

**Avoiding Atomic Disaster: The Destabilizing Impacts of
Conventional and Nuclear Hypersonic Intercontinental Missiles**

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Abstract

United States Strategic Command should not support the development of *conventional or nuclear* hypersonic intercontinental missiles because they are destabilizing to other nuclear-armed nations. First, replacing the United States' nuclear intercontinental ballistic missile (ICBM) arsenal with hypersonic payloads, whether conventional or atomic, will cause unintended consequences affecting the stability of nuclear deterrence. Without the ICBM leg of the nuclear triad, it opens the door for aggression, proliferation, and ambiguity—all of which weaken nuclear deterrence. Additionally, if intercontinental-range hypersonic missiles become operational, mitigating the risks of nuclear instability is unfeasible and not worth the fiscal costs. It is expensive—not to mention impractical—to manage nuclear uncertainty and compete in long-term defensive and offensive arms races. In general, the operational benefits of an intercontinental-range hypersonic capability are not worth the strategic problems they may cause. Ultimately, the United States must pursue a multilateral arms control agreement by trading its existing, superior HICM technology for strategic concessions from Russia and China. Not only would such an approach strengthen nuclear deterrence, but it would also avoid unfeasible national expenses.

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“But we have to be ready to recognize that deterrence philosophies and win-the-war philosophies may diverge in important respects... The objective of erecting a high degree of deterrence takes a higher priority than the objective of assuring ourselves of a winning capability.”¹

-- Bernard Brodie, 1959

Prior to the nuclear age, as technology transformed the character of warfare, the fundamental priority for powerful nations remained mostly the same—equip a military strong enough to win the next war.² However, as the evolution of weapons sparked rapid procurements of long-range missiles to deliver powerful nuclear warheads, the “next war” looked quite different and immensely destructive compared to wars of the past. The United States eventually prioritized its national strategic policies to *deter* war between nuclear-armed states before the aim of *winning* one, since there is no real winner in an atomic exchange.³ Throughout the Cold War, deterrence doctrine prevailed; but soon after, the United States’ unilateral supremacy set in motion thirty years of atrophied deterrence thinking and a gradual return to heavy-handed military capabilities. In today’s era of great power competition, once again, the United States faces a new long-range existential threat, this time in the form of hypersonic missile technology. If the government does not prioritize maintaining stable nuclear deterrence above its capabilities to win the next war, mutually assured destruction will likely become a self-fulfilling prophecy.

United States Strategic Command should not support the development of *conventional or nuclear* hypersonic intercontinental missiles because they are destabilizing to other nuclear-armed nations. First, replacing the United States’ nuclear intercontinental ballistic missile (ICBM) arsenal with hypersonic payloads, whether conventional or atomic, will cause unintended consequences affecting the stability of nuclear deterrence. Without the ICBM leg of

¹ Bernard Brodie, “The Anatomy of Deterrence,” *World Politics* 11, no. 2 (1959): 178.

² Seymour Deitchman, *Military Power and the Advance of Technology: General Purpose Military Forces for the 1980s and Beyond* (Boulder, CO: Westview Press, 1983), 1-6.

³ Keith B. Payne, *The Great American Gamble: Deterrence Theory and Practice from the Cold War to the Twenty-First Century* (Fairfax, VA: National Institute Press, 2008), 31-35.

the nuclear triad, it opens the door for aggression, proliferation, and ambiguity—all of which weaken nuclear deterrence. Additionally, if intercontinental-range hypersonic missiles become operational, mitigating the risks of nuclear instability is unfeasible and not worth the fiscal costs. It is expensive—not to mention impractical—to manage nuclear uncertainty and compete in long-term defensive and offensive arms races. Ultimately, the operational benefits of an intercontinental-range hypersonic capability are not worth the strategic problems they may cause.

