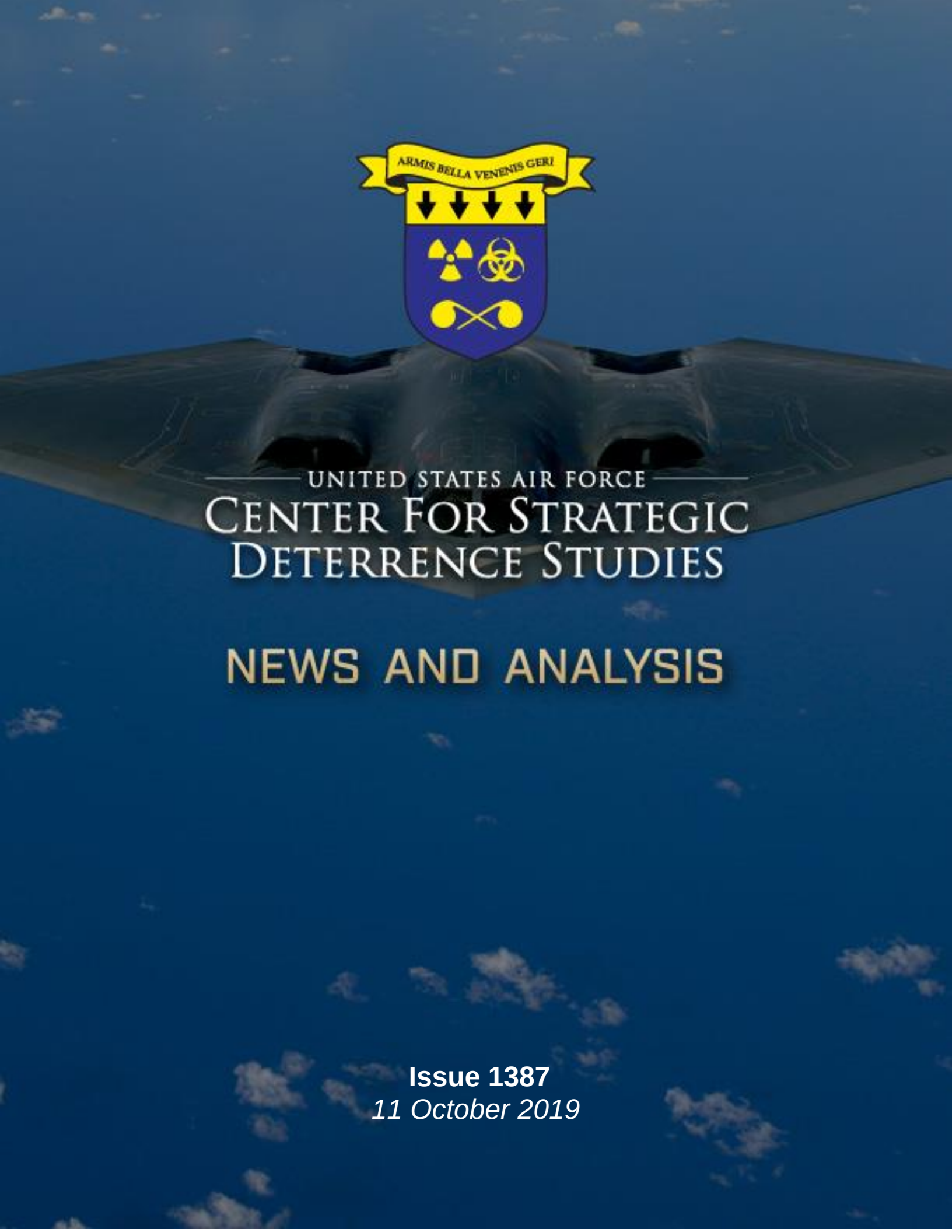
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CENTER FOR STRATEGIC DETERRENCE STUDIES
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Feature Report

"*The US-China Nuclear Relationship: Why Competition Is Likely to Intensify*". By Caitlin Talmadge. Published by Brookings; September 2019

https://www.brookings.edu/research/china-and-nuclear-weapons/

For decades, nuclear weapons have been largely peripheral to U.S.-China relations, but the nuclear relationship is now growing more competitive as both countries pursue major programs to modernize their forces. China's efforts to strengthen its relatively small nuclear arsenal seem largely oriented toward improving survivability and do not appear to constitute a shift away from the country's long-standing No First Use (NFU) policy. Nevertheless, the improvements are provoking anxiety in Washington, which has long resisted acknowledging a state of mutual nuclear vulnerability with China.

The core U.S. concern is likely that improvements in China's nuclear arsenal, even if intended only to improve survivability, will reduce the U.S. ability to limit damage in the worst-case scenario of an all-out nuclear war with China. The U.S. preference for damage limitation, largely through missile defense and counterforce capabilities, should not be taken to mean that the United States intends to start a nuclear war or that it believes it could emerge from a nuclear war unscathed. Rather, the likely U.S. objective is to make China to worry that if China starts a crisis or conflict that raises risks of nuclear escalation, the United States will have a higher tolerance for bearing these risks than China will, because of the United States' relatively greater ability to limit the damage the United States would suffer in a nuclear exchange. Advocates of damage limitation believe that such a capability could deter China from initiating conflict in the first place—even conflict well below the nuclear threshold—and could endow the United States with bargaining advantages in any effort to coerce China if a crisis or war did break out.

Rightly or wrongly, this is likely why the United States perceives China's ongoing improvements to survivability as threatening, especially when set against the backdrop of growing bipartisan concern about China's broader strategic intentions, and a conventional balance that is also becoming less favorable to the United States and its allies. Understandably, however, China is also very unlikely to stop seeking a more survivable nuclear arsenal, even if its strategic aims are limited and its nuclear doctrine remains static. As a result, nuclear competition between the United States and China is almost certain to intensify. This paper explores the causes and implications of this emerging competition.

TABLE OF CONTENTS

NUCLEAR WEAPONS

- Air Force Reactivates Squadron for B-21 Bomber Testing (UPI)
  The 420th Flight Test Squadron at Edwards Air Force Base has been reactivated by the U.S. Air Force for flight and ground testing of the next-generation bomber, the B-21 Raider.
- Growth Brings Challenges along with Opportunities for New Sandia Leader (The Independent)
  Sandia has many programs, but its main responsibility is to help keep America's nuclear weapons reliable and safe, even though every bomb, warhead and artillery shell in the arsenal is now older than its originally planned lifetime.
- Boeing Supports Test of Huntsville-Managed ICBM, Secures More Critical National Defense Work for Alabama (Yellowhammer News)
  The test was conducted early that morning at Vandenberg Air Force Base in California. The ICBM was equipped with a test reentry vehicle. The Minuteman III is the land-based prong of the nuclear triad.

US COUNTER-WMD

- The Data Challenge of Space-Based Hypersonics Defense (C4ISRNET)
  Hypersonic weapons are dimmer than traditional ballistic missiles, making them harder to detect. The sensors will have to be able to remove that clutter, detect the threat and then pass their data to the next LEO sensor …
- Missile Defense Agency Shaping Strategy to Meet Evolving Challenges (USNI News)
  Vice Adm. Jon Hill, four months into his assignment, said the agency is looking at threats from Russia and China, and assessing the technological advances being made by North Korea …

US ARMS CONTROL

- Top Dems Warn Trump against US Pullout of Open Skies Treaty (Defense News)
  Open Skies permits unarmed flights over the sovereign territory of 34 signatory nations to monitor military activity and conduct arms control measures.
- North American Seismic Networks Can Contribute to Nuclear Security (Seismological Society of America)
  The need to detect low-yield explosions—those with a yield less than 0.5 kilotons and causing seismic events between magnitude 1.0 and 3.0—has become more pressing …
- US Denies North Korean Nuclear Talks Failed (BBC News)
  The US has denied that its day of nuclear talks with North Korea ended in failure, insisting that "good discussions" were had.

COMMENTARY

- Deterrence: I Don't Think It Means What You Think It Means (Modern War Institute)
  This is a far too flowery definition for what Dr. Strangelove called "the art of producing in the mind of the enemy the fear to attack."
- When Rick Perry Thinks about AI, He Thinks about Nuclear Weapons (Bulletin of the Atomic Scientists)
  But surely AI and the competition between the United States and China to develop it isn't the same as the Cold War-era race to develop nuclear weapons.
- The US Is Trying to Restore Deterrence in the Gulf. That Won't Be Enough (Defense One)
  RAND researcher Michael Mazarr notes that classic studies of deterrence theories and historical practice suggest that "denial strategies are inherently more reliable than punishment strategies."

