

MITCHELL INSTITUTE
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The Need to Modernize the Air Breathing Leg of the Triad

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Challenge: Most USAF triad systems were developed for Cold War-era threat environments



Minuteman ICBM Silos

First built in 1962



Minuteman III

Delivered 1970 - 1977



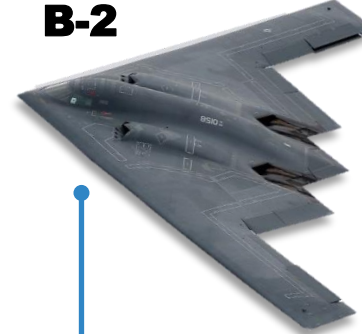
ALCM

Delivered 1980 - 1986



B-1B

Delivered 1984 - 1988



B-2

Delivered 1993 - 2000

- B-52H originally designed to penetrate, now standoff strikes into contested areas
- B-1s conventional missions only
- 20 B-2s: our nation's only stealth long-range strike force



B-52

Delivered 1954 - 1962

1950s

1960s

1970s

1980s

1990s

2000s



1954 Chevy Bel Air



1970 Ford Pinto



1984 Ford Escort



1962 Ford Fusion



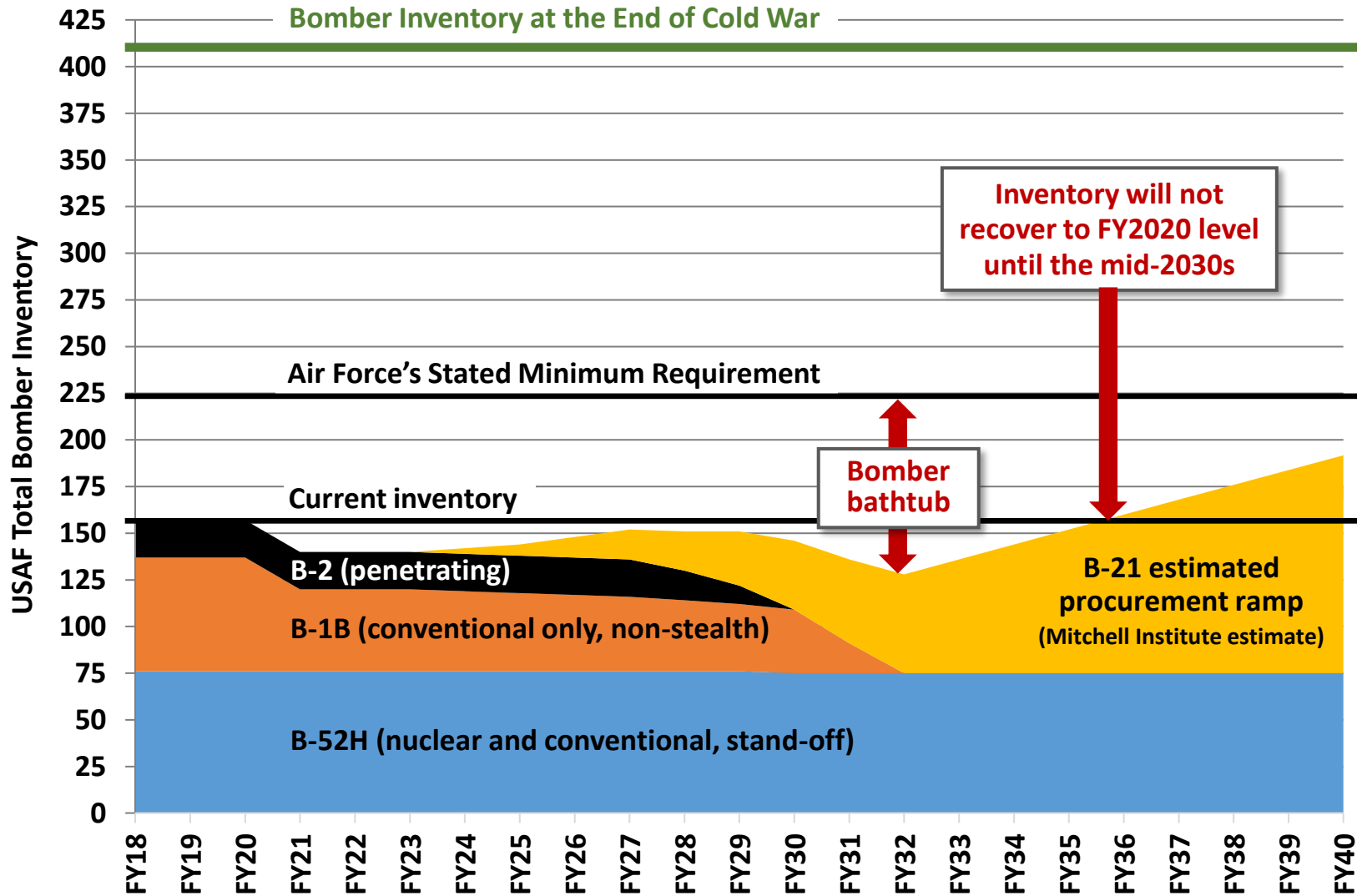
1980 Oldsmobile Cutlass



1993 Ford Probe



Another challenge: the growing bomber inventory shortfall

