A Golden Dome for America?: The Logic & Implications of President Trump's Missile Defense Proposal

Dr. J. Michael Greig
Professor, Department of Political Science
Senior Fellow, Castleberry Peace Institute
University of North Texas

Missile threats to the U.S. homeland will expand in scale and sophistication in the coming decade. **China** and **Russia** are developing an array of novel delivery systems to exploit gaps in current U.S. ballistic missile defenses, but traditional ballistic missiles—which are guided during powered flight and unguided during free flight—will remain the primary threat to the Homeland. **North Korea** has successfully tested ballistic missiles with sufficient range to reach the entire Homeland, and **Iran** has space launch vehicles it could use to develop a militarily-viable ICBM by 2035 should Tehran decide to pursue the capability. The majority of systems presented here have nuclear-capable variants.

Depicted are selected missile threats to the Homeland from notional launch points. Missiles from mobile platforms—aircraft, submarines and ships—can penetrate farther should the platform risk a closer approach to the United States. Numbers below are approximate inventory totals with the exception of submarine-launched ballistic missiles.

China Russia North Korea Iran

Intercontinental Ballistic Missile (ICBM) 1

A ground-based missile with a range exceeding 5,500 km that flies on a ballistic trajectory and is typically armed with a nuclear warhead or warheads. There is no part of the Homeland which cannot be struck by existing ICBMs.

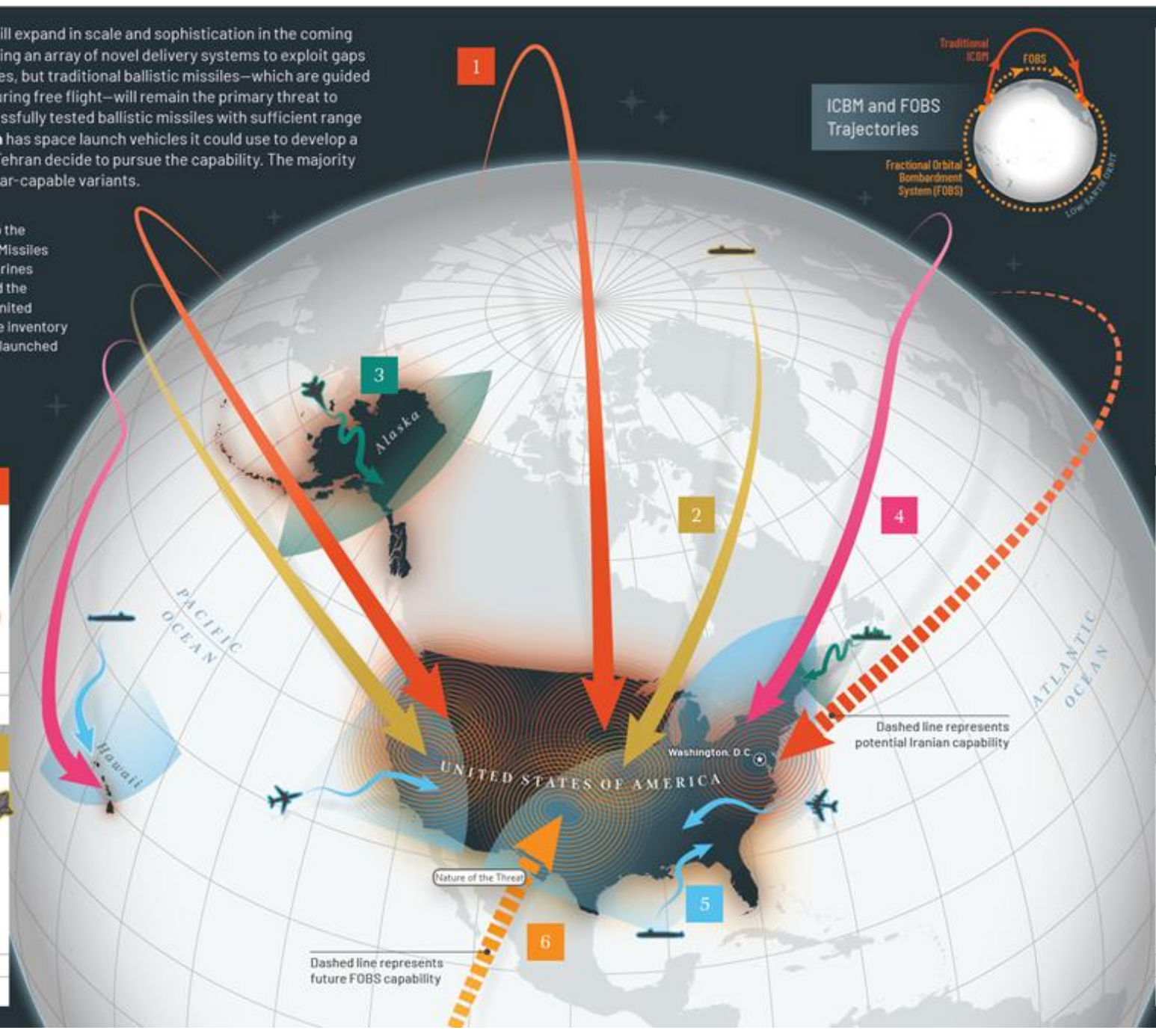
Country				
Current	400	350	10 or fewer	-
2035	700*	400*	50	60