NUCLEAR WEAPONS

UPI (Washington, D.C.)

Air Force Reactivates Squadron for B-21 Bomber Testing

By Ed Adamczyk

Oct. 10, 2019

Oct. 10 (UPI) -- The U.S. Air Force reactivated its 420th Flight Test Squadron at Edwards Air Force Base, Calif., to plan and analyze flight and ground testing of the new B-21 Raider bomber.

The squadron was organized under the 412th Test Wing at the base, and a ceremony marking the occasion was held on Oct. 4, the Air Force announced on Wednesday.

The first B-21 Raider bomber, the next-generation replacement for the B-1 and B-2 aircraft, is under development at Lockheed Martin facilities in nearby Palmdale, Calif.

"The first flight of the Raider will take it from Palmdale to Edwards AFB, where the legacy of excellence will continue with the reactivation of the 420th Flight Test Squadron," Acting Secretary of the Air Force Matthew Donovan said in a statement.

That legacy includes the first flight of the B-2 Spirit bomber, which left Palmdale in 1989 and arrived at Edwards Air Force Base 112 minutes later for testing.

The wing-shaped plane is planned as the next long-range, stealth strategic bomber for the U.S. Air Force, capable of delivering conventional and thermonuclear weapons. The branch plans to eventually have 100 of the new bombers.

In 2018, the Air Force selected Dyess Air Force Base on Texas, Ellsworth Air Force Base in South Dakota, and Whiteman Air Force Base in Missouri, all current bomber bases, as sites under consideration to host the B-21.

The B-21 is expected to enter service by 2025, and will replace the B-1 Lancer and B-2 Spirit over time. The new bomber's first operational location -- including its formal training unit -- will be based at Ellsworth, the Air Force said in March.

https://www.upi.com/Defense-News/2019/10/10/Air-Force-reactivates-squadron-for-B-21-bomber-testing/7051570721566/

Return to top

The Independent (Livermore, Calif.)

Growth Brings Challenges along with Opportunities for New Sandia Leader

By Jeff Garberson

Oct. 10, 2019

Andrew McIlroy, the new leader of the Livermore campus of Sandia National Laboratories, is taking on his management role at a time of considerable challenge.

Sandia has many programs, but its main responsibility is to help keep America's nuclear weapons reliable and safe, even though every bomb, warhead and artillery shell in the arsenal is now older than its originally planned lifetime.

In fact, the weapons are older than the bright young engineers and scientists Sandia hires out of graduate school to work on them, meaning they trained on technologies that did not exist when the weapons were designed using now-obsolete computer codes.

Congress and the Administration are determined to modernize the nuclear weapons complex and extend the lives of the aging weapons themselves. That places heavy administrative, as well as technical, demands on the institution. Sandia needs new people, and it needs them now.

To McIlroy, these demands have led to "truly unprecedented growth" at Sandia's Livermore site, a challenge that is particularly difficult because the Tri Valley and surroundings are financially intimidating for first-time home buyers.

If cost-of-living were one obstacle to hiring, so is the need to employ people able to get security clearances. Many of the technically talented young PhDs turned out by graduate schools today are non-citizens, and therefore unlikely to qualify.

The issue has always been present for Sandia, but is now exacerbated by increasingly tense and mistrustful relations with China, a major nuclear power and direct competitor for the U.S.

Conundrum

Restrictions on hiring are "a real conundrum for us as a Laboratory because we want to be involved in the open science world, be vigorously engaged there, and, at the same time, we have to balance our national security mission against that," McIlroy said.

McIlroy's job is formally called Associate Laboratories Director. With academic training in chemical physics, a discipline at the interface of chemistry and physics, he has extensive experience in the Laboratory's defense, energy and environment programs.

The Livermore site started to grow slowly a decade ago when there were about 900 people on staff, he said in an interview last week. Growth has accelerated, and the laboratory is now adding 100 to 200 people every year.

Full-time staff numbers just under 1,500, a little more than one-tenth of Sandia's overall employee count of about 14,000. Most work at the main Albuquerque site.

In contrast to Lawrence Livermore and Los Alamos National Laboratories, which design the nuclear core of nuclear weapons, Sandia has responsibility for engineering the non-nuclear components of weapons, as well as integrating the entire weapon package.

Not surprisingly, recruiting emphasizes mechanical, electrical and systems engineers, sometimes bringing experienced people to Livermore from Albuquerque if they can afford to live in such an expensive part of the country.

Life Extension Programs

The efforts to keep aging U.S. nuclear weapons reliable and safe decades after they were deployed are called Life Extension Programs, or LEPs.

The biggest of the LEPs is the W80-4, managed from the Livermore site and carried out Sandia-wide at a cost of about $1 million a day.

The W80-4 is the latest version of the warhead that armed air-launched cruise missiles which were first deployed in 1982.

The upgraded system will yield no operational capability not already found in the nuclear stockpile, according to the National Nuclear Security Administration, the federal agency responsible for maintaining the reliability and safety of the nation's nuclear weapons.

It is this agency, which is part of the U.S. Department of Energy, that overseas the biggest programs at Sandia, as well as at Lawrence Livermore and Los Alamos National Laboratories.

When completed, the W80-4 will incorporate modern components and safety features and be engineered for use with a new cruise missile called the "long-range standoff," or LRSO. This will be carried by several aircraft, including the B-52 and B-2.

Beyond ensuring the success of Sandia's core nuclear weapons responsibilities, McIlroy would like to see closer laboratory collaborations with campuses such as the Davis and Berkeley campuses of the University of California.

In an earlier phase of his career, he had responsibility for Sandia's Academic Alliances programs, which seek out such collaborations.

He believes the connection to universities "brings new perspectives to the laboratory (and) creates a pipeline for us to get new employees…."

It also "gives us a chance to have dialogues with universities about our future needs," he said, while "giving us an opportunity to inform what new programs they develop. So we hope it's a symbiotic kind of relationship."

20 Years Ahead

To prepare Sandia for a rapidly evolving world, the Laboratory is now looking ahead 20 years rather than five or 10, as was the custom in the past, McIlroy said.

The longer term view has been encouraged by the overall director of the Laboratory, Steve Younger, a physicist who once worked at Lawrence Livermore and Los Alamos National Laboratories.

"That (longer view) has really forced us in a good way to think about what the coming national security challenges are," McIlroy said.

There is an "outside the box" dimension to the planning that may not come easily to a laboratory responsible for the safety and reliability of the nation's nuclear weapons, McIlroy pointed out.

Sandia engineers live by the terse motto "Always/Never," he said. The weapons must always work if commanded by an appropriate authority and never under any other circumstances.

That's a "really challenging environment" that can lead to understandably cautious engineering practices, so one important component of the long-range planning is to modernize the practices themselves by incorporating recent advances in the field.

Overall, McIlroy said, the goal is to determine what investments the Laboratory should be making today "so that in 15 or 20 years we are ready when the nation says we have this problem, what can you do?"

Asked for an example, McIlroy cited the field of hypersonics, which refers to aircraft and missiles that travel at extreme speeds.

Sandia has a "rich history" in the field, which is rapidly evolving and will "probably…be very different five, 10, 20 years out."

https://www.independentnews.com/news/growth-brings-challenges-along-with-opportunities-for-new-sandia-leader/article_e68ce2c0-eb17-11e9-b182-fb3a0a5e98db.html

Return to top

Yellowhammer News (Alabama)

Boeing Supports Test of Huntsville-Managed ICBM, Secures More Critical National Defense Work for Alabama

By Sean Ross

Oct. 3, 2019

The U.S. Air Force on Wednesday announced the successful flight test of an unarmed Minuteman III intercontinental ballistic missile (ICBM), which are managed by Boeing in North Alabama.

The test was conducted early that morning at Vandenberg Air Force Base in California. The ICBM was equipped with a test reentry vehicle. The Minuteman III is the land-based prong of the nuclear triad.

According to the Air Force, "The test demonstrates that the United States' nuclear deterrent is robust, flexible, ready and appropriately tailored to deter twenty-first century threats and reassure our allies. Test launches are not a response or reaction to world events or regional tensions."