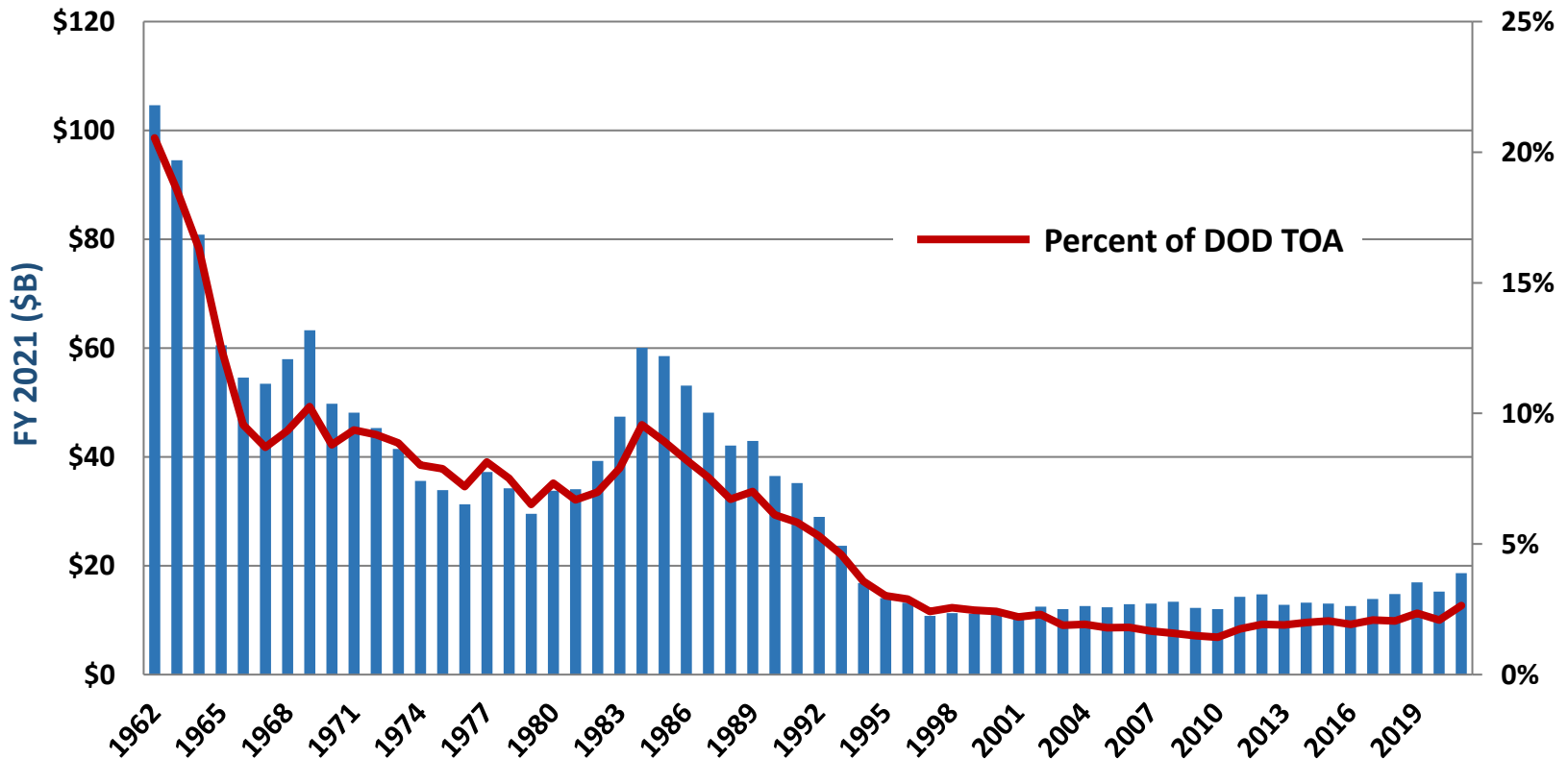




Why force cuts and failure to modernize? Triad seen as a billpayer for decades

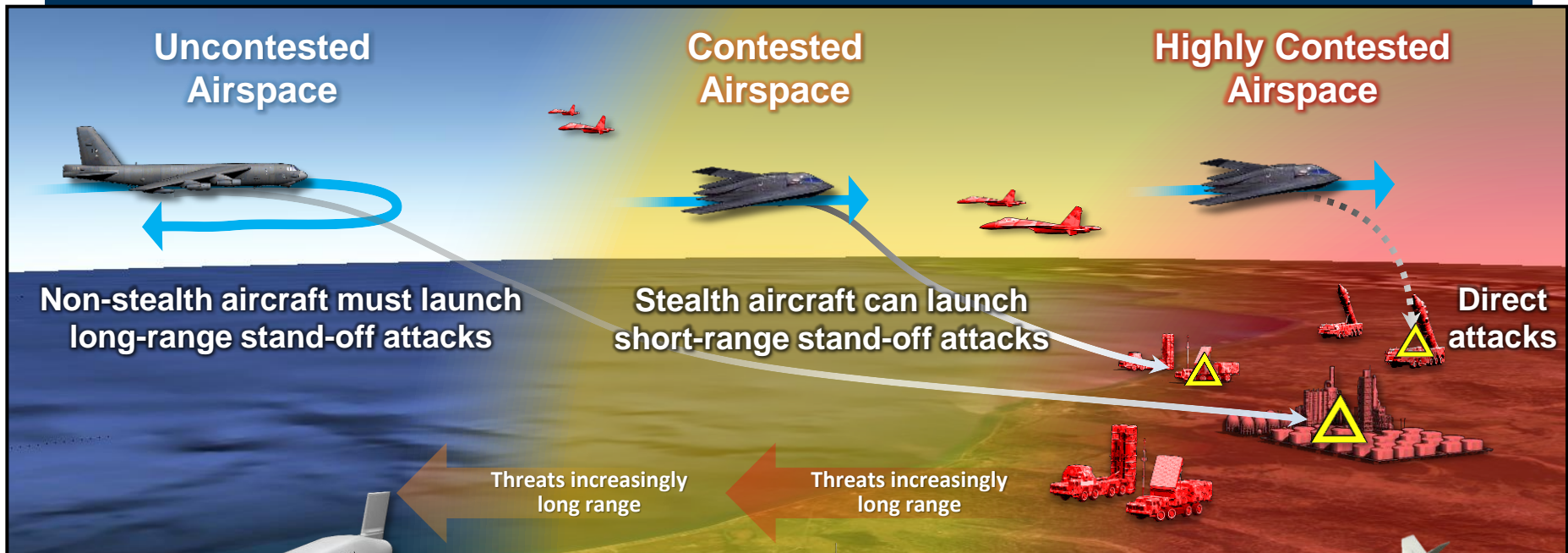
DOD Major Force Program-1 funding for nuclear forces

- FY62: **\$104.6B** in FY21 dollars, or about 20.5% of DoD's TOA
- FY62 to FY90: **\$50.1B** in FY21 dollars, averaged 9.3% of DoD's annual TOA
- FY92 to FY21: **\$14.2B** in FY21 dollars, averaged 2.3% of DoD's annual TOA