Submarine-Launched Ballistic Missile (SLBM) 2

A ballistic missile, typically carrying nuclear warheads, launched from a submarine. There is no part of the Homeland which cannot be struck by existing adversary SLBMs. Included below are maximum loadout numbers for current and future submarine fleets.

Country		
Current	72	192
2035	at least 132	192

*Number includes FOBS



ICBM and FOBS Trajectories

Boosted Hypersonic Weapon

A highly maneuverable system that achieves hypersonic speed (Mach 5+); includes:

Aeroballistic Missile: A type of hypersonic missile carrying nuclear or conventional warheads that can be launched from air, sea, or ground platforms and combines aerodynamic maneuvers with phases of ballistic loft to extend range. Russia can currently strike portions of the Homeland with aeroballistic missiles launched from aircraft, ships, or ground launchers, and will probably add a launch capability from submarines. 3

Hypersonic Glide Vehicle (HGV): A maneuverable aerodynamic body that is typically delivered by a ballistic missile, achieves sustained hypersonic glide at altitudes of 15-50 km, and glides for at least half of its flight to its target. HGVs can be armed with a nuclear warhead, but China may have deployed a conventional HGV with sufficient range to strike Alaska. 4

Country		
Current	600	200-300
2035	4,000	1,000

Land Attack Cruise Missile 5

A missile that flies through the atmosphere, potentially with reduced signatures, that can maneuver extensively in flight and be armed with a nuclear or conventional warhead; some may achieve hypersonic speeds. Russia can currently strike large portions of the Homeland with cruise missiles launched from aircraft, ground launchers, ships, or submarines, and China is beginning to field similar capabilities against Alaska, Hawaii, and the U.S. West Coast.

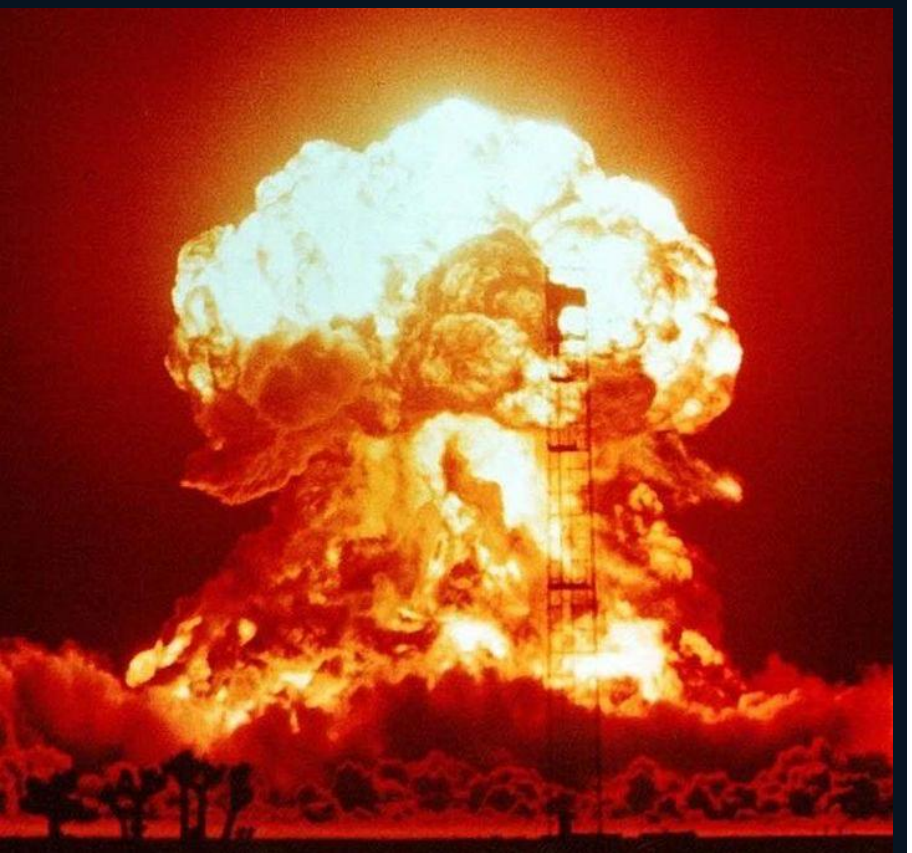
Country		
Current	1,000	300-600
2035	5,000	5,000

