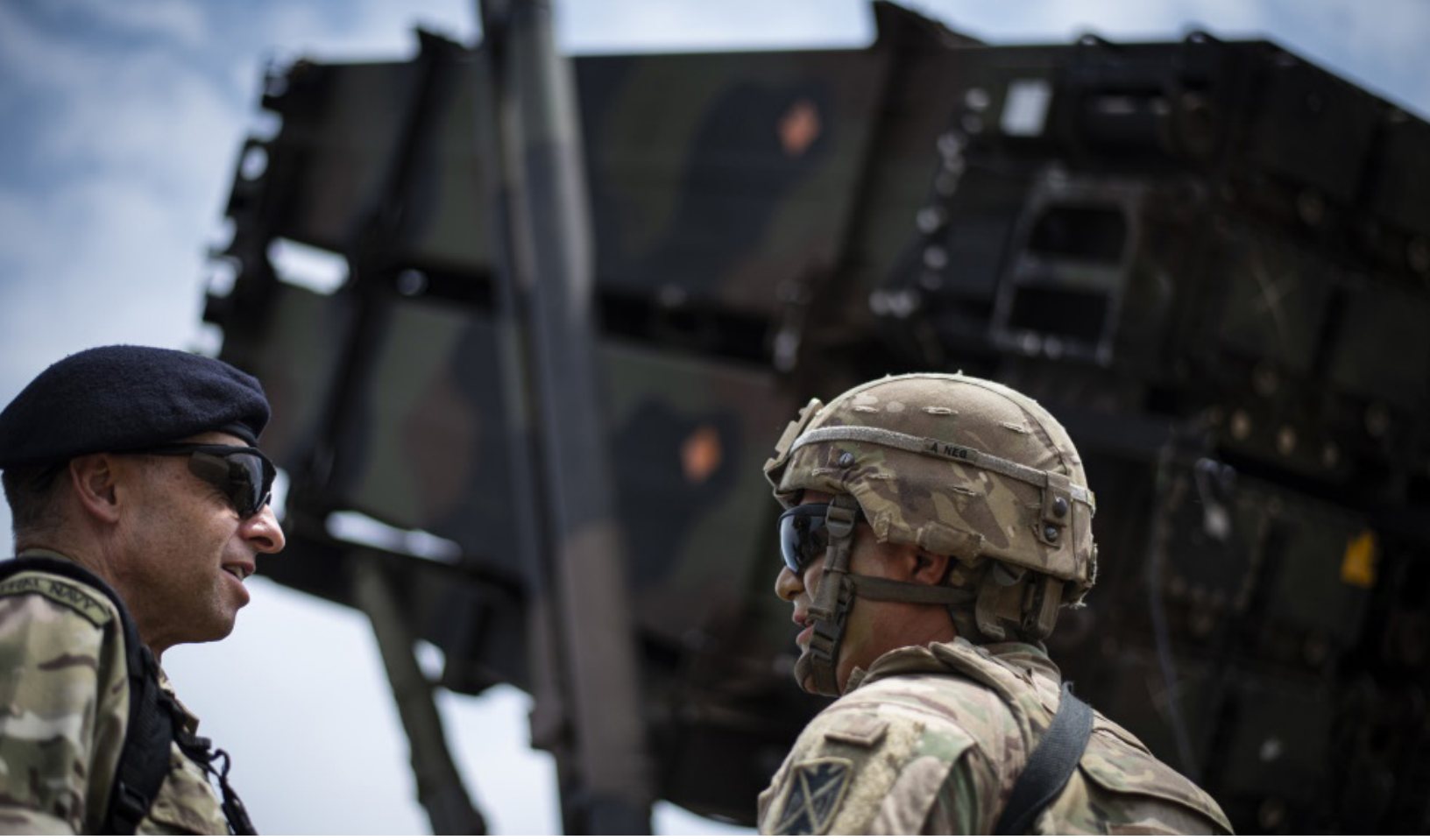

(Michigan National Guard photo by 2nd Lt. Ashley Goodwin taken on June 20,2019) Spc. George Hollingsworth, 5th Brigade, 7th Air Defense Artillery Regiment, Baumholder, Germany, describes the Patriot missile launcher to British Defense Attache, Commander Neville McNally during a static display in Capul Midia, Romania during Saber Guardian 19 on June 20, 2019. Saber Guardian 19 is designed to improve the integration of multinational combat forces.