Boeing has supported every Minuteman flight test in the last 58 years. The program is managed out of Huntsville, but the missiles were built in the 1970's in Utah with Boeing working diligently to keep it safe, secure and reliable.The Minuteman III is as fast as a seismic wave, traveling up to four miles per second and up to 15,000 miles per hour.

You can view video from Wednesday's test here.

Additionally, Boeing the same day announced that the company and the U.S. Air Force have definitized a $122.9 million contract to upgrade the Minuteman III coding system, bringing even more work to Huntsville.

This upgrade will provide remote, over-the-air rekey and code change capability for the important missile system.

Boeing outlined that some development and assembly work will be performed in Huntsville at Boeing's Electronics Center of Excellence, which recently underwent a 28,000 square-foot expansion. The contract will provide the government with the components needed to support the deployment of the ICU II hardware through 2022 — sustaining the Minuteman III weapon system until 2036.

In addition to Huntsville, some of the work for the ICU II upgrade is being done in Utah and California.

https://yellowhammernews.com/boeing-supports-test-of-huntsville-built-icbm-secures-more-critical-national-defense-work-for-alabama/

Return to top

US COUNTER-WMD

C4ISRNET (Vienna, Va.)

The Data Challenge of Space-Based Hypersonics Defense

By Nathan Strout

Oct. 9, 2019

Managing data is the biggest challenge to developing a new space-based sensor layer that would help detect hypersonic weapons, the director of the Missile Defense Agency said Oct. 7.

The agency is working toward building the Hypersonic and Ballistic Tracking Space Sensor, a layer of sensors on orbit that would be capable of detecting and tracking hypersonic weapons that the nation's current missile defense architecture was not designed to handle. The new system will be built into the Space Development Agency's constellation of low earth orbit satellites.

For Vice Adm. Jon Hill, the director of the agency, designing the sensors for the system is a surmountable engineering issue and evolving commercial launch capabilities mean it will be easy to get the technology to space once its ready. The real challenge is "the passing of track data between different space vehicles and maintaining track and dealing with clutter."

Hypersonic weapons are dimmer than traditional ballistic missiles, making them harder to detect. The sensors will have to be able to remove that clutter, detect the threat and then pass their data to the next LEO sensor, which will pick up the object as it travels around the globe at hypersonic speed. Allowing for that data flow from sensor to sensor is essential to the effective operation of the system.

Hill compared the complexity of that data transfer to his time in the Navy, where information had to go between moving vessels, but the data issue with satellites is magnitudes of order more difficult.

"When you put yourself on a moving body that's moving, not at 30 knots but at a much higher speed, you know, maintaining the stability of that track, being able to pull the clutter out of it, determining how much you want to process up on orbit versus how much you want to feed down and process on the ground, then how you distribute. Do you distribute directly from the sensor? Do you control the weapon from space? Or do you take it to the ground station and do it there? There [are] different trades, and we'll probably do it differently in a lot of different ways because that adds to the overall resilience of the system," Hill said speaking at a Center for Strategic and International Studies event October 7.

Finding the right answers to those questions will be a priority for the MDA as it works to works to get the system on orbit quickly.

"It's going to be a great capability. We just need to get it up there as soon as we can and rapidly proliferate," Hill said.

https://www.c4isrnet.com/battlefield-tech/space/2019/10/09/the-data-challenge-of-space-based-hypersonics-defense/

Return to top

USNI News (Annapolis, Maryland)

Missile Defense Agency Shaping Strategy to Meet Evolving Challenges

By John Grady

Oct. 7, 2019

The Missile Defense Agency is working to up its game to meet new challenges posed by the next generation of precision-guided weapons the agency's director said on Monday.

Vice Adm. Jon Hill, four months into his assignment, said the agency is looking at threats from Russia and China, and assessing the technological advances being made by North Korea in launching either an undersea-based or submarine-launched missile capable of striking Japan.

Later in answer to questions, Hill added the cyber threat as a new challenge. "They go together" with the challenges posed by cruise missiles and hypersonics, he said speaking at the Center for Strategic and International Studies

As to focusing on directed energy, he said it was important that different agencies and services "work together" in this area not only to meet immediate warfighting needs but also to develop sensors for detection and provide another layer of defense.

"Everyone needs it," he said.

Part of the effort going forward will be to coordinate across different agencies. "You want to leverage as much data as possible," he said, referring to sensors on the ground, at sea and in space to deter great power adversaries and regional powers. "It really is a multi-domain environment" for offense and defense.

If these elements successfully integrate, they "change the calculus for the adversary" in deciding whether to attack or not.

He said the March successful homeland defense exercise launching two different types of interceptors showed the value of integration of sensors across all domains. North Korea has successfully tested intercontinental ballistic missiles.

Hill said the new threats — from hypersonic weapons, cruise and ballistic missiles "are all different." To address that, "your sensor architecture matters" and "you have to make investments" to achieve that goal.

On the increasing use of space-based sensors, he added, "there's a lot of water out there that we just can't cover" from the ground or even ships, and space closes that gap. The biggest challenge faced with using space-based sensors is "the passing of data" among the various types of sensors put into orbit to meet different requirements. They were not designed to work together seamlessly. Also, there is space "clutter," picking up a host of other objects that need to be filtered out for an accurate picture.

"We just need to get it up there quickly," Hill said, referring to a space-based sensor layer to detect and assess the threats.

During the session, Hill was asked about Aegis, Aegis Ashore in Europe, the Pacific and in the homeland. In all cases, "it significantly extends the battlespace" for a combatant commander and remains, important well into the future.

He described the Aegis Ashore site in Poland "as a small naval base;" and like its counterpart in Romania, "that it's there for a reason," to counter the missile threat from Iran.

As to the four Aegis destroyers operating from Rota, Spain, "they're often forgotten" in discussions of missile defense in Europe, but their maneuverability "provides more tools for the combatant commander." In the future, these ships will take on longer-range ballistic missile threats, Hill said.

While an Aegis Ashore site was upgraded, the Army and Navy worked together seamlessly to deploy a Theater High Altitude Area Defense [THAAD] battery to cover, he said. It showed the nation's ability to deliver "dynamic, unpredictable force deployment, quickly" on-site to any would-be adversary.

Japan "is working through their plans for two Aegis Ashore" sites. "Their soldiers will operate it," not the Maritime Self-Defense Force; and they are in training now with the Navy.

On interoperability with allies and partners on missile defense, Hill said, "there were workarounds" that can be used to cover the split between Korea and Japan in a trade dispute that disrupts their direct sharing of intelligence on ballistic missiles. But the situation of going through the United States for that data was "not optimal."

On the positive side, Hill pointed to the biannual Formidable Shield exercises off Scotland's Hebrides Islands. Eight NATO nations "are playing in that unique testbed" and working together to achieve a common goal.

https://news.usni.org/2019/10/07/missile-defense-agency-shaping-strategy-to-meet-evolving-challenges

Return to top

US ARMS CONTROL

Defense News (Washington, D.C.)

Top Dems Warn Trump against US Pullout of Open Skies Treaty

By Joe Gould and Valerie Insinna

Oct. 8, 2019

WASHINGTON — Top Democratic lawmakers strongly urged the Trump administration on Tuesday against expected action to withdraw America from a landmark treaty which allows the Russian military to be monitored from the air.

In a letter to Defense Secretary Mark Esper and Secretary of State Mike Pompeo, Senate Foreign Relations Committee ranking member Bob Menendez — with House Armed Services Committee Chairman Adam Smith, D-Wash.; House Foreign Affairs Committee Chairman Eliot Engel, D-N.Y., and Senate Armed Services Committee ranking member Jack Reed, D-R.I. — said scrapping the 1992 Open Skies Treaty "would be another gift" to Russian President Vladimir Putin.

"Withdrawing from the Open Skies Treaty would be perceived as casting further doubt on the status of the United States commitment to Ukraine's security and would advance the Russian narrative that the United States is an unreliable partner in the region," the letter reads.

Open Skies permits unarmed flights over the sovereign territory of 34 signatory nations to monitor military activity and conduct arms control measures. The U.S. uses two aging Boeing OC-135B aircraft, which are flown by the 45th Reconnaissance Squadron out of Offutt Air Force Base, Neb.

Though the U.S. has spy satellites, the overflights have allowed the U.S. and other signatories to share unclassified imagery with Ukraine and other countries near Russia who may not have satellite capability. Last year, then-Defense Secretary Jim Mattis said in a letter to Nebraska Republican Sen. Deb Fischer that the overflights were particularly useful after the Russian annexation of Crimea in 2014 and that it was in America's "best interest" to stay in it.