Fractional Orbital Bombardment System (FOBS) 6

An ICBM that enters a low-altitude orbit before reentering to strike its target, with much shorter flight times if flying the same direction as traditional ICBMs, or can travel over the South Pole to avoid early warning systems and missile defenses. It releases its payload before completing a full orbit.

Country		
Current	-	-
2035	60	fewer than 12

Current U.S. Defenses Against Nuclear Attack



- Nuclear deterrence
- Limited ballistic missile defense

Nuclear Deterrence

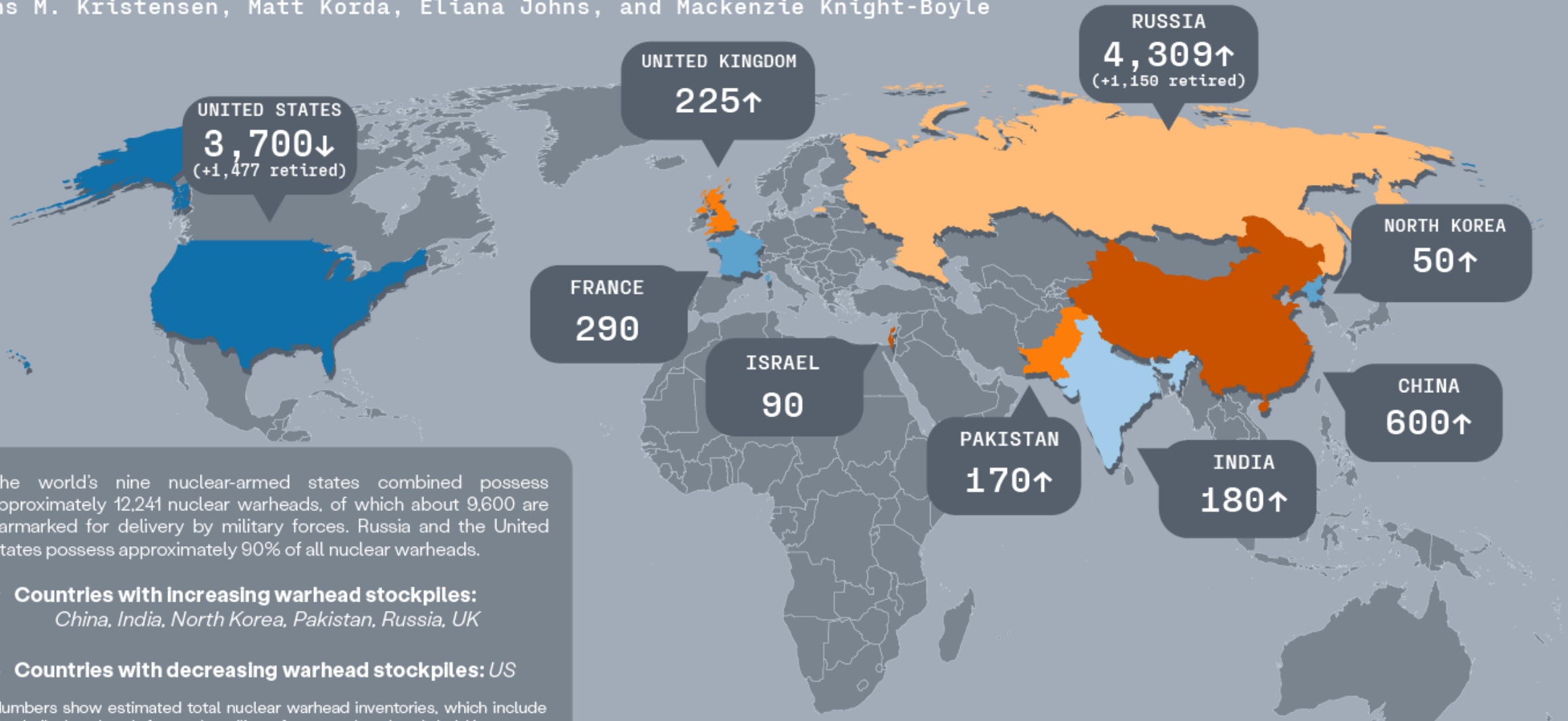
- A policy that seeks to persuade an adversary, through the threat of military retaliation, that the costs of using military force to resolve political conflict will outweigh the benefits

- Mutual Assured Destruction (MAD)
  - Massive retaliation
  - Maximization of enemy's pain
  - Secure second-strike capability

Requirements for Deterrence

Estimated Global Nuclear Warhead Inventories, 2025

Hans M. Kristensen, Matt Korda, Eliana Johns, and Mackenzie Knight-Boyle



The world's nine nuclear-armed states combined possess approximately 12,241 nuclear warheads, of which about 9,600 are earmarked for delivery by military forces. Russia and the United States possess approximately 90% of all nuclear warheads.