Hypersonic Missiles

Today's Arms Race

By Sgt. Maj. Joseph Magni

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In December of 2019, Russian President Vladimir Putin announced to the world that his country had deployed its first hypersonic missile system: the Avengard. This system is an intercontinental hypersonic glide vehicle that travels at 27 times the speed of sound and is capable of delivering a nuclear warhead (Hodge et al., 2019). Like Russia's Avengard, China's Dong Feng 17 (DF-17) is a hypersonic glide vehicle capable of reaching speeds in excess of Mach 5 (five times the speed of sound). While the pursuit of hypersonic weapons is not new, the recent proliferation of hypersonic weaponry has some experts worried that we are in the midst of the next great arms race (Panda, 2019). In order to prepare for this future threat, the U.S. must continue to invest not only in its own hypersonic weapon technology, but also strengthen and expand its current missile defense architecture, as well as try to negotiate a new international arms control treaty to subdue this new global arms race.

Hypersonic Technology

The term *hypersonic* refers to any airborne craft traveling at speeds greater than Mach 5, or five times the speed of sound (Lewis, 2017). Unlike conventional projectiles, hypersonic missiles are capable of maneuvering during flight, making them more difficult to track and destroy. These missiles threaten to overwhelm America's

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existing missile defense architecture and potentially shift the geopolitical balance of power.

While superpowers China, Russia, and the U.S. are currently in the lead in the hypersonic weapons race, countries such as Taiwan, South Korea, India, and Japan all have military programs dedicated to the development of hypersonic technology. Notably, India successfully tested its first Hypersonic Technology Demonstrator Vehicle in 2019, putting the development of a hypersonic cruise missile within the country's reach (Space Daily Staff Writers, 2019).

The Current State of Offense

Currently, the U.S. has a sizeable arsenal of ballistic missiles, which, if not singularly capable of defeating most adversarial missile defense systems, are certainly capable of overwhelming them when fired in mass (Scimia, 2020). Furthermore, in 2018, the U.S. successfully tested hypersonic shells capable of traveling at speeds in excess of Mach 7 which can target ships, ground forces, aircraft, and other missiles (Axe, 2019).

In contrast to Russia and China's cutting edge, yet unproven missile technology, America's decision to invest in existing technology that is purposeful and effective has placed it in a strategically advantageous position (Axe, 2019).

David Axe for the *Daily Beast* states:

> "Russia has focused on seemingly impressive but marginally useful hypersonic weapons that make for good PR but don't actually shift the balance of power. China for its part has chosen to tinker with very advanced high technology that might prove impractical. America meanwhile has focused on less sophisticated weapons it's reasonably certain it can deploy quickly and widely, while deferring development of more ambitious munitions designs until the technology is more mature. (2019, para. 27)"

It should also be noted that while certain countries are claiming to arm their hypersonic missiles with nuclear warheads, this is actually more of a PR stunt, as firing a nuclear missile would start a campaign of mutually assured destruction (Axe, 2019; Wilde, 2019).

The State of Defense

Even if the U.S. manages to overtake China and Russia in developing offensive hypersonic strike capabilities, it still maintains a global footprint of bases, troops, and ships that all must be protected (Marlowe, 2019).

For a defense system to be successful it will need to perform three defensive critical tasks:

1. It will need to be capable of detecting that a launch has occurred and then track the hypersonic vehicle.
2. It will need to intercept and disable the hypersonic vehicle.
3. It will need a command and control system to coordinate the operation (Marlowe, 2018).