Hypersonic weapons are an emerging technology with vast potential for U.S. Strategic Command and other combatant commands, but the United States has fallen behind in prioritizing their development. In the 2018 National Defense Strategy, the United States formally identified hypersonics as a high-priority means to “fight and win wars of the future” after lagging behind Russia and China.⁴ Senior defense officials and many national security experts deem hypersonics a “game-changer” because this technology can strike enemy targets where other military capabilities cannot or are not appropriate.⁵ One variety commonly referred to as a hypersonic glide vehicle (HGV), is technologically mature and better suited for integration with missile boosters. This article focuses on HGVs equipped to intercontinental missile boosters and henceforth referred to as a hypersonic intercontinental missile (HICM).⁶

⁴ U.S. Department of Defense, *Summary of the 2018 National Defense Strategy* (Washington, DC: Office of the Secretary of Defense, 2018), 3.

⁵ Hyten, John E., “Testimony,” Senate Committee on Armed Services, 116th Cong., 1st sess., 2019; John Harper, “Hypersonics, AI Top Indo-Pacific Command’s Tech Wishlist,” *National Defense Magazine*, 3 March 2020, <https://www.nationaldefensemagazine.org/articles/2020/3/11/indo-pacific-command-lays-out-top-st-priorities>; Steven Simon, “Hypersonic Missiles are a Game Changer,” *New York Times*, 2 January 2020, <https://www.nytimes.com/2020/01/02/opinion/hypersonic-missiles.html>; Richard H. Speier, George Nacouzi, Charrie Lee, and Richard M Moore, *Hypersonic Missile Nonproliferation: Hindering the Spread of a New Class of Weapons* (Santa Monica, CA: Rand Corporation, 2017), xiii.

⁶ For a detailed discussion on hypersonic weapons’ technical capabilities and strategic issues, refer to: Kelley M. Saylor, *Hypersonic Weapons: Background and Issues for Congress* (Washington, DC: Congressional Research Service, 2020); Amy F. Woolf, *Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues* (Washington, DC: Congressional Research Service, 2020); U.S. Department of Defense, *2019 Missile Defense Review* (Washington, DC: Pentagon, 2019); Kyle Mizokami, “Russia’s New Hypersonic Weapon Flies at Mach-27,” *Popular Mechanics*, 30 December 2019, <https://www.popularmechanics.com/military/weapons/a30346798/russia-new-hypersonic-weapon-mach-27>; Sydney J. Freedberg, “Hypersonics: DoD Wants ‘Hundreds of Weapons’ ASAP,” *Breaking Defense*, 24 April 2020, <https://breakingdefense.com/2020/04/hypersonics-dod-wants-hundreds-of-weapons-asap/>.

Myopic Support for Hypersonic Intercontinental Missiles

Hawkish perspectives dominate the national discussion arguing for a hypersonic intercontinental missile capability. Some experts advocate for a *conventional* HICM capacity to offset Russian and Chinese regional military advantages. For example, Russia or China could invade territories near the Baltics or the South China Sea, respectively, with a *fait accompli* while deterring the United States from responding by holding slow-reacting American regional military assets at risk.⁷ To discourage this possibility, proponents of conventional HICMs argue a quick-response capability located in the continental United States is more flexible, reliable, timely, and defended compared to friendly assets in Europe or the Western Pacific.⁸ Operationally, an American HICM launched from the continental United States that compresses time and space may compel Russia or China to return to the status quo. Strategically, however, the same response may unintentionally degrade nuclear deterrence and escalate a conflict to nuclear use and large-scale war. Losing a slight edge on the battlefield is better than the global impact of nuclear fallout.

Another argument calls for *nuclear* hypersonic intercontinental missiles as a balanced option to deter nuclear aggression. One group believes low-yield nuclear weapons delivered by HICMs are more credible in certain situations that do not require an all-out nuclear response and are proportionately appropriate per the laws of armed conflict.⁹ Another side thinks high-yield nuclear payloads should be delivered by hypersonic missiles just to keep strategic parity with Russia and China in the event a highly-reliable missile defense network becomes feasible.¹⁰

⁷ Alan Cummings, "Hypersonic Weapons: Tactical Uses and Strategic Goals," *War on the Rocks*, 12 November 2019, <https://warontherocks.com/2019/11/hypersonic-weapons-tactical-uses-and-strategic-goals/>.

⁸ Woolf, *Conventional Prompt Global Strike*, 7-10.