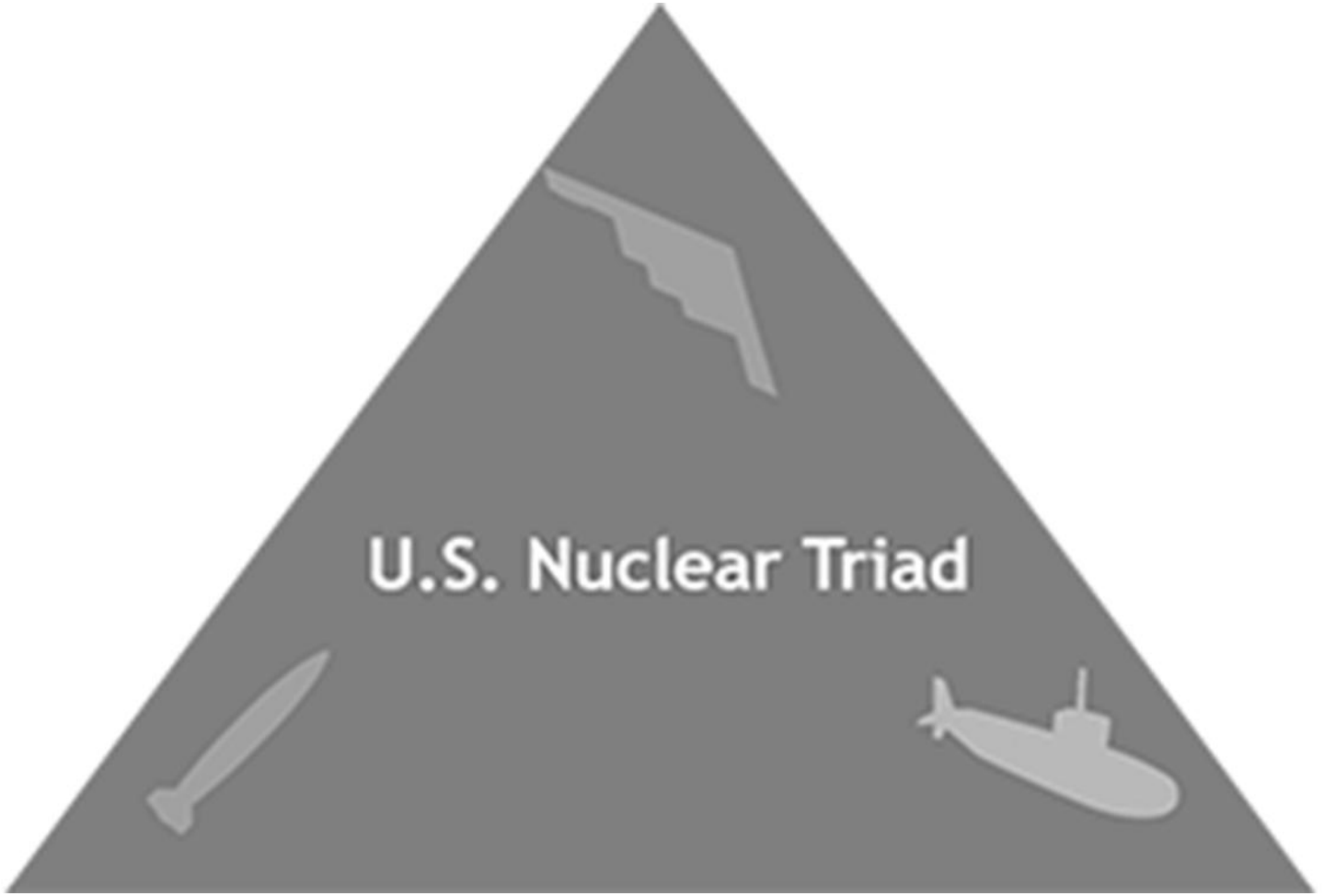
↑ **Countries with increasing warhead stockpiles:**
China, India, North Korea, Pakistan, Russia, UK

↓ **Countries with decreasing warhead stockpiles:** *US*

Numbers show estimated total nuclear warhead inventories, which include stockpiled warheads for use by military forces and warheads held in reserve. Of the 9,600 warheads in the military stockpiles, about 3,900 are deployed on ballistic missiles and bomber bases. Approximately 2,100 warheads on ballistic missiles are on alert and can be launched on short notice.