The lawmakers alleged the administration was moving forward without consulting allies or Congress and that, "agencies have been directed not even to discuss this matter with Congress." The administration, they said, had made no case for withdrawing on national security grounds.

"That the administration may now be choosing to withdraw from the Treaty would signal a troubling reversal and a lack of coherent strategic thinking," the letter reads.

Increased discussions inside the Pentagon and State Department of late have fueled fears the National Security Council is planning a push to withdraw the U.S. from the Open Skies Treaty. "There are a lot of rumors floating around, but there are also fears in the Department of State and Department of Defense that this is on the path to happening," said one House Armed Services Committee aide.

On Monday, Engel sent his own letter to White House National Security Advisor Robert O'Brien to urge against the Trump administration's "reported plans" on Open Skies. A withdrawal would undercut NATO allies and Ukraine, which have lauded the treaty-sanctioned ability to monitor Russia's military as check on further Russian aggression in Ukraine, Engel said.

"Withdrawal risks dividing the transatlantic alliance and would further undermine America's reliability as a stable and predictable partner when it comes to European security," Engel said. "If the Administration is indeed considering a change of status on the Treaty, it must be part of a transparent process that includes a thorough interagency review and consultation with Congress, and that provides other signatories a clear understanding of your intentions."

The current controversy comes amid an impeachment investigation over Trump pushing Ukraine's president to investigate former Vice President Joe Biden and whether Trump withheld military aid to Ukraine as leverage, and avoided an interagency process.

As of Tuesday morning, the White House had not directed the Defense Department to curb Open Skies activities, said Pentagon spokeswoman Lt. Col. Carla Gleason.

"The Open Skies Treaty enhances confidence and security by providing a mechanism for mutual understanding," Gleason said in a statement, noting that Russia had previously been found in violation of the terms of the treaty.

"The United States has imposed Treaty-compliant measures on Russian Open Skies flights over the United States in response to their violations," Gleason said. "We will continue to work with our partners to press Russia to correct these violations and return to compliance with the Treaty."

Late last year, the U.S. flew an OC-135 over Ukrainian territory to reaffirm U.S. commitment to Ukraine and other allies — a signal to Russia after it attacked Ukrainian naval vessels in the Black Sea near the Kerch Strait. It was the first flight of the year after the U.S. and Russia appeared to resolve an impasse over what equipment may or may not be certified on Russia's overflight aircraft, the Tu-214.

In September, 2018, Deputy Secretary of State John Sullivan certified, as required by the 2019 defense authorization act, that the U.S. had imposed consequences for Russia's treaty violations as well as legal countermeasures.

Congress has passed action to support OC-135B recapitalization plans in recent years, but Republicans have been split over the treaty. While the House Armed Services Committee's ranking member, Mac Thornberry, R-Texas, and the Senate Subcommittee on Tactical Air and Land Forces chairman, Sen. Tom Cotton, R-Ark., have vented frustration over Russian treaty violations, Fischer and other key lawmakers from Nebraska have fought off efforts to strip funding for its modernization.

Rep. Don Bacon, R-Neb., a retired Air Force brigadier general who formerly commanded the 55th Wing, defended planned upgrades to treaty aircraft and said the treaty itself "promotes understanding, trust and stability" among its members, "grants the U.S. valuable access to Russian airspace and military airfields on short notice."

"I understand that the administration is considering if we should remain in the treaty," Bacon said in a statement Tuesday. "I believe the US was justified in terminating our participation in the [Intermediate Nuclear Forces Treaty], but I've yet to see a compelling reason to withdraw from Open Skies."

Cotton, on the other hand, has called on the U.S. withdraw for years, arguing it is out of date and favors Russia, in part because it restricts surveillance flights over Kaliningrad, home to a Russian military hub, and the breakaway Georgian territories of Abkhazia and South Ossetia.

"Vladimir Putin has violated the Open Skies Treaty for years while continuing to benefit from surveillance flights over the United States," Cotton said in a tweet Tuesday. "The president should withdraw from the Open Skies treaty and redeploy the hundreds of millions of dollars the Pentagon wastes on the flights and equipment to increase U.S. combat power.

The funding for the OC-135 recapitalization would be better shifted to other higher defense priorities than a treaty that lets Putin play the U.S. for "chumps," said one congressional aide, adding: "It's the height of insanity to burn a quarter of a million to make the Europeans feel good."

The draft 2020 defense authorization bill passed by the Democrat-led House would bar DoD funding to exit the treaty. That is, unless the secretaries of state and defense jointly certify Russia is in material breach and is not trying to return to compliance, and that all the other parties to the treaty concur, or that it's in the best interest of the U.S. to leave and all other parties to the treaty were consulted.

An Open Skies pullout would mark a reversal for Trump, who signed a 2019 budget that included $125 million towards the first of two new aircraft to replace the aging Open Skies planes. The White House budget office last year fought off an effort in Congress to defund the OC-135 recapitalization effort, arguing the Air Force needed the money to replace the existing fleet of 1960s-era aircraft with "modern, capable, and cost-effective aircraft."

The Air Force has been preparing to replace both the aircraft and its current wet film camera system, which would move to an entirely digital sensor, processing and control suite. It began surveying industry in April 2018 and initially planned to award a contract in 2020 — although it was unclear Tuesday whether it was still on track to do so.

According to a PowerPoint presentation shown during a May 2018 industry day, the service was seeking out two new commercial airliners that could be outfitted with the existing Digital Visual Imaging System. In April 2019, the Air Force noted in an update to its solicitation that it planned to issue a request for proposals for an OC-135 replacement in June.

However, in June it amended the posting with an additional request for information about "other than new" aircraft that could fill the OC-135's mission — indicating, perhaps, that the service was not ready to commit to buying new planes and was looking for a more economical alternative. There have been no updates to the solicitation since June 25 and no additional information on when the service might start a formal competition.

The possible move to abandon Open Skies follows the Trump administration's withdrawal from the Intermediate-Range Nuclear Forces Treaty, which banned land-based missiles with a range between 500 and 5,500 kilometers, and amid questions over whether the New Strategic Arms Reduction Treaty, which applies to weapons with a global reach, will continue past its 2021 expiration date.

Kingston Reif, director for disarmament and threat reduction policy at the Arms Control Association, noted that U.S. flights over Ukraine and western Russia have yielded valuable data, easily shared between allies. The flights strengthen ties between the U.S. and its allies and reassure non-NATO members on Russia's periphery, he said.

"The Trump administration has already laid waste to several international agreements designed to enhance the security of the United States and its allies and it appears the Open Skies Treaty could be next on the kill list," Reif said. "Withdrawing from the treaty would be another step in the collapse of U.S. leadership and further alienate U.S. allies and partners."

The reports of a possible withdrawal prompted a backlash on social media from arms control experts like Reif but also former government officials who seemed to have been blindsided.

"We are now pulling out of the Open Skies Treaty? Really? Please tell me this can't be true," former U.S. Ambassador to Russia Michael McFaul said in a tweet.

"Russia hates Open Skies because it requires them to let Ukraine fly over their country," Jon Wolfsthal, a former National Security Council official for arms control and nonproliferation said in a tweet. "This is another Trump gift to Putin."

https://www.defensenews.com/air/2019/10/08/top-dems-warn-trump-against-us-pullout-of-open-skies-treaty/

Return to top

Seismological Society of America (Albany, Calif.)

North American Seismic Networks Can Contribute to Nuclear Security

Author Not Attributed

Oct. 2, 2019

The International Monitoring System is the top global seismic network for monitoring nuclear weapon tests around the world. To expand the system's detection capabilities, however, international monitors should seek out the data, methods and expertise of smaller regional seismic networks.

In a paper published as part of an upcoming focus section on regional seismic networks in Seismological Research Letters, University of Utah seismologist Keith Koper explains how the work of regional seismic networks in North America is contributing to nuclear test monitoring, particularly in the case of low-yield explosions. Koper is the director of the University of Utah Seismograph Stations.

The need to detect low-yield explosions—those with a yield less than 0.5 kilotons and causing seismic events between magnitude 1.0 and 3.0—has become more pressing, given conflicting reports on Russian low-yield tests at its Arctic island base of Novaya Zemlya and in North Korea, where researchers have debated whether a 2010 event was an explosion or a natural earthquake.

"Whether with an experienced tester like Russia or an inexperienced tester like North Korea, the U.S. government has a very strong interest in these small events," said Koper.