⁹ Dennis Evans and Jonathan Schwalbe, "Intercontinental Ballistic Missiles and Their Role in Future Nuclear Forces," *Air & Space Power Journal* 32, no. 2 (Summer 2018): 43-44.

¹⁰ Bishop Garrison and Preston Lann, "Russia's Hypersonic Nukes Exploit U.S. Vulnerabilities," *Real Clear Defense*, 18 September 2019, https://www.realcleardefense.com/articles/2019/09/18/russias_hypersonic_nukes_exploit_us_vulnerability_114750.html.

Collective to each side, these proponents believe both options would add another tool to the military's playbook, giving the President flexibility during a nuclear crisis to deter or achieve a successful outcome. However, from a deterrence standpoint short of nuclear use, these capabilities are excessive and actually decrease strategic stability. Enhanced methods to accomplish the same result is not usually effective when it comes to deterring nuclear use.

Those who want to fill an operational capability gap using HICMs insufficiently understand the negative impacts this course of action will have on effective nuclear deterrence and defense spending. Or perhaps these groups fully appreciate the "escalation entanglement" problem long-range hypersonics pose to miscalculated nuclear first use, which has been established in detail by international security expert, James Acton.¹¹ If this is the case, HICM supporters must have confidence that U.S. Strategic Command can adequately mitigate the risks associated with maintaining strategic stability, or their assertions are misguided. Otherwise, savvy operational leaders, such as supported combatant commanders, would likely never employ or endorse HICMs during an operational conflict due to the risk of nuclear ambiguity at the strategic-level. The remainder of this article discusses in greater nuance the ways operational HICMs will cause strategic problems, specifically how they will destabilize nuclear deterrence while imposing unrealistic costs to mitigate the risks of strategic instability.

Destabilizing Impacts on Nuclear Deterrence

Evaluating the negative impacts both conventional and nuclear HICMs pose to strategic stability begins with a review of the United States' nuclear deterrence policy. The 2018 Nuclear

¹¹ James M. Acton, "Escalation through Entanglement: How the Vulnerability of Command-and-Control Systems Raises the Risks of an Inadvertent Nuclear War," *International Security* 43, no. 1 (Summer 2018): 56-99; James M. Acton, "The Weapons Making Nuclear War More Likely," *BBC News*, 8 February 2019, <https://www.bbc.com/news/world-47117349>; James M. Acton, *Silver Bullet? Asking the Right Questions About Prompt Global Strike* (Washington, DC: Carnegie Endowment for International Peace, 2013), 9-29.

Posture Review says, “The deterrence effects [nuclear weapons] provide are unique and essential to preventing adversary nuclear attacks, which is the highest priority of the United States.”¹²

Given this statement, civilian and military decisions related to nuclear weapons and deterrence efforts should focus on this ultimate goal. For nuclear deterrence to be effective, it relies on the perception of mutual vulnerability.¹³ Using this framework, U.S. Strategic Command can evaluate the gains of an operational HICM capability against the strategic effects it will have on the current nuclear deterrence posture.

First, replacing the nuclear ICBM force with a conventional HICM force will create a dangerous gap in the United States’ strategic deterrence posture, and potentially increase the prospect of nuclear use. A reduction of the triad to a dyad of bombers and submarines would severely limit first- or second-strike options required to achieve effective deterrence.¹⁴

Researchers predict that emerging underwater detection abilities could significantly increase the vulnerability of U.S. nuclear submarines within the next several decades.¹⁵ The bomber force would be hard-pressed to provide a robust level of deterrence without ICBMs and a survivable nuclear submarine fleet.¹⁶ Only a force of nuclear land-based missiles can prevent American weakness from being exploited at the strategic-level. Therefore, without the ICBM leg of the United States nuclear deterrence posture, a counterstrike from conventionally-armed HICMs would not deliver enough mutual vulnerability to deter preemptive atomic aggression.

In addition, fielding conventional HICMs in-place of the land-based nuclear missile arsenal would encourage the proliferation of nuclear weapons among non-nuclear nations,

¹² U.S. Department of Defense, *Nuclear Posture Review* (Washington, DC: Office of the Secretary of Defense, 2018), IV.