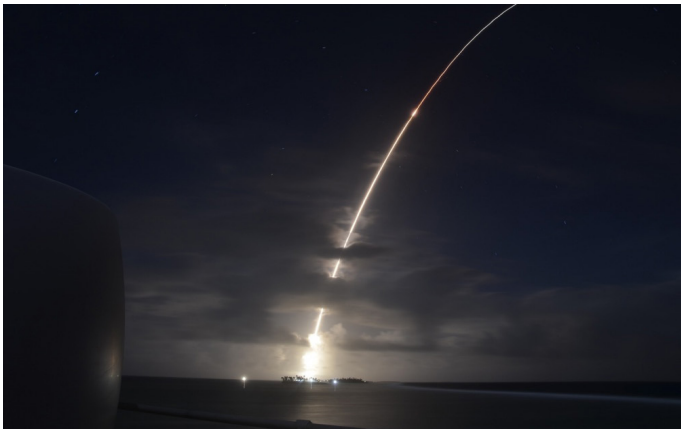
Detection

Current ground-based sensors are insufficient for tracking hypersonic vehicles as they travel at varying altitudes and on erratic flight paths. However, a space-based constellation of satellites could serve as an unblinking eye, capable of providing detection to destruction tracking (Patel, 2019).

Interception

While current technology used to intercept ICBMs may be adequate, the Missile Defense Agency (MDA) is currently funding several promising programs to deal with long-term challenges posed by hypersonic missiles such as the pinpoint accuracy required to destroy one in-flight (Marlowe, 2019). Michaela Dodge, a missile defense specialist for the Heritage Foundation, said about missile defense, "It's a very advanced technology, very complicated rocket science. It's like hitting a bullet with a bullet" (Bogan, 2018, para. 3). The new MDA programs include energy weapons that target missiles in cruise phase as well as high explosive interceptors that can destroy or throw missiles off its course (Tucker, 2020).

The Israel Missile Defense Organization (IMDO) and the U.S. Missile Defense Agency (MDA) complete a successful high altitude hit-to-kill engagement with the Arrow-3 Interceptor missile at Pacific Spaceport Complex-Alaska in Kodiak, Alaska, July 22, 2019. (Photo courtesy of the Missile Defense Agency)



A threat-representative ICBM target launches from the Ronald Reagan Ballistic Missile Defense Test Site in the Republic of the Marshall Islands March 25, 2019. It was successfully intercepted by two long-range Ground-based Interceptors launched from Vandenberg Air Force Base, California. (Photo courtesy of the Missile Defense Agency)

Command and Control System

Because long-range hypersonic missiles are capable of covering vast expanses and crossing multiple geographic commands rapidly, future command and control architecture will most likely incorporate artificial intelligence to provide seamless tracking, real-time targeting data, and fire-control options (Marlowe, 2019). Recognizing the complexity of the situation, the Pentagon awarded a military contract to Northrop Grumman to continue work on its Glide Breaker program to develop interceptors that utilize all three defensive critical tasks (Tucker, 2020).

The Case for Diplomacy

The rapid proliferation of hypersonic weapons is countered by the consistent development of technologies to defend against them. This armament/counter-armament cycle is self-perpetuating and contributes to the very growth it is trying to prevent (Article 36 Staff, 2019). To this end, the U.S. should diplomatically pursue a new international arms control treaty between itself, China, and Russia, restricting the expansion of hypersonic technology (Hursh, 2020). This would come at a crucial time as the U.S. and Russia's New START treaty (limiting the amount of strategic offensive arms) expires in early 2021 (Department of State, n.d.).

A new arms control agreement could lay the groundwork for increased trust-building measures such as advanced notification of missile tests, restrictions on testing sites, and an arrangement that hypersonic missiles will not be armed with nuclear warheads, which would ultimately lead to a nuclear apocalypse (Article 36 Staff, 2019). More importantly, such an agreement has the potential to limit hypersonic technology to historically unstable countries such as Pakistan, Iran, Libya, and North Korea.

Russia, at the least, is ready to negotiate. In April of 2020, Russian Foreign Minister Sergei Lavrov said, "We are open to talks about new promising developments, including hypersonic weapons in the context of, and I emphasize this especially, taking into account all aspects and factors that influence strategic stability, without exception" (Marrow, para. 8). With Russia at the negotiating table, China could potentially be close behind and a tripartite deal could soon be in the works.

