic delivery systems. Alternatives might be to cap the maxi-

554. Michael Peck, "Now France Wants Hypersonic Missiles by 2021," *The National Interest* (February 4, 2019), https://nationalinterest.org/blog/buzz/now-france-wants-hypersonic-missiles-2021-43202; Richard Stone, "'National Pride is at Stake.' Russia, China, United States Race to Build Hypersonic Weapons," *Science Magazine* (January 8, 2020), https://www.sciencemag.org/news/2020/01/national-pride-stake-russia-china-united-states-race-build-hypersonic-weapons; Sarah Zheng, "India Joins Hypersonic Club with Successful Test Flight of Cruise Vehicle," *South China Morning Post* (September 8, 2020), https://www.scmp.com/news/china/diplomacy/article/3100662/india-joins-hypersonic-club-successful-test-flight-cruise.

mum number of MIRVs or multi-MHVs that can be deployed on any single ICBM and/or the maximum number of launchers that can hold MIRVed or multi-MHV missiles. This would temper current trends pointing toward a destabilizing surge in MIRV and multi-MHV systems. Russia is re-MIRVing aggressively and plans multi-MHV ICBMS. China and India are now MIRVing for the first time. The United States currently MIRVs only SLBMs and thus is not yet in this race. But it could gain significant negotiating leverage just by pointing to its ability quickly to re-MIRV should it choose to do so by uploading stored warheads back onto deployed ICBMs. Realistically, Russia is unlikely to forgo its MIRV and nascent multi-MHV advantages. and China is unlikely to countenance the intrusive measures that verifying any MIRV ceiling would necessitate. Still, it would be worthwhile to put this out there as an aspirational proposal.

Conclusion

Nuclear missiles and defenses against them are central to the US-Russia-China strategic rivalry that is gaining momentum and pulling in the secondary nuclear powers. In particular, the technology race for hypersonic missiles and defenses is up for grabs and promises to reshape strategic balances in ways that could profoundly alter the geostrategic positions of winners and losers alike. The stakes could not be higher. This new multipolar nuclear missile race poses dangers to deterrence stability and if left unchecked could over time provoke wider nuclear hedging or breakout. Current international controls are not up to the task of curtailing these dynamics and therefore need to be strengthened and augmented. Unfortunately, the prospects for this are remote in today's adversarial and shifting geopolitical and geostrategic international environment. Putting viable controls in place will therefore require Washington and its allies to play a long game that focuses on bending the incentives for China, Russia, and others to accept the need for new arms control constraints and nonproliferation guardrails. This will not be easy, and it will not happen quickly.

The nonproliferation and arms control ideas suggested here are by

no means fully formed proposals. Most of these ideas have been bouncing around for years or even decades without attracting much interest. Modest and pragmatic options along these lines are not exciting to those seeking bold disarmament solutions. At the same time, even the most modest of them are still relatively far-fetched as China and others eschew negotiations. At most these are examples of seeds that could be planted and tended to see which ones might take root as geopolitical circumstances evolve over the coming decade.

Ultimately, solutions will not come from clever proposals. They will come instead from the realignment of hardnosed calculations across various capitals. The most important aspect of a new US approach to arms control and nonproliferation is therefore to achieve and utilize negotiating leverage. In practice this means demonstrating to China and Russia that they will gain nothing by arms racing against the United States and its allies and demonstrating to those allies that America has their back—all the while offering reasonable and pragmatic proposals to control the new nuclear arms race, temper hedging, and prevent new proliferation spirals.