¹³ For a detailed discussion on nuclear deterrence theory, reference: Payne, *The Great American Gamble*.

¹⁴ Bernard Brodie, *Strategy in the Missile Age* (Princeton, NJ: Princeton University Press, 1959), 271-286.

¹⁵ James Johnson, “Artificial Intelligence Drone Swarming and Escalation Risks in Future Warfare,” *The RUSI Journal* (2020): 5-7; Bryan Clark, “The US Navy should turn to unmanned systems to track and destroy submarines,” *Defense News*, 13 April 2020, <https://www.defensenews.com/opinion/commentary/2020/04/13/us-navy-should-turn-to-unmanned-systems-to-track-and-destroy-submarines/>.

¹⁶ Jack Weinstein (Boston University), interview by the author, 3 May 2020.

leading to further instability. Without the approximately 500 nuclear missile silos and launch control centers to contend with, other nations with much smaller nuclear forces could target the United States' main nuclear bomber bases, submarine ports, and command centers with just seven nuclear weapons.¹⁷ Further, only seven additional warheads would wipe out the United States' supporting nuclear enterprise and production centers.¹⁸ Without ICBMs, the incentive to gain nuclear parity with the United States dramatically increases for states and non-state actors wishing to contest American superiority. Plus, as nuclear weapons proliferate, allies of the United States may develop their own atomic weapons with the American nuclear umbrella considerably smaller.¹⁹ As more countries enter the nuclear club, the chances of an intentional attack, miscalculated escalation within a regional conflict, or unintentional accident significantly increases. No matter the reason, more countries with nuclear weapons would destabilize the globe, making the efficacy of a conventional HICM insignificant.

Conventional HICMs would also degrade nuclear stability in other ways because there is no sure method to establish and maintain trust and transparency through diplomacy. Any diplomatic agreement limiting the number of hypersonic weapons or implementing strict verification procedures to ensure a payload is conventional could result in a “lulling effect” on political leaders and the American public.²⁰ When in reality, according to Lieutenant General (retired) Jack Weinstein, former Air Force Deputy Chief of Staff for Strategic Deterrence and Nuclear Integration, after detecting an incoming HICM the attacked leadership would always assume the worst-case scenario—that the inbound missile carries a surprise nuclear payload.²¹

¹⁷ Matthew Kroenig, *The Logic of American Nuclear Strategy: Why Strategic Superiority Matters* (New York, NY: Oxford University Press, 2018), 60.

¹⁸ Amy F. Woolf and James D. Werner, *The U.S. Nuclear Weapons Complex: Overview of Department of Energy Sites* (Washington, DC: Congressional Research Service, 2020), 11.

¹⁹ Terence Roehrig, *Japan, South Korea, and the United States Nuclear Umbrella: Deterrence After the Cold War* (New York, NY: Columbia University Press, 2017), 37.

²⁰ Richard Haass and Albert Carnesale, *Superpower Arms Control: Setting the Record Straight* (Cambridge, MA: Ballinger Publications Company, 1987), 350.

²¹ Weinstein, interview.

Even if a treaty did provide some degree of reassurance, given the current geopolitical conditions, it is unlikely the United States, Russia, and China would agree to meaningful verification terms or fully comply with them. Without effective verification from inspections or confident intelligence assessments using national technical means, the fog of war may cloud an enemy's judgment during a crisis and result in unnecessary escalation. This is why using an operational-level conventional HICM could result in a miscalculated response with a nuclear weapon, pushing a conflict past the brink of nuclear deterrence.

An alternative option nuclearizes HICMs with low-yield warheads, but this only causes related ambiguity problems and may escalate a conflict to extensive nuclear use. Similar to the challenges posed by conventional HICMs, attacked countries cannot distinguish a low-yield nuclear payload from a high-yield payload during flight.²² Therefore, assuming the worst-case scenario, any missile launched from the continental United States might be construed as a high-yield strategic weapon, then responded to in kind.²³ Although low-yield capabilities are necessary to deter an enemy's use of smaller nuclear weapons during regional conflicts, such as Russia's unofficial "escalate to deescalate" policy, strategic systems should not employ these tactical options. Instead, low-yield nuclear weapons effectively deter along lower rungs of the escalation ladder when equipped to fighter jets or launched from naval ships deployed in-region. Low-yield nuclear HICMs project confusion rather than credibility, so there is a chance their use could quickly escalate to larger-yield usage, thus negating their worth in the first place.