These small seismic events would likely only be well-recorded at local distances of 150 to 200 kilometers, and are difficult to distinguish from earthquakes and other kinds of industrial explosions. Regional seismic networks, which operate over local distances and routinely create catalogs of small earthquakes that must be uncontaminated by non-earthquake seismic noise, are well-equipped to handle these challenges.

"That's sort of our bread and butter—the detection, the location and estimation of the size of these small events," Koper noted. "It's a way that regional networks in North America can contribute to this important global security issue."

In the SRL paper, Koper offers several examples of how regional seismic networks have provided data that can be useful to international nuclear monitoring. Most regional seismic networks in North America center around a particular "seismo-tectonic feature that warrants extra monitoring versus what you might get from a global or national-scale network," said Koper, such as the New Madrid Fault Zone in the central United States or the Cascadia subduction zone in the Pacific Northwest.

Data from several North American regional networks are helping seismologists refine some of the usual techniques that they use to distinguish explosions from natural earthquakes, such as comparing surface and body seismic waves and calculating the ratio between P-waves and S-waves. (P-waves compress rock in the same direction as the wave's movement, while S-waves move rock perpendicular to the direction of the wave.) While these techniques can identify earthquakes at a regional and global distance, data collected by regional networks suggests that these techniques may not perform in a similar way over local distances.

Specific regions may provide other important information for monitoring. For instance, the geology in the northeastern United States is more similar to Asian test sites than the geology of western North America. "If you're really interested in detecting things in, let's say, North Korea, the Northeastern U.S is a better geological analog," Koper said.

Beyond the IMS, low-yield nuclear test discrimination is also a topic of interest for agencies like the U.S. Department of Defense and national laboratories. In Utah, for instance, the Air Force Research Laboratory has provided funds for the regional network operators to create a catalog of times, locations and sizes of Utah mining blasts. "For the people who are testing new methods of discrimination, maybe based on machine learning or something like that, we can provide this nice, ground-truth catalog," Koper said.

https://www.seismosoc.org/news/north-american-seismic-networks-can-contribute-to-nuclear-security/

Return to top

BBC (London, U.K.)

US Denies North Korean Nuclear Talks Failed

Author Not Attributed

Oct. 5, 2019

The US has denied that its day of nuclear talks with North Korea ended in failure, insisting that "good discussions" were had.

Earlier, North Korea said the meeting had broken down, because the US brought "nothing to the negotiation table".

Officials from the two countries met in Sweden on Saturday, in the hope of breaking their stalemate.

This came just days after North Korea tested a new missile, in a significant advance on earlier tests.

The meeting was the first formal working-level discussion since US President Donald Trump and North Korean leader Kim Jong Un met briefly at the inter-Korean border zone in June.

Neither of the leaders was present in Sweden. Instead, initial discussions were being handled by North Korea's Kim Myong Gil and US Special Representative for North Korea Stephen Biegun.

They met on an island north-east of Stockholm called Lidingo, where North Korea has its embassy.

Who said what?

On Saturday evening, North Korea's top nuclear envoy Kim Myong Gil spoke to reporters outside the embassy, saying "the negotiations have not fulfilled our expectation and finally broke off".

North Korea's missile tests have alarmed people in the South

"The US raised expectations by offering suggestions like a flexible approach, new method and creative solutions, but they have disappointed us greatly," he added.

He said "the US would not give up their old viewpoint and attitude".

However, shortly afterwards, the US state department released a contradictory statement from spokeswoman Morgan Ortagus.

"The early comments from the DPRK [North Korean] delegation do not reflect the content or the spirit of today's 8.5-hour discussion," it read. "The US brought creative ideas and had good discussions with its DPRK counterparts."

Washington has also accepted Sweden's invitation to host more talks in two weeks' time, Ms Ortagus said.

What was expected?

Many observers saw the fresh talks as an opening move to another Trump-Kim summit.

The two have held two summits so far. The first one in Singapore in 2018 resulted in a vague denuclearisation agreement which led to few concrete results.

The second summit in Vietnam in February 2019 ended early without any agreement.

Didn't North Korea just test a missile?

Just this Thursday, North Korea confirmed it had test-fired a new type of a ballistic missile, a significant escalation from the short-range tests it has conducted since May.

The missile - able to carry a nuclear weapon - was the North's 11th test this year. Fired from a platform at sea, it appears to be capable of being launched from a submarine, which means North Korea could potentially launch missiles far outside its territory.

Analysts said North Korean might have been seeking to build up pressure ahead of the talks.

https://www.bbc.com/news/world-asia-49947836

Return to top

COMMENTARY

Modern War Institute (West Point, N.Y.)

Deterrence: I Don't Think It Means What You Think It Means

By Al Mauroni

Oct. 8, 2019

We need a frank discussion on what deterrence is and how it is operationalized in contemporary conflicts, because right now, there is a disconnect between theory and practice. Just as some will quote Clausewitz out of context as a way to buttress a bad thesis, we now see people quoting Schelling and Kahn to support poorly developed deterrence concepts to counter the use of emerging technologies. Many analysts believe that new technologies or platforms should drive changes in deterrence theory, as if it should change with every new evolution in the character of warfare. Certainly deterrence theory has changed since its development during the Cold War. But we need to go deeper to justify whether deterrence theory truly needs to be changed solely due to the emergence of new technologies.

The Department of Defense defines deterrence as "the prevention of action by the existence of a credible threat of unacceptable counteraction and/or belief that the cost of action outweighs the perceived benefits." This is a far too flowery definition for what Dr. Strangelove called "the art of producing in the mind of the enemy the fear to attack." The key to correctly defining deterrence is to recall that it is the threat of force—not the actual use of force—to retain the status quo, successfully communicated to an adversary. Often people will confuse compellence, the actual use of force to cause an adversary to change a behavior they are already doing, with deterrence. Deterrence and compellence are targeted at political leaders, and military forces provide the means by which those objectives are met. As a result, the two concepts are easily confused when practiced by governments. Dissuasion is convincing an adversary to stop a course of action without the use of force. These definitions are important if one intends to develop operational capabilities that maintain a state of deterrence.

There is no shortage of academic literature on deterrence theory—Lawrence Freedman, Therese Depelch, and Brad Roberts all have written readily accessible books on the topic. There are many books and journal articles written every year, speculating as to how deterrence theory holds up today during contemporary crises. Multiple conferences every year offer the opportunity to exchange ideas and debate about deterrence theory. What some call "classic deterrence" often refers to rational-actor theory addressing a strategic nuclear exchange between the two superpowers during the Cold War—what Thomas Schelling and Herman Kahn discussed in the 1960s. The maturation of space-borne capabilities, cyber threats, and hypersonic weapons constitute new strategic threats to the United States, and as a result, the defense community has struggled to define new theories of deterrence distinct from nuclear deterrence.

There is a strong argument in favor of retaining a focused, single theory of strategic deterrence that is agnostic to the type of technology. Gen. John Hyten, the former commander of US Strategic Command, has stated that the command's primary mission is to provide a strategic deterrent, and given that his command "has all the global nuclear capabilities of our nation," he explained, "that better be priority number one." But he also made clear that the nuclear arsenal "is not the only thing that provides our strategic deterrent." By that, he means that a twenty-first-century strategic deterrent also requires the integration of conventional global strike, space control, control of the electromagnetic spectrum, and missile defense. This idea of integrating nuclear and non-nuclear capabilities to provide a strategic deterrent dates back to the 2002 Nuclear Posture Review. That said, nuclear deterrence is certainly the most important aspect of strategic deterrence.

There will always be debates as to whether nuclear deterrence works, and to extend the argument, whether US national security strategy today relies too heavily on a Cold War deterrence model. These debates miss a critical point. The major superpowers with nuclear weapon systems are the same today as they were during the Cold War, and political motivations have not differed remarkably. Political leaders have changed, there are new nuclear weapons, and there are new global entanglements, but the deterrence theory developed during the Cold War and improved upon after the Cold War ended still works. We can debate the value of deterrence by punishment versus that of deterrence by denial, but both have complementary roles in designing operational capabilities that address US political objectives.

