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U.S. Should Leverage Middle East Partners to Boost Space Capabilities

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As Iran-backed projectile attacks continue to inflict significant and tragic costs across the Middle East, space-based sensors could help detect those launches earlier and faster. Advances by U.S. regional partners—namely Bahrain, Saudi Arabia, the United Arab Emirates (UAE), and Israel—in satellite development provide an opportunity to develop integrated space-based intelligence, surveillance, and reconnaissance (ISR) capabilities in the Middle East.

The United States should better leverage its partners in the Middle East by collectively enhancing space-based ISR through joint research and development (R&D) ventures, leveraging emerging space technologies like nanosatellites and hyperspectral satellites, and incorporating space-based assets into bilateral and multilateral drills with regional partners.

What Happened?

- On January 28, an Iranian-made drone launched by Iran-backed proxies killed three Americans at a U.S. base in Jordan. Since October 17, 2023, Iranian proxies across the region have been responsible for over 165 attacks on U.S. personnel in the Middle East, according to JINSA's Projectile Tracker, inflicting over 70 injuries. Many of these were drone and missile attacks launched over a significant distance.

Why Is It Important?

- Space is a critically important strategic theater for the United States, given the domain's importance for intelligence, surveillance, and reconnaissance (ISR) capabilities essential to detecting and intercepting Iran-backed drone, missile, and rocket attacks across the Middle East. The United States should better leverage its partners in the Middle East by working with them to jointly enhance readiness in the space domain, including by increasing joint R&D; working towards greater space-based early threat detection and information-sharing by leveraging emerging space technologies like nanosatellites and hyperspectral satellites; and increasingly incorporating space assets into bilateral and multilateral drills with regional partners.
- The 2019 establishment of the Space Force as the U.S. military's sixth service branch—the first new U.S. service branch established since 1947—and the creation that year of the U.S. Space Development Agency both underscore the growing importance of space to strategic readiness.
  - » U.S. Deputy Secretary of Defense Kathleen Hicks noted in January, "more than ever before, space is integral to military operations. And our competitors know it. They realize

how much the American way of life and the American ways of war depend on space power … [space] supports our strengths in every other domain."

- Space capabilities serve a variety of indispensable military and commercial purposes for the United States, with space-based platforms forming the backbone of U.S. communications systems, global positioning systems (GPS), and other key functions.
- Aside from the United States, only eight countries in the world can independently launch spacecraft, four of whom—China, Iran, Russia, and North Korea—are leading U.S. adversaries. The remaining four countries are India, Israel, Japan, and South Korea.
- The Abraham Accords laid the groundwork for enhanced collaboration in the space domain with U.S. partners in the Middle East, and the United States should build on this momentum by working to foster increased R&D opportunities.
  - » The Abraham Accords codified the United States, Israel, Bahrain and the UAE's "common interest in establishing and developing mutually beneficial cooperation in the field of exploration and use of outer space for peaceful purposes," including joint programs and activities in "space related technologies" and exchange of information.
  - » In October 2021, Israel and the UAE signed an agreement to boost space cooperation, including a research project to jointly analyze agricultural and climate data using an Israeli satellite. However, such initiatives could easily be expanded to include data-sharing on Iranian projectiles or other threats.
- The United States and its Middle East partners have a mutual strategic interest in forming an integrated space-based shared early warning system to better detect Iran-backed projectile attacks across the region, which continue to threaten U.S. personnel and regional partners and endanger global shipping.
  - » The Department of Defense's inaugural 2023 National Defense Industrial Strategy (NDIS) stated that a "resilient defense industrial ecosystem among the U.S. and close international allies and partners" is a strategic priority. The NDIS called for the Department of Defense to generate "mechanisms for sharing technologies and applications of scientific knowledge with other partners and allies."
  - » NATO initiatives to boost joint ISR provide a model for mechanisms to enhance space-based ISR that U.S. partners in the Middle East could emulate.
    - In February 2023, 16 NATO countries formed the Alliance Persistent Surveillance from Space (APSS), an initiative to establish a virtual constellation of satellites aimed at streamlining data collection and sharing.
    - APSS includes both governments and private industry, a model well-suited for a similar initiative in the Middle East given the robustness—including approximately 60 companies—of Israel's space industry.
- Nanosatellites represent a promising emerging space technology that, if integrated in tandem with Middle East partners, could help the United States and its regional partners detect Iran-linked projectile threats.
  - » Nanosatellites are miniature satellites, roughly the size of a loaf of bread and weighing less than 20 pounds, that are launched in large numbers to form nanosatellite constellations.
  - » Nanosatellite constellations are considerably more cost-effective than conventional satellites, as multiple small satellites can be put into space in a single launch, as opposed to large satellites which each require their own launch. Given the expenses of satellite launch vehicles, launches comprise a large portion of the cost of a satellite.