Up to this point, both conventional and nuclear HICMs clearly add new strategic deterrence challenges for U.S. Strategic Command to manage. The operational utility these

²² Vipin Narang, "The Discrimination Problem: Why Putting Low-Yield Nuclear Weapons on Submarines is so Dangerous," *War on the Rocks*, 8 February 2018, <https://warontherocks.com/2018/02/discrimination-problem-putting-low-yield-nuclear-weapons-submarines-dangerous/>.

²³ George Perkovich, "Critiquing the State Department's Nuclear Posture Clarification," *Carnegie Endowment for International Peace*, 6 May 2020, <https://carnegieendowment.org/2020/05/06/critiquing-state-department-s-nuclear-posture-clarification-pub-81722>.

systems provide would never be a viable option for an in-theater commander who does not want to make a bad problem worse. Unless suitable mitigation of the risks to nuclear escalation occurs, an operational HICM is as good as an empty quiver. The next section addresses the low viability of risk mitigation, and the unreasonable costs to the American taxpayers.

Unrealistic Costs to Mitigate Risks

To mitigate the risks HICMs pose to nuclear stability, considerable costs to the national budget will require policymakers to sacrifice competing strategic priorities. As federal appropriations fluctuate over the next decade, the Department of Defense will likely face budget cuts requiring difficult and contentious decisions to balance sustaining its aging weapons with modernizing and growing a force to compete with great powers.²⁴ Cost-effective solutions and reduced defense spending may be the new normal for the foreseeable future, which adds to the importance of reallocating high fiscal costs of HICMs towards other programs to maintain strategic stability.

First, to mitigate the miscalculation a HICM may cause, it would cost an unrealistic amount of money and time to do so. The flight profile or location of the missile would need to be completely different than a traditional ICBM, and it would be costly to develop and field an innovative capability.²⁵ This could include designing a distinctive type of booster launched from existing silos, building new silos in other parts of the United States, or designing a road-mobile missile to alleviate any confusing intent following a launch.²⁶ Any of these programs, even if technically feasible, would probably take decades to implement and cost hundreds of billions of dollars each. Throwing money at this problem will only reduce—not eliminate—the ambiguity

²⁴ Weinstein, interview.

²⁵ Woolf, *Conventional Prompt Global Strike*, 39.

²⁶ Woolf, *Conventional Prompt Global Strike*, 38.

of nuclear attack, hence it would be better spent on different strategic initiatives or future programs instead. Strategic stability is better off without dramatically increasing the price tag to reduce the risk of a niche capability.

Besides, the United States would need to invest heavily in missile defense upgrades to gain genuine security against a hypersonic missile attack, whether it be conventional or nuclear. Advancing the current technology to intercept fast, maneuverable payloads is more technologically challenging than shooting down ballistic warheads—which is already difficult enough to do reliably and consistently.²⁷ The price tag for today’s layered missile defense system currently sits around \$1 trillion, so the cost of hypersonic missile defense will likely be even higher and take decades to mature and field an umbrella large enough to protect both Americans and allies alike.²⁸ Given the massive scale of an all-encompassing network and the necessary technological leaps, a national strategy relying on missile defense to protect against miscalculated nuclear use is not cost-effective or realistic. Instead, this technology should scale-down to focus on protecting vulnerable regional assets during a conflict, as well as rogue threats to major cities. Overall, the cost and feasibility of a large-scale HICM defensive system are not practical or economical to manage the risks.