Conventional deterrence operates the same way as nuclear deterrence in terms of demonstrating both capability and credibility of action, as well as communicating these to an adversary. The main difference is that when there is a failure in conventional deterrence, the result is not as extreme as a failure in nuclear deterrence. We have US forces in Korea and Japan, throughout the Middle East, and in Europe as conventional deterrents against open conflict. However, an adversary may still undertake a conventional attack against US interests and accept the risk of US retaliation. A nuclear-armed adversary may be even more emboldened to take conventional actions despite US attempts to deter such aggression. So we see China building bases in the South China Sea, Russia openly supporting insurgents in Ukraine, Iran seizing oil tankers in the Persian Gulf, and North Korea firing ballistic missiles around Japan despite deterrent efforts by the United States. These same adversaries would not risk attacking the United States with hundreds of hypersonic vehicles or cruise missiles, perhaps because the United States identified a large-scale conventional attack as a red-line in the 2018 Nuclear Posture Review report.

One of the most important issues in deterrence practice is deciding on what behavior US policymakers are trying to deter, and how we can judge the effectiveness of a deterrent posture. One can find relevant academic discussions on space deterrence and cyber deterrence, but it is not clear how the US military would use cyber or space forces to deter nuclear-weapon states from actions during non-nuclear confrontations. There has been some research on "cross-domain deterrence" but how best to incorporate that theory into US strategy and policy remains far from certain. The 2016 National Security Space Strategy outlines a general "deterrence by denial" approach by improving satellite protection and adding resiliency. The 2018 National Cyber Strategy hints at more of a "deterrence by punishment" approach by imposing consequences to deter bad behavior. So these deterrence terms are familiar, which means it is more of an exercise of determining if there is credible willpower and capable tools to enforce these strategies.

It is not clear as to whether the US national missile-defense system is a deterrent (by denial) or just an aspect of homeland defense. The Missile Defense Agency states that its mission is to defend the United States, and its current strategic plan says that "when deterrence fails, the Nation will need active defenses." At the same time, its vision is to (eventually) "give the Joint Force an overwhelming deterrence and warfighting advantage." So which is it, a deterrent or a defense? In

theory, one might believe that an adversary can be deterred from launching ballistic missiles against the United States if a national missile defense system was in fact in place, was robust, and was highly effective. Lacking evidence of a capable (fully functional) defense system, it would not be a very effective deterrent against another superpower. One might hope that a limited missile-defense program would deter North Korea from launching ballistic missiles against the United States, but then again Kim Jong-un might try to saturate US missile defenses in an effort to overcome this defense. Because the nature of the mission—whether deterrence or defense—is unclear, it becomes hard to identify what objectives national missile defense is supposed to meet and to what degree it is effective. Having a robust missile-defense program does not change how the United States seeks to deter other nuclear-weapon states from attacking the homeland.

To continue this line of thought, ML Cavanaugh wrote in a recent MWI article that "we deter in order to defend, [so] when deterrence changes, so must defense." In my view, I see military analysts viewing deterrence as a means to delay the adversary while the US military prepares to attack. That's not the intent of deterrent actions, to provide US forces some time to organize prior to attacking the adversary. It's a political form of communication, and as such, deterrence hasn't significantly changed. Defense and deterrence may work in tandem but they are two distinct operations. Cavanaugh believes that a "defense in depth" for the homeland will result in a denial of benefits to an adversary, through integrating major US industries into defense plans and partnering with Mexico on security issues. While we might hope that a homeland defense in depth would discourage general attacks against the United States, it is unclear that, eighteen years after 9/11, this form of deterrence is working. Russian bombers still approach US borders. Chinese, Iranian, and North Korean cyber attacks haven't diminished. Strategic nuclear arsenals in China and North Korea continue to grow to offset a US global hegemony.

We should not view "deterrence by denial" as merely a defensive block against one avenue of attack. Deterrence by denial only works if the adversary views it as an obstacle. If the adversary views our defensive efforts as weak, has resources to use multiple attacks against limited resources, can achieve political objectives regardless of an effective defense, or wins in public opinion even in losing on the battlefield, then developing defenses as a "deterrence by denial" will not work. We maintain national defenses because we are unsure that general deterrence will work. It may be that adversarial nation-states have other reasons not to attack the US homeland, and nonstate actors capable of such attacks may have been destroyed or diminished by active US military actions. This reduces the need for deterrence efforts. Sometimes a defense is just a defense.

At a recent conference, a field-grade military officer was doing his best to convince his audience that US plans to counter weapons of mass destruction could be rolled up under deterrence policy. He rationalized this by pointing to DoD's joint definition of countering WMD: "efforts against actors of concern to curtail the conceptualization, development, possession, proliferation, use, and effects of weapons of mass destruction." US policy is to deter nations from developing and using nuclear weapons, and this counter-WMD definition addresses efforts to curtail development and use of WMD. Ergo, countering WMD is a subcomponent of deterrence. This simplistic explanation ignores nearly three decades of developing counterproliferation/counter-WMD strategy and the careful segregation of nuclear deterrence and counter-WMD policy within DoD.

US counterproliferation policy was always aimed at operationally protecting US forces from unconventional weapons effects and not intended as a strategic deterrent. We needed counterproliferation in 2003 because we were not sure as to whether Saddam Hussein might use chemical and biological weapons in an act of regime survival, despite US statements of massive retaliation. We need counterproliferation today because we are not sure as to whether Kim Jong-un might use chemical or biological weapons, despite demonstrations of US military power and clear

statements warning him against such action. Countering WMD is the defensive plan we go to when tailored deterrence (against a specific adversary) fails.

During the Cold War, it was clear what strategic deterrence meant and that the United States needed capable military systems to convince the Soviet Union that a strategic nuclear exchange would be a mistake. Nearly thirty years after the fall of the Soviet Union, we have a new generation of military and civilian analysts who have not considered modern deterrence concepts. Just as Clausewitz's broader views on the nature of war remain viable today, so does the general relevance of deterrence theory and its observations on how political adversaries can be coerced through threats of force. The basic principles apply to both nuclear and non-nuclear scenarios. We should guard against reinventing deterrence theory merely because there are new technologies that did not exist thirty years ago.

Al Mauroni is the director of the US Air Force Center for Strategic Deterrence Studies and author of the book Countering Weapons of Mass Destruction: Assessing the U.S. Government's Policy. The views expressed are those of the author and do not reflect the official position of the United States Military Academy, Department of the Army, Air University, US Air Force, or Department of Defense.

https://mwi.usma.edu/deterrence-dont-think-means-think-means/

Return to top

Bulletin of the Atomic Scientists (Chicago, Illinois)

When Rick Perry Thinks about AI, He Thinks about Nuclear Weapons

By Matt Field

Oct. 7, 2019

It's pretty easy to conjure up dystopian visions for how the global pursuit of artificial intelligence will play out. After all, governments, militaries, and startups frequently push ideas seemingly ripped from the pages of a Philip K. Dick novel, or worse. It's easy to think of the pursuit of AI, for instance, in the oft-used frame of an arms race. It's so easy that US Energy Secretary Rick Perry, ostensibly at a press conference to tout the positive impact of his department's AI research portfolio, pretty quickly started talking about nuclear weapons.

At the Department of Energy AI event in Chicago, Perry took a question on the risks of the United States not leading the world in artificial intelligence. The Oct. 2 event was hosted by Argonne National Laboratory, which will soon take possession of the United States' first exascale supercomputer—a really powerful computer with all sorts of artificial intelligence applications. After touching on the competition between the United States and China in supercomputing, Perry, standing alongside Energy Department Under Secretary for Science Paul Dabbar and others, reached for metaphors from the annals of US nuclear history to talk about just how important artificial intelligence is.

"Paul and I happened to be together at Hanford yesterday in front of the B Reactor that was the first reactor in the world that produced plutonium, the material that the Trinity project and then the bomb at Nagasaki that helped end World War II were produced there." said Perry, before ending on a more upbeat note. "Where I'm going with this is that it's the innovators, the innovators in America, and I don't want to get too far afield here, but it's one of the reasons it's so important for America to invest in STEM programs, to excite young people into science and technology."

But surely AI and the competition between the United States and China to develop it isn't the same as the Cold War-era race to develop nuclear weapons. Asked to clarify, Perry seemed to

simultaneously double down on and walk back his previous words. "What I'm saying is that artificial intelligence is a lot more than just the weapons program—it's a part of it. I would say that, and Paul you would probably agree with me here, the ancestor to AI that we see today goes back to the old weapons program, the ability to compute all of the science that was required to build the B Reactor," Perry said. "It's so vast in how it's going to affect all of our lives."