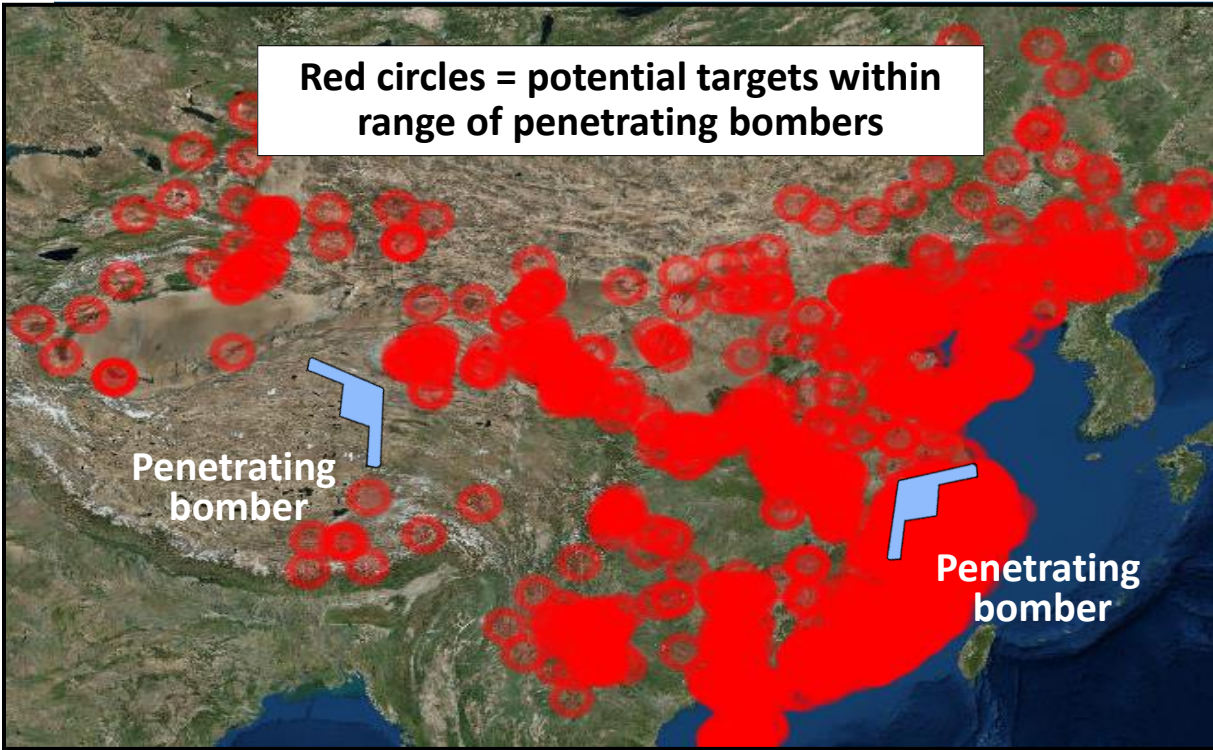
Challenge: Advanced air defenses are increasingly capable against U.S. legacy aircraft and weapons



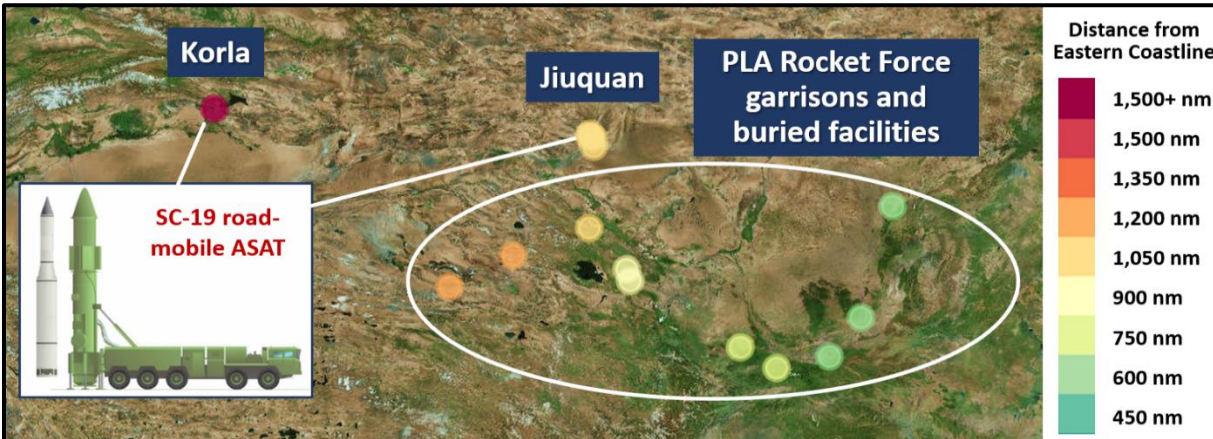
Long-Range Stand-off Weapons	Short-Range Stand-off Weapons	Direct Attack Weapons
ALCM, JASSM-ER, etc.	Joint Standoff Weapon, SDB, etc.	Gravity bombs, JDAMs, etc.
<ul style="list-style-type: none"> • Ranges more than 400 nm • Typically powered to extend range • Enable attacks by non-stealth aircraft from outside contested areas 	<ul style="list-style-type: none"> • Ranges up to 400 nm • Winged/glide capable, may also be powered to extend range • Enables attacks from beyond the most lethal ranges of some point defenses 	<ul style="list-style-type: none"> • Ranges of single digit to low 10s of nm • Weapons are typically unpowered • Must be released close to targets