- According to the Department of Defense, a nanosatellite costs about $1.3 million on average to construct, as opposed to hundreds of millions of dollars required to construct and launch traditional satellites.

- An integrated nanosatellite constellation would aid the United States and its Middle East partners by forming an comprehensive common operating picture at relatively low costs, enhance detection of Iran-backed drone, rocket, and missile attacks.
  - As a JINSA task force including four retired senior U.S. military leaders noted in a May 2023 report, an integrated Middle East nanosatellite constellation could feed data into U.S. Central Command's Combined Air Operations Center (CAOC) in Qatar, providing the United States and its partners with "near-continuous monitoring of Iran and its proxies" at a cost of as little as $200 million.
  - Nanosatellites offer the same intelligence collection benefits as conventional U.S. satellites, without the disadvantages of being "big, juicy targets" for U.S. adversaries, in the words of former commander of U.S. Strategic Command General John Hyten, USAF (ret.), that large, expensive, and difficult-to-replace traditional satellites represent.
  - Former Director of the U.S. Missile Defense Agency and JINSA Iran Policy Project member Lieutenant General Henry Obering, USAF (ret.) has observed that smaller satellites like nanosatellites mitigate the threat of adversary signal jamming, a persistent threat facing U.S. satellites and other military assets.
    - In a nanosatellite constellation, each satellite serves as a node in the network to form a common operating picture. Lt. Gen. Obering notes that as a result, smaller satellite constellations are "largely protected against jamming," since even if "an adversary might be able to jam a handful of the small satellites, that would have no effect on the overall network."
    - Since each satellite in a constellation reroutes and synthesizes data points constantly, adversaries would have to eliminate almost every satellite in a constellation to take down the data network as a whole.

- U.S. partners in the Middle East, namely Bahrain, Israel, and the UAE, have already made forays into nanosatellite development, providing a fruitful opportunity for the United States to help synthesize its own and its partners' efforts.
  - Bahrain and the UAE have already launched nanosatellites into space. Though Bahrain's nanosatellite was launched in order to study gamma-ray flashes and other meteorological patterns, nanosatellites can be employed for a variety of uses, including projectile threat detection.
    - The meteorological data from Bahrain's satellite was transmitted to ground stations in Denmark, Lithuania, and the UAE, providing a template for how nanosatellites could be used to form a common operating picture of Iranian projectile threats.
  - Israel is a worldwide pioneer in nanosatellite technology, having become among the first countries in the world to launch a nanosatellite when it did so in 2014.
    - In January 2023, Israeli researchers launched a nanosatellite capable of quantum communication. Quantum communications enable greater data processing as well as enhancing the security of data feeds, as quantum computing provides the most secure form of encryption currently available.

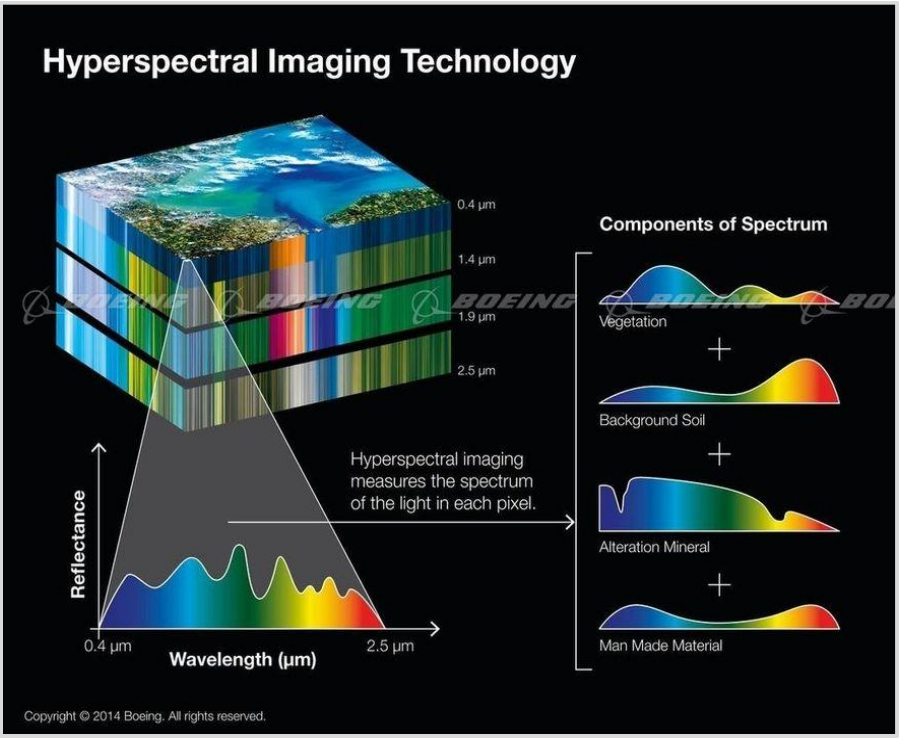
- In addition to nanosatellites' detection capabilities, nanosatellite constellations can also form swarms to potentially intercept ballistic and hypersonic missiles, an important asset given the current absence of U.S. hypersonic defenses.