FAS FEDERATION OF AMERICAN SCIENTISTS

Structure of U.S. Nuclear Arsenal



Existing U.S. Ballistic Missile Defense Capabilities

- 44 ground-based interceptors in California and Alaska for homeland defense
- 38 Aegis-equipped warships with tracking & ballistic missile defense capabilities
- 7 active THAAD batteries (one deployed to Guam, one deployed to South Korea)

Executive Order: January 27, 2025

- Sec. 2. Policy. To further the goal of peace through strength, it is the policy of the United States that:
- (a) The United States will provide for the common defense of its citizens and the Nation by deploying and maintaining a next-generation missile defense shield;
- (b) The United States will deter — and defend its citizens and critical infrastructure against — any foreign aerial attack on the Homeland; and
- (c) The United States will guarantee its secure second-strike capability.

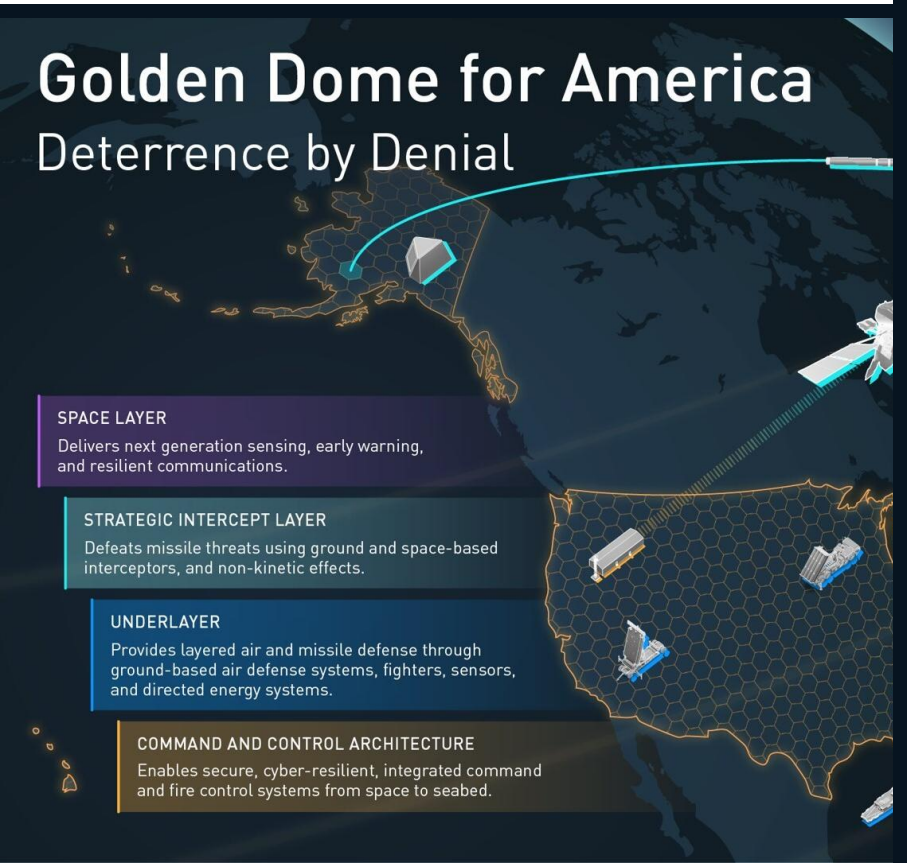
What is the Golden Dome?

- Initiative announced by President Trump in January 2025 to create a protective shield for the United States against all missile attacks
  - Vision: an impenetrable shield against threats like Russia, China, North Korea, and Iran

- Inspirations:
  - Reagan's Strategic Defense Initiative
  - Israel's Iron Dome – short-range, limited-area defense