Challenge: Must plan for target sets that will be very different than in the past



- Target sets will be much larger and more distributed than in the past
- Enemy high-value weapon systems are increasingly mobile or relocatable
- Other targets are hardened or very deeply buried
- Also covered by active and passive air and missile defenses





One reason penetrating bombers are needed: Non-stealth bomber stand-off ranges can affect targets they can attack

If a bomber must stand off 550 nm

60% of aimpoints in range of JASSM-ER-like weapons

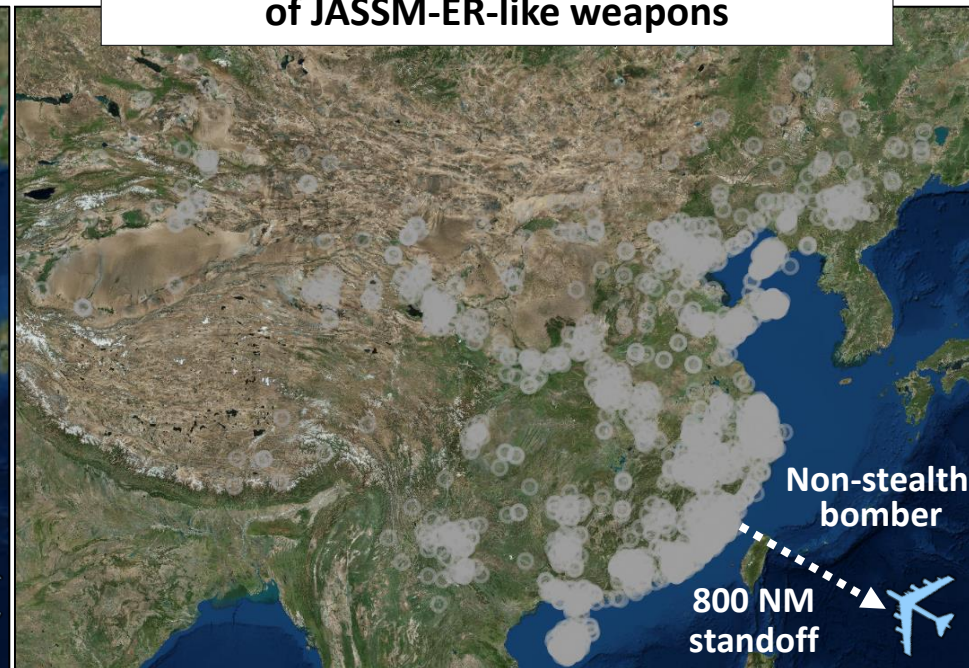


Potential targets not covered:

- Interior C2 nodes
- Ballistic missile sites, bomber bases
- Anti-satellite threats
- Military aerospace industry, etc.