Furthermore, upgrading existing nuclear warheads with high-yield hypersonics would not add any deterrent value, but instead would lead to higher costs for little benefit. Currently, there are no missile defense systems in the world that can stop a substantial number of incoming ballistic nuclear warheads, so gaining the maneuverability advantages of hypersonics is a moot point.²⁹ Also, it is not necessary to increase accuracy because the current war plan already

²⁷ Speier, et. al, *Hypersonic Missile Nonproliferation*, 10.

²⁸ Kenneth J. Arrow, William A. Cox, Rodney W. Jones, and Richard F. Kaufman, *The Full Costs of Ballistic Missile Defense* (Washington, DC: Center for Arms Control and Non-proliferation, 2003), xi.

²⁹ Nathan Terry, “The Utility of Replacing U.S. ICBMs with Nuclear-armed Hypersonic Weapons Systems,” *United States Air Force Center for Strategic Deterrence Studies*, no. 59 (June 2019): 23.

covers the ability to destroy targets effectively. Therefore, this capability does not produce any operational benefits for the United States. It only drains finite money and resources from other necessary government programs that can ensure nuclear stability in the future, like modernizing the nuclear enterprise to maximize its reliability. Considering partisan politics and budget disagreements, pursuing this option would only hurt the long-term capabilities of America's nuclear deterrence posture in a competitive fiscal environment.

Lastly, if all or some of the expenses above happen to materialize, Russia and China will undoubtedly try to maintain parity with the United States, so HICMs may create an uncontrollable arms race and result in a financial burden. Historically, as strategic technology evolved, the side who operationalized it first gained an advantage over the other side, fueling opposing national security concerns.³⁰ A competition to establish equilibrium and reduce fear ensued, resulting in continual offensive-defensive capability contests to maintain quantitative and qualitative edges over the adversary.³¹ To compete with HICMs, all sides would need to build expensive missile defense networks while developing offensive weapons to overwhelm the defenses. But arms races not only divert resources from other stabilizing priorities—they also make neighboring countries uneasy. Focusing too much on superior military capabilities may lead to regional tension in Europe or Asia, which is more costly to the United States long-term compared to the price of deterrence. Therefore, a shift towards the buildup of HICMs may start a path towards unrealistic and unnecessary spending better used for other strategic gains.

Overall, developing and fielding new approaches to combat the risks posed by HICMs simply adds unnecessary spending to an already dangerous operational capability. The strategic domino effect resulting from the fielding and using this weapons is certainly not worth the

³⁰ Brad Roberts, *The Case for U.S. Nuclear Weapons in the 21st Century* (Stanford, CA: Stanford University Press, 2015), 43.

³¹ Dean Wilkening, "Hypersonic Weapons and Strategic Stability," *Survival* 61, no. 5 (2019): 141-142.

financial burden. Instead, other hypersonic technologies, such as short- and mid-range ship- or air-launched weapons, give more utility at the operational-level without the associated strategic challenges. Methods to mitigate HICM risks quickly becomes a money sink and still does not entirely solve the problem of maintaining nuclear deterrence and strategic stability.

Recommendations

Ultimately, the only practical way for U.S. Strategic Command to prevent nuclear aggression while responsibly paying for strategic stability is by prioritizing nuclear deterrence over a war-winning capability, just as Bernard Brodie argued in the late-1950s. Although it is tempting to pursue parity with Russia and China, there are alternative ways to achieve suitable outcomes with a multilateral arms control agreement. By trading its existing, superior HICM technology for strategic concessions from Russia and China, the United States could eliminate the risks HICMs pose to nuclear stability while simultaneously balancing mutual vulnerabilities between military powers. Not only would such an approach strengthen nuclear deterrence, but it would also avoid unfeasible national expenses. This option puts the United States in the driver's seat while navigating the complexities of great power competition and geopolitical tensions.

At the time of this writing, the United States government has correctly decided not to pursue a HICM program in favor of other types of hypersonic weapons. There is still a place for regional-level hypersonic weapons in the United States' operational inventory—just not intercontinental-range options. However, future policymakers might consider taking up the HICM option, so U.S. Strategic Command's leadership must be ready to advocate against this option with the best possible arguments. Until hypersonics are leapfrogged by the next technological breakthrough, this topic will remain relevant to the future of national security.

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