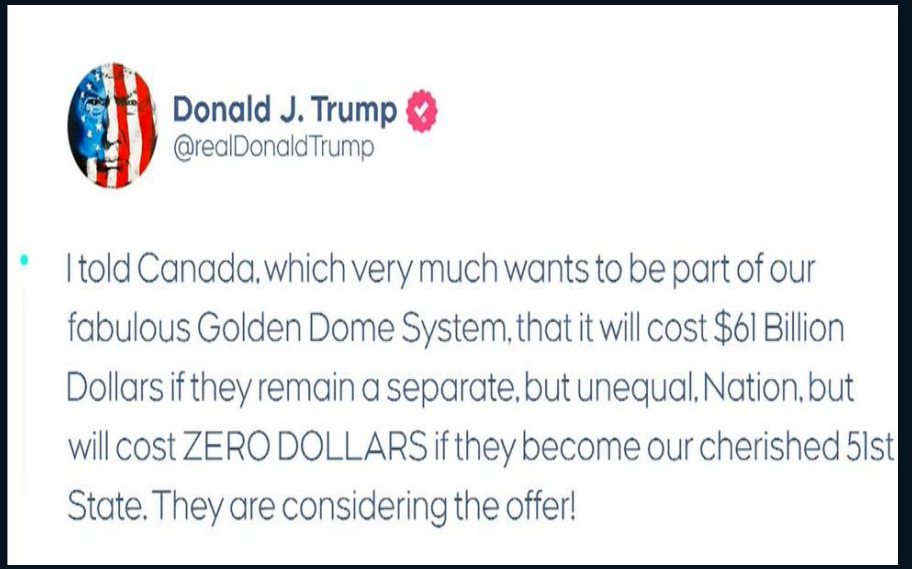
- Quite different from Iron Dome in size, scope, and challenges

How Would the Golden Dome Work?



- Layered missile defense system covering the continental U.S.
  - Defend against ICBMs, advanced cruise missiles, hypersonic weapons
- Multiple interceptor systems, directed energy weapons, space-based sensors
- The architecture:
  - DETECTION: Satellite-based systems to track & discriminate
  - TRACK: AI-integrated tools to connect sensors to interceptors
  - DESTROY: kinetic interceptors (space/sea/land); directed energy weapons

How Much Would It Cost?



- Trump administration estimate, May 2025: $175 Billion

- Congressional Budget Office estimate: $542 Billion
  - Chief of Space Force Operations Gen. B. Chance Saltzman: “I’m 34 years in this business; I’ve never seen an early estimate that was too high. My gut tells me there’s going to be some additional funding that’s necessary.”

- Saltzman: “You don’t buy Golden Dome; you orchestrate a program that includes a lot of programs … it’s a system of systems. [The U.S military will need to decide] “which systems are critical … which ones are affordable, which ones are practical in terms of the technology we can rapidly bring to bear.”

- AEI estimates: $252 billion-$3.6 trillion over 20 years

- Sen. Tim Sheehy, (R-MT), who announced plans to form a Golden Dome caucus, said: “It will likely cost in the trillions if and when Golden Dome is completed.”

When Would It Be Deployed?

- President Trump: system would be “fully operational” by end of his term
- Pentagon: defense weapons ready for demonstration by end of 2028

What Would It Require?

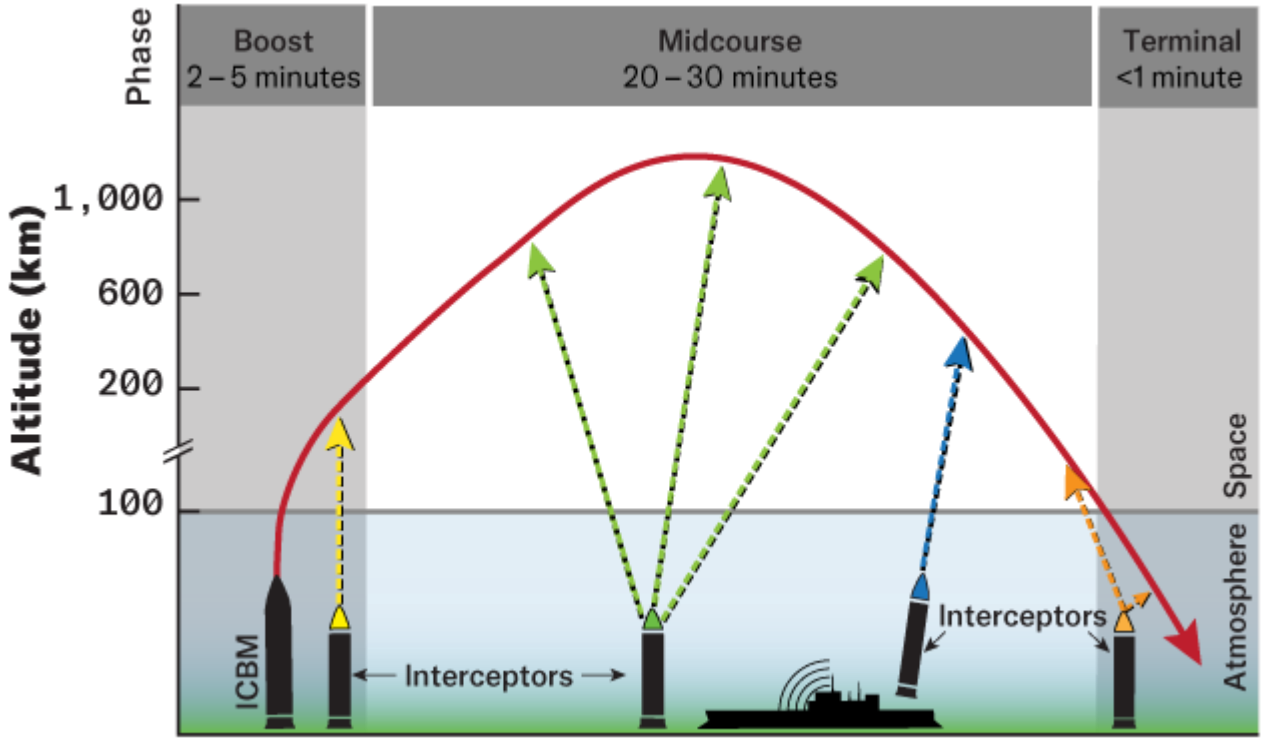
- Golden Dome would have to be ***resilient***
  - “retaining the capability and capacity to perform essential functions and services” and the ability to “rapidly mitigate” the effects of attacks.
  - Degrade gradually rather than catastrophically – continue to defend U.S. homeland even while the system is under attack