Noteworthy views on artificial intelligence aside, Perry's been in the news for other reasons lately. Congressional Democrats are questioning the energy secretary's ties to Ukraine in the context of the impeachment inquiry against President Donald Trump. On Friday, Trump reportedly blamed Perry for pushing him to make the fateful call to the president of Ukraine that jump-started the impeachment inquiry. Numerous outlets have reported Perry will be resigning by year's end.

Perry's certainly not alone in viewing artificial intelligence in Cold War or martial terms. Earlier in the day, US Rep. Will Hurd talked about the need for US dominance in artificial intelligence. China, he said, wasn't using cutting-edge technology like facial recognition to "make it easier to buy groceries." But there's a danger to framing competition in developing artificial intelligence as an arms race; such framing, many experts (including the University of Cambridge's Heather Roff) say, creates the risk that governments will adopt military policies that make AI-based conflict more likely.

Besides, China probably has made AI that helps you buy groceries.

https://thebulletin.org/2019/10/when-rick-perry-thinks-about-ai-he-thinks-about-nuclear-weapons/

Return to top

Defense One (Washington, D.C.)

The US Is Trying to Restore Deterrence in the Gulf. That Won't Be Enough

By Christopher J. Bolan

Oct. 6, 2019

Iran and Saudi Arabia are locked in a security dilemma. Here are some potential ways out.

The United States' ability to deter Iran in the Gulf is collapsing, as shown by an escalating series of violent actions either known or suspected to be Iranian. U.S. officials have responded with sensible steps that are largely consistent with scholarly insights on deterrence theory. But even if they manage to restore deterrence, it will provide only a temporary respite to the primary source of instability in the Gulf: the security dilemma confronting Saudi Arabia and Iran. U.S. policymakers must address this more fundamental issue, lest the region arrive at a "1914 moment" and careen into war.

Recalibrating a failed U.S. deterrence policy

As global tensions escalated in the wake of the Sept. 14 missile and drone strikes on the oil refineries at Abqaiq and Khurais, Defense Secretary Mark Esper and Joint Chiefs Chairman Gen. Joseph Dunford held a rare and unscheduled press conference on Sept. 21. World leaders were anxiously awaiting an outline of America's planned military response to what the U.S. Secretary of State Mike Pompeo had declared "an act of war" by leaders in Tehran.

Few would have been surprised if President Trump ordered missile and airstrikes on Iranian military or oil facilities, given that the president had in June approved (though at the last minute called off) strikes on Iranian targets after the downing of a U.S. drone. Indeed, American military

strikes against Iran would have been entirely consistent with a strategy of deterrence-by-punishment. In other words, in order to reinstate deterrence and prevent further escalation, U.S. leaders would act immediately and decisively to demonstrate America's willingness and capacity to impose direct and mounting costs on Iranian leaders in Tehran should they continue to undertake actions injurious to U.S. or allied interests.

Instead, Esper and Dunford announced a largely defensive response that more closely reflected a strategy of deterrence-by-denial. Instead of imposing visible punishment on Iran, the United States chose to bolster the defenses of Saudi Arabia and other allies in a bid to reduce the prospects of Iranian success in future strikes. RAND researcher Michael Mazarr notes that classic studies of deterrence theories and historical practice suggest that "denial strategies are inherently more reliable than punishment strategies." Moreover, denial strategies minimize the risks of escalation inherent in deterrence-by-punishment strategies whose credibility depends on delivering punishment when challenged.

This deterrence-by-denial logic is also reflected in the cyberattacks on Iran ordered by the current administration and its two predecessors. Bush began and Obama intensified cyber efforts to disable Iranian centrifuges that were enriching uranium; some U.S. officials claim to have set back the Iranian nuclear program up to two years. Cyberattacks also figured in President Trump's response to the June downing of a U.S. drone over the Gulf: he rejected his advisors' universal recommendations for direct strikes, and instead ordered cyberattacks to degrade the computers, intelligence systems, and missiles that enable Iranian attacks on Gulf shipping. President Trump is considering similar cyberstrikes in response to the Sept. 14 oil attacks — and as a way to restore U.S. deterrence while avoiding the risks of further escalation inherent in kinetic strikes.

Of course, these deterrence-by-denial steps do not foreclose the options of a more aggressive American military response down the road. Since May, U.S. defense officials have announced several military deployments to the region, including the addition of a carrier strike group, bombers, missile defense units, and multiple ground troop deployments aimed at bolstering the offensive and defensive capabilities of U.S. and allied forces alike. While hardliners in Tehran may doubt the credibility of the threat of direct U.S. military strikes — President Trump has often expressed a desire to "avoid entangling his presidency in another messy military conflict in the Middle East," as Brookings' Iran expert Suzanne Maloney puts it — there can be no denying the physical capacity of the United States military to inflict tremendous damage on Iran. Bridging this credibility gap will remain the central critical challenge for U.S. policymakers as they work to restore deterrence.

The Gulf's security dilemma

But even if the United States restores its ability to deter Iran from unwanted behavior, and even if this leads to the negotiations that leaders in both Washington and Tehran claim to seek, a failure to address the basic security dilemma confronting Saudi Arabia and Iran will simply leave the region perched on its perpetual knife's edge. Both sides must ultimately aim to identify concrete steps that Iran, the Arab Gulf states, and outside actors can take to ease the fears and mistrust that fuel sectarian divisions, competition, and conflict.

Arab fears of Iranian hegemony have steadily grown since the Iranian Revolution of 1979 brought a militant Shi'a clerical regime to power in Tehran. Iranian political, financial, and military support to Shi'a proxy groups in Lebanon, Iraq, Syria, and Yemen have been cited as evidence that Iran is now in control of four Arab capitals. These claims wildly exaggerate the influence wielded by clerics in Tehran, but they nonetheless accurately reflect the sectarian fears permeating much of the region. These fears have led Arab Gulf leaders to reckless behavior. Witness Riyadh's military intervention

in Yemen, which has produced the world's largest humanitarian disaster while providing Iran a pretext for deepening and expanding its engagement in Saudi Arabia's strategic backyard.

Meanwhile, Iranian leaders see themselves as an isolated and victimized Persian and Shi'a minority in a region dominated by Sunni Arab leaders who are backed politically, financially, and militarily by the world's most powerful state. They note that the defense budget of Saudi Arabia alone is nearly four times that of Iran. And they have for decades chafed under U.S. and multilateral sanctions — economic, financial, and military — meant to limit Iran's nuclear and missile programs, hobble its conventional military, and curb its support to terrorist groups and sectarian militias.

Failing to address the security dilemma

In different ways and through different means, Presidents Obama and Trump have tried but failed to ease this security dilemma.

President Obama and the other signatories to the Joint Comprehensive Plan of Action (JCPOA) undoubtedly viewed this nuclear deal as way to reassure Arab Gulf allies that Iran could not go nuclear for a decade or more. But it also reassured Iranian leaders by recognizing Iran's "right" to enrich uranium (within specified limits and under strict international supervision) and throwing them an economic lifeline by lifting U.S. sanctions and allowing much-needed foreign investment.

The deal was necessarily imperfect. Some of the restrictions on Iran's civilian nuclear program expire over time. The agreement expressly did not address Iran's ballistic-missile efforts, its support for regional proxies, and other troubling Iranian behavior. Nonetheless, the curbs on Iran's nuclear programs were substantial, the inspections regime was intrusive, and inspections would be conducted on a permanent basis. Moreover, many of the U.S. and multilateral sanctions targeting Iran's missile programs and support to terrorist groups remained in place or were actually strengthened.

Nonetheless, Arab Gulf leaders were concerned that this nuclear deal would leave Iran free to sow instability throughout the region through other means. They also feared such a deal could eventually lead to a U.S. rapprochement with Iran that threatened their privileged position in U.S regional strategies. In their nightmares, these leaders likely feared that this would be a first step toward Washington's unqualified embrace of Iran as a legitimate regional power — as during the decades-long reign of the Shah.

If that seems far-fetched or far-off, recall that several other trends in U.S. security policy have been raising alarms in Arab capitals: the growing U.S. strategic focus on Asia, withdrawals of U.S. military forces from Iraq and Afghanistan, and a 2017 National Defense Strategy emphasizing great power competition with China and Russia. Taken together, they were viewed as confirmation that the decades-long U.S. security commitment to the region was evaporating before their eyes.