» Miniature satellite swarms can theoretically intercept the booster rockets carrying the hypersonic glide vehicles by crashing into them during the boost phase, during which the missiles travel on a predictable ballistic trajectory, rather than the glide phase, during which hypersonic missiles travel at hypersonic speeds and are difficult to intercept.

- The United States can also leverage burgeoning regional innovation in the development of satellites with hyperspectral imagery capabilities, which can help detect Iran-backed projectile attacks even before projectiles have been launched, due to their ability to detect subterranean activity.

  » Hyperspectral satellites can detect hundreds of wavelength bands in the light spectrum, scanning and processing far more detailed data than conventional satellites, including beneath the earth's surface.

  » Iranian proxies, including Hezbollah and the Houthis, frequently utilize underground missile silos in their projectile attacks. As a JINSA task force chaired by former NATO Allied Supreme Commander Admiral James Stavridis, USN (ret.) concluded, the "military importance of [hyperspectral satellites] is increasing … especially when adversaries shed their uniforms [and] move underground."



Source: The Boeing Company

- Regional partners, namely Israel and Saudi Arabia, have made advances in hyperspectral satellite innovation that the United States can leverage.

  » Israel has initiated a venture with Italy to launch a hyperspectral satellite, the Spaceborne Hyperspectral Applicative Land and Ocean Mission, into orbit, which is expected to be completed in 2025. Once launched, the hyperspectral satellite will become one of only a handful of hyperspectral satellites that have been sent into orbit.

  » Saudi Arabia has also become a leading player in hyperspectral satellites, having successfully launched, in conjunction with a U.S.-based company, a nanosatellite with hyperspectral capabilities in April 2023.

- The untapped potential of greater space integration between the United States and its Middle East space-based early warning system has garnered congressional interest.
  - » In December, Senator Joni Ernst (R-IA) said that space represents an opportunity to build on regional integration efforts to enhance maritime and air defense integration between the United States and its Middle East partners.
  - » Senator Ernst stated, "it's incredibly important that all of our systems are tied together for friends and allies, and that we're able to share information quickly to again interdict whether it's a seaborne threat, airborne threat, or even perhaps, as I'm thinking ahead, [space.]"
- By incorporating space assets in bilateral or multilateral ready drills with regional partners, the United States can facilitate increased integration between platforms, an important step towards a shared space-based early warning system.
  - » The United States and Israel have already done so in the Juniper Oak bilateral drills in January 2023, which involved the United States Space Forces Central (SPACECENT) and U.S. space assets.

What Should the United States Do Next?

- The United States should examine establishing a Middle East version of NATO's Alliance Persistent Surveillance from Space Initiative (APSS). The initiative would adapt regional partners' satellite advances and, like APSS, incorporate both public sector and private sector initiatives from across the region.
- The Department of Defense and Congress should explore launching a defense-industrial joint venture with Israel and interested Arab partners to develop hyperspectral satellites and nanosatellites to supplement existing U.S. space-based early warning systems and complement other regional air defense integration efforts.
- Congress should require the Department of Defense to submit an unclassified report to legislators exploring the possibility of developing a regional nanosatellite constellation to better monitor Iran-linked projectile threats that securely feeds data into U.S. Central Command's CAOC facility in Qatar.
- The U.S. military should increase the frequency of bilateral and multilateral drills with regional partners that involve space capabilities, like the bilateral Juniper Oak drill conducted last January with Israel that involved U.S. space assets.