- Attacks against system would target battle management, command, control, and communications nodes as well as sensors
  - Kinetic attacks – missiles
  - Cyber warfare
  - Electronic warfare

- Requirements to harden system against these threats would increase both costs and complexity

Critique 1: Feasibility – Can It Be Done?

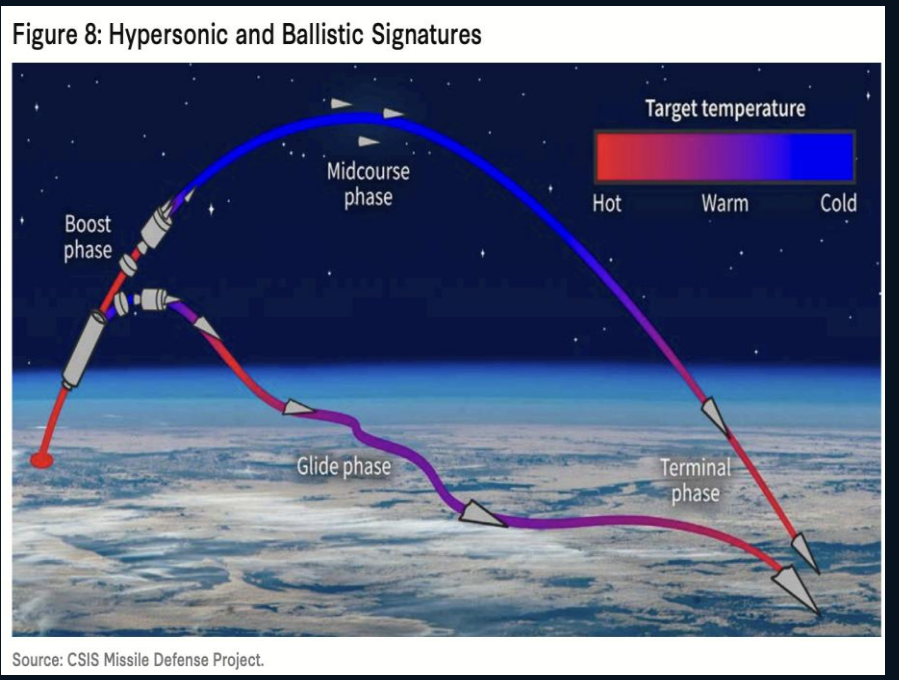
- Intercepting 1 nuclear ICBM is very difficult
  - No system has shown an ability to reliably do this
- Involves hitting a bullet with a bullet
  - An ICBM's speed is about 7 times faster than that of a bullet
- Stages of ICBM flight:
  - Boost phase
  - Midcourse phase
  - Terminal phase
- Protecting American cities would focus on boost & midcourse phase interception