Upon taking office, President Trump took several quick steps intended to reassure the Arab Gulf states. He made his first overseas trip as president to Saudi Arabia, where he trumpeted the sale of billions of dollars of American weapons and blamed Iran for fueling "the fires of sectarian conflict and terror." He withdrew from the JCPOA, reimposed tough U.S. economic sanctions against Iran, and loudly demanded that Tehran end nuclear enrichment, terminate its ballistic missile program, and stop supporting proxy forces. He appointed as key security advisors several virulent critics of Iran, including Mike Pompeo, James Mattis, and John Bolton, and announced a strategy of "maximum pressure." Moreover, Trump remained mute as Arab leaders arrested, imprisoned or executed thousands of political opponents, journalists, and human rights workers — reassuring these regimes that America would give them a free hand to solidify their authoritarian control.

As a whole, these steps should have gone a long way to reassure America's traditional allies and minimize the security fears and concerns from the Arab side of the Gulf. Yet quite predictably, they

inflamed fears in Tehran. The renewed sanctions in particular have backed Iranian leaders into a corner from which they have come out fighting. President Rouhani's pledges to improve the economy have collapsed due to the lack of government revenues, absence of foreign investment, rising inflation, and growing unemployment. Meanwhile, the U.S. withdrawal from the JCPOA has strengthened the position of hardliners who claim that Iranian concessions at the negotiating table have unnecessarily endangered Iranian national security by making the country more vulnerable to Western exploitation and pressures. Moreover, they remain suspicious that the real U.S. objective is to cause the collapse of the Islamic theocracy in Tehran. This sense of exposure and vulnerability has led Iranian leaders to replace their initial strategy of "patience" with one of "maximum resistance" that seeks to raise the costs of America's own strategy, highlight the vulnerability of Gulf infrastructure and international shipping to Iranian attacks, and boost Iranian leverage should negotiations be renewed.

Mitigating the security dilemma — for real this time

This explosive strategic context means that U.S. policymakers need not only to restore effective deterrence but to mitigate the underlying security dilemma.

President Obama was correct when he suggested that for violence to end and regional stability to return, Saudi Arabia and Iran would need to find a way to "share the neighborhood." Just as U.S. policy seeks to address the justifiable security concerns of the Arab Gulf states, it must also strive to ease Iranian perceptions of its vulnerabilities in a way that minimizes the security dilemma from both sides of the Gulf. The ultimate goal of such an approach should be the inclusion of Iran into a regional security architecture that provides assurances and reduces vulnerabilities both for the Arab Gulf states, but also for Iran. Former Central Intelligence Agency senior Middle East analyst Emile Nakhleh similarly observes that "security collaboration between Riyadh and Tehran is necessary for the long-term security of the Gulf."

Small confidence-building steps could help reduce the temperature in the region. For example, the United States might allow Iran to resume limited oil exports in exchange for returning to full compliance with the JCPOA's nuclear restrictions.

Another step would be supporting the efforts of the United Nations Special Envoy to end the conflict in Yemen. A political resolution allowing the rebelling Houthi minority an acceptable role in governance would at once reduce their need for Iranian military support and provide the Saudis an exit ramp from an expensive and exhausting conflict.

Just as Gulf Arab states fear Iran's ballistic missiles, so Tehran is concerned with Arab air forces with offensive strike capability. U.S. military sales to the Gulf States should emphasize the strengthening of purely defensive capabilities — specifically, missile defenses — while avoiding significant improvements to the offensive military capabilities of Arab Gulf states. This can and should be done in conjunction with comparable Russian and Chinese efforts to do the same in their arms sales to Iran, Syria, or other countries in the region. U.S. international diplomacy should push for strict adherence to export limitations on all regional programs consistent with the existing Missile Technology Control Regime. Iran already adheres to a self-imposed range limitation of 2,000 kilometers for its ballistic missiles. Through negotiations, Iran might be persuaded to concede additional restrictions on the sophistication, deployment, and ranges of its missiles in exchange for firm commitments to ease specific U.S. economic and military sanctions.

To facilitate freedom of navigation in the Hormuz Strait, the U.S. could invite Iranian conventional naval forces to participate in joint multinational patrols of this vital international waterway. Iran should be first required to adhere to international standards of conduct at sea similar to the "Code for Unplanned Encounters at Seas Agreement" negotiated in 2014 to prevent unintended

altercations in the Pacific and since joined by more than 20 countries including the United States and China. The current U.S. effort to marshal an international naval coalition ("Operation Sentinel") in the Gulf has thus far failed to attract key allied support from even traditional Western allies like France and Germany and consequently needs to be rebranded to attract broader support. Participation by other partners with a vested interest in Gulf security could include Russia and China, both of whom could help curb Iranian misbehavior. And if the U.S. fails to take the lead in this area, others will forge security arrangements that do not take U.S. interests into account. Already, the United Arab Emirates has begun direct military-to-military engagement with Iran in order to better manage the risk of unintentional escalation.

Additionally, the history of conventional arms control in Europe might be explored for models on the conduct of joint inspections regimes, the establishment of mutual confidence building measures, and the imposition of verifiable limitations on the deployment of conventional ground, air or missile forces in the region. Improved transparency along these lines could usefully reduce the sense of uncertainty and vulnerability currently aggravating the security dilemma.

These security issues are difficult, but managing proxies and cyberwarfare are likely to prove even more daunting. The shadowy and covert nature of these activities make transparency and accountability more difficult. Nonetheless, there might be an opportunity for the United States, Russia, and China to press their respective allies to impose restrictions and limitations on the scope, type, and extent of assistance offered to proxy groups. Incentives such as easing military sanctions on Iran might also be exchanged for Iranian limits on military technologies and weapons provided to its proxies in order to reduce the threats they pose to U.S. allies. Lastly, the Middle East might provide a testbed for the United States to lead an international effort to establish a set of mutually agreed norms of behavior to guide the conduct of cyberwarfare, as my colleague has recently suggested the U.S. could also usefully do to better manage proxy warfare.

All of these recommendations carry risks. None will be easy to implement. None will guarantee success. However, failing to more effectively address the Saudi-Iran security dilemma from both sides of the Gulf risks a devastating war that could push a struggling region to the brink of catastrophe and collapse.

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Return to top

ABOUT THE USAF CSDS

The USAF Counterproliferation Center (CPC) was established in 1998 at the direction of the Chief of Staff of the Air Force. Located at Maxwell AFB, this Center capitalizes on the resident expertise of Air University — while extending its reach far beyond — and influences a wide audience of leaders and policy makers. A memorandum of agreement between the Air Staff's Director for Nuclear and Counterproliferation (then AF/XON) and Air War College commandant established the initial personnel and responsibilities of the Center. This included integrating counterproliferation awareness into the curriculum and ongoing research at the Air University; establishing an information repository to promote research on counterproliferation and nonproliferation issues; and directing research on the various topics associated with counterproliferation and nonproliferation.

In 2008, the Secretary of Defense's Task Force on Nuclear Weapons Management recommended "Air Force personnel connected to the nuclear mission be required to take a professional military education (PME) course on national, defense, and Air Force concepts for deterrence and defense." This led to the addition of three teaching positions to the CPC in 2011 to enhance nuclear PME efforts. At the same time, the Air Force Nuclear Weapons Center, in coordination with the AF/A10 and Air Force Global Strike Command, established a series of courses at Kirtland AFB to provide professional continuing education (PCE) through the careers of those Air Force personnel working in or supporting the nuclear enterprise. This mission was transferred to the CPC in 2012, broadening its mandate to providing education and research on not just countering WMD but also nuclear operations issues. In April 2016, the nuclear PCE courses were transferred from the Air War College to the U.S. Air Force Institute for Technology.

In February 2014, the Center's name was changed to the Center for Unconventional Weapons Studies (CUWS) to reflect its broad coverage of unconventional weapons issues, both offensive and defensive, across the six joint operating concepts (deterrence operations, cooperative security, major combat operations, irregular warfare, stability operations, and homeland security). The term "unconventional weapons," currently defined as nuclear, biological, and chemical weapons, also includes the improvised use of chemical, biological, and radiological hazards. In May 2018, the name changed again to the Center for Strategic Deterrence Studies (CSDS) in recognition of senior Air Force interest in focusing on this vital national security topic.

The Center's military insignia displays the symbols of nuclear, biological, and chemical hazards. The arrows above the hazards represent the four aspects of counterproliferation — counterforce, active defense, passive defense, and consequence management. The Latin inscription "Armis Bella Venenis Geri" stands for "weapons of war involving poisons."

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