Conclusion

Given the costs associated with hypersonic missiles, and the unlikelihood that they will be employed in anything short of full-scale war, diplomacy should be at the forefront of the hypersonic technology strategy. A synchronous approach that prioritizes offensive and defensive capabilities provides the U.S. with its best opportunity to achieve a diplomatic solution to hypersonic proliferation while maintaining a credible deterrence should those efforts fail. ■

References

Article 36 Staff. (2019). *Hypersonic weapons*. http://www.article36.org/wp-content/uploads/2019/06/hypersonic-weapons.pdf

Axe, D. (2019). How the U.S. is quietly winning the hypersonic arms race. *Daily Beast*. https://www.thedailybeast.com/how-the-us-is-quietly-winning-the-hypersonic-arms-race

Bogan, R. (2018). New defensive missile is 'like hitting a bullet with a bullet.' *New York Post*. https://nypost.com/2018/02/23/new-defensive-missile-is-like-hitting-a-bullet-with-a-bullet/

Davenport, C. (2018). Why the Pentagon fears the U.S. is losing the hypersonic arms race with Russia and China. *The Washington Post*. https://www.washingtonpost.com/business/economy/why-the-pentagon-fears-the-us-is-losing-the-hypersonic-arms-race-with-russia-and-china/2018/06/08/7c2c3b4c-57a7-11e8-b656-a5f8c2a9295d_story.html

Hodge, N., Said-Moorhouse, L., Ehlinger, M. (2019). Russia deploys hypersonic missile into 'combat duty,' state media claims. *CNN*. https://www.cnn.com/2019/12/28/europe/russia-weapons-intl/index.html

Hursh, J. (2020). Let's make a deal: How to mitigate the risk of hypersonic weapons. *Just Security*. https://www.justse-

curity.org/70025/lets-make-a-deal-how-to-mitigate-the-risk-of-hypersonic-weapons/
Lewis, M. (2017). *Global strike hypersonic weapons*. https://aip.scitation.org/doi/abs/10.1063/1.5009210
Marlowe, M. (2019). Hypersonic threats need an offense-defense mix. *Defense News*. https://www.defensenews.com/opinion/commentary/2019/08/02/hypersonic-threats-need-an-offense-defense-mix/
Marrow, A. (2020). Russia says it's ready for hypersonic missile talks with U.S. *Reuters*. https://www.reuters.com/article/us-usa-russia-arms/russia-says-its-ready-for-hypersonic-missile-talks-with-u-s-idUSKCN21W14C
Panda, A. (2019). Hypersonic Hype: Just How Big of a Deal Is China's DF-17 Missile? *The Diplomat*. https://thediplomat.com/2019/10/hypersonic-hype-just-how-big-of-a-deal-is-chinas-df-17-missile/
Patel, N. (2019). The Pentagon wants to launch satellite constellations to track missiles. *MIT Technology Review*. https://www.technologyreview.com/2019/10/07/132730/the-pentagon-wants-to-launch-military-satellite-constellations-to-track-missiles/
Reddie, A. (2020). Hypersonic missiles: Why the new "arms race" is going nowhere fast. *Bulletin of the Atomic Scientists*. https://thebulletin.org/2020/01/hypersonic-missiles-new-arms-race-going-nowhere-fast
Scimia, E. (2020). Russia's hypersonic hype may not match reality. *The Washington Times*. https://www.washingtontimes.com/news/2020/jan/5/russian-avangard-hypersonic-missiles-more-hype-thr/
Space Daily Staff Writers (2019). After ASAT test, India inches closer to developing hypersonic cruise missile. *Space Daily*. https://www.spacedaily.com/reports/After_ASAT_test_India_inches_closer_to_developing_hypersonic_cruise_missile_999.html
Sutton, H. (2019). Russian Navy to be first to field hypersonic cruise missiles on submarines. *Forbes*. https://www.forbes.com/sites/hisutton/2019/09/15/russian-navy-to-be-first-to-field-hypersonic-cruise-missiles-on-submarines/#5fd612f9542c
Tucker, P. (2020). Pentagon seeks a way to shoot down Putin's 'invincible' hypersonic missiles. *Defense One*. https://www.defenseone.com/technology/2020/01/pentagon-seeks-way-shoot-down-putins-invincible-hypersonic-missiles/162717/
Wilde, R. (2019). What is mutually assured destruction? *ThoughtCo*. https://www.thoughtco.com/mutually-assured-destruction-1221190

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