Boost Phase Interception

- Ideal time to intercept a threat, neither warhead nor countermeasures have been deployed
  - Easiest to detect – bright & hot exhaust
- Enormous time pressure, only lasts a few minutes
  - Interceptor must be fired within 1 minute of launch detection
- Necessitates placing interceptors very close to launch sites
  - Interceptor must be within ~500 km of the interception point, but must be far enough from hostile powers
  - Implications for Russia and China
- Space-based boost phase interceptors:
  - Solves proximity problem
  - Would require many, many satellite-based interceptors
    - APS estimates:
      - Protection against 1 North Korean ICBM = 1000 interceptors
      - Protection against 10 North Korean ICBMs = 30,000 interceptors
- Key: Space control - Deny adversary access to and ability to use space

Midcourse Phase Interception



- Several opportunities to destroy missile outside the atmosphere
- Space makes things hard – lack of drag, different objects with different mass will travel in the same way
  - A nuclear warhead will move at the same speed in space as a balloon
  - Discrimination is difficult in the “threat cloud”
- This allows an adversary to employ countermeasures
  - Debris or decoys released alongside a warhead
  - Aluminized mylar ballons mimic radar, infrared, and visible signs of a nuclear warhead
  - Counter-measure technology is well-established, widely available, and relatively inexpensive
- Tracking stations vulnerable to high-altitude nuclear detonations
  - Both planned & incidental
- Aim: Overwhelm the defense system

Midcourse Phase Interception

- Instead of seeking to confuse a defensive system, an opponent could attack them directly
  - Midcourse interception is dependent upon a group of sensors for tracking potential missiles and discerning them from countermeasures
- Short- & intermediate-range missiles could target forward-based radar stations
- High-altitude nuclear detonations could disrupt radar & infrared sensors
  - Proximity fuses

Terminal Phase Interception

- Last opportunity for an interception
- Only lasts about 1 minute
- Decoys would only be eliminated ~10 seconds before detonation
- Terminal-phase interceptors also vulnerable to atmospheric detonations

- Existing systems: Terminal High Altitude Area Defense (THAAD) system, Army PATRIOT system, Aegis BMD Sea-Based Terminal Defense

Critique 2: Strategic Consequences – How Will Others React?

- Nuclear adversaries build more nuclear weapons at a greater level of sophistication to overwhelm missile defense
  - Cheaper than defense system
- Encourage militarization of space
  - Proliferation of space weapons; development of advanced anti-satellite weapons
- U.S. will still need significant nonnuclear and nuclear forces to target opponent's forces in a crisis
- Potential to undermine strategic stability
  - Logic for the 1972 Anti-Ballistic Missile Treaty
  - Potential impetus for an arms race

Could a Golden Dome Make the U.S. Less Safe?

- Stoke the security dilemma
- Weakened deterrence, active launch suppression, and fears of first strikes
- Crisis instability window – period between perceived threat of system deployment and actual deployment
  - Increases incentives for an adversary to initiate a conflict that it would otherwise not engage in

Characteristics of the Crisis Instability Window

- High tension, perception more important than reality
- Risks of both arms racing and preemptive escalation both increase
- Diplomacy and signaling are vital to managing risks, but are also made more difficult by tension, stakes, and potential punishment for being wrong

How Might an Adversary Act During the Crisis Instability Window?

- Rapid nuclear capability development
  - Goal: Overwhelm system & guarantee a secure second-strike capability
- Expand development of missile defense countermeasures
  - Decoys
  - Anti-satellite capabilities
  - Grow cyber and electronic warfare capabilities – not easily distinguished from offensive capabilities
- Shift nuclear doctrine
  - “Use-it-or-lose-it”

What Could the U.S. Do to Mitigate the Crisis Instability Window?

- Signaling and transparency
  - Capabilities, limits, intentions
- Built-in system limitations
  - “Rogue” states
- Arms control

Critique 3: Opportunity Costs

- Prioritizing Golden Dome spending could cause other defense budget items to be underfunded/eliminated or other threats to develop or go unaddressed
- Low-tech or asymmetric threats – drones, cyberattack, terrorism
  - Ukraine & Operation Spiderweb
- Adversary countermeasures create a security spiral
  - Hypersonic weapons, MIRVs, anti-satellite weapons
- Redirect funding from modernization and readiness of conventional forces
- Implications for diplomatic relations
  - With adversaries – shift coercive strategies
  - With allies – potential for decoupling

Alternatives to the Golden Dome

- Arms control agreements & efforts to promote strategic stability
  - Promote transparency & risk reduction
  - Limitations of nuclear capabilities
  - Improved transparency measures, “no-first-use” policies, efforts to reduce risk of misperception
- Regional missile defense
  - THAAD, Aegis, PATRIOT
  - Deal with rogue threat without increasing Chinese, Russian sense of threat
- Strengthen U.S. nuclear deterrent
  - Modernization
  - Survivability
- Prioritize other high-impact threats