If a bomber must stand off 800 nm

No aimpoints in range of JASSM-ER-like weapons



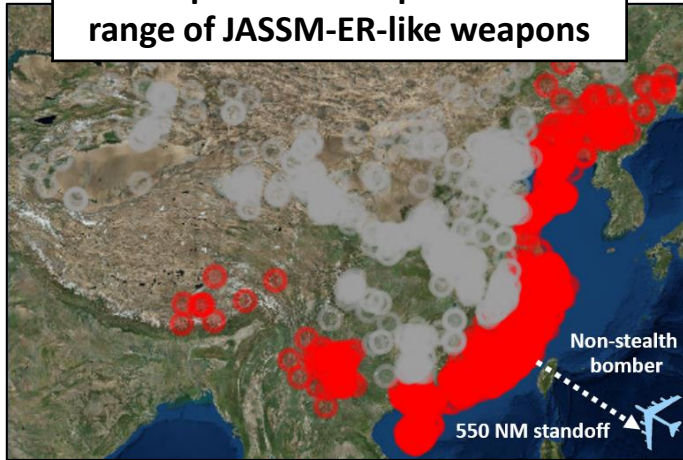
Longer range weapons would help but...

- Increasing weapons range increases weapon size
- Larger weapons = fewer carried per sortie and greater unit costs
- Longer ranges also increases weapon flight times

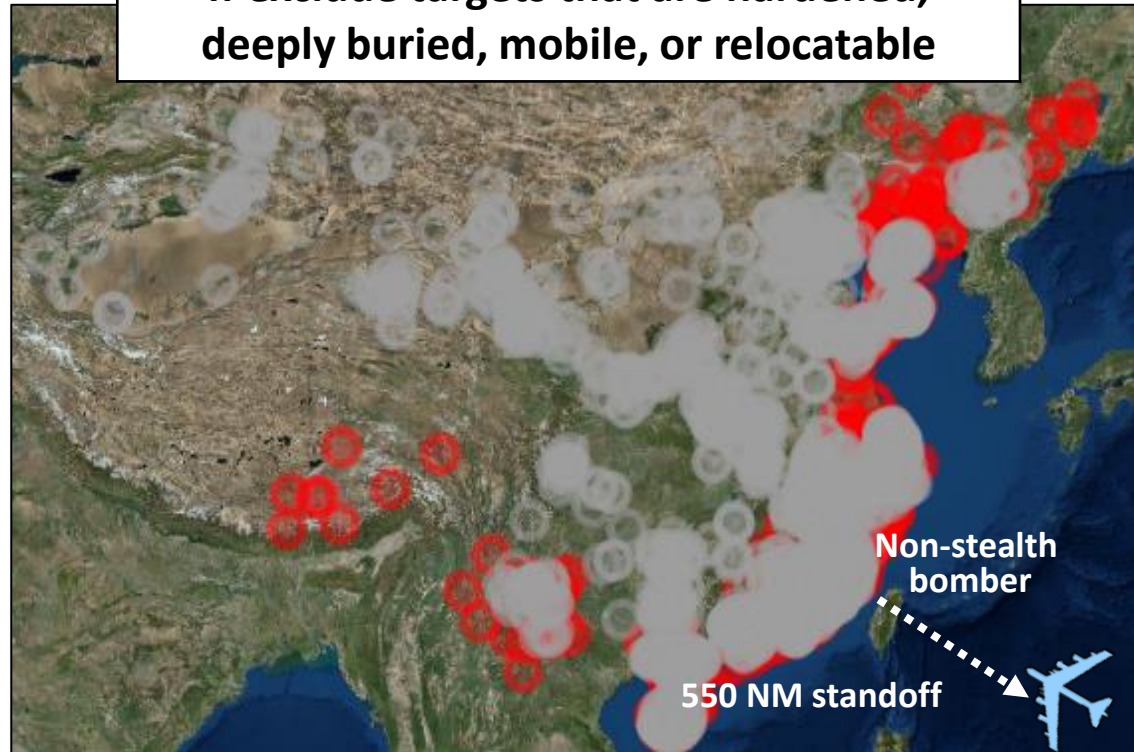


Another reason for penetrators: Enemy countermeasures can reduce the effectiveness of long-range standoff strikes

60% of potential aimpoints within range of JASSM-ER-like weapons



If exclude targets that are hardened, deeply buried, mobile, or relocatable



PLAAF underground hanger



Ballistic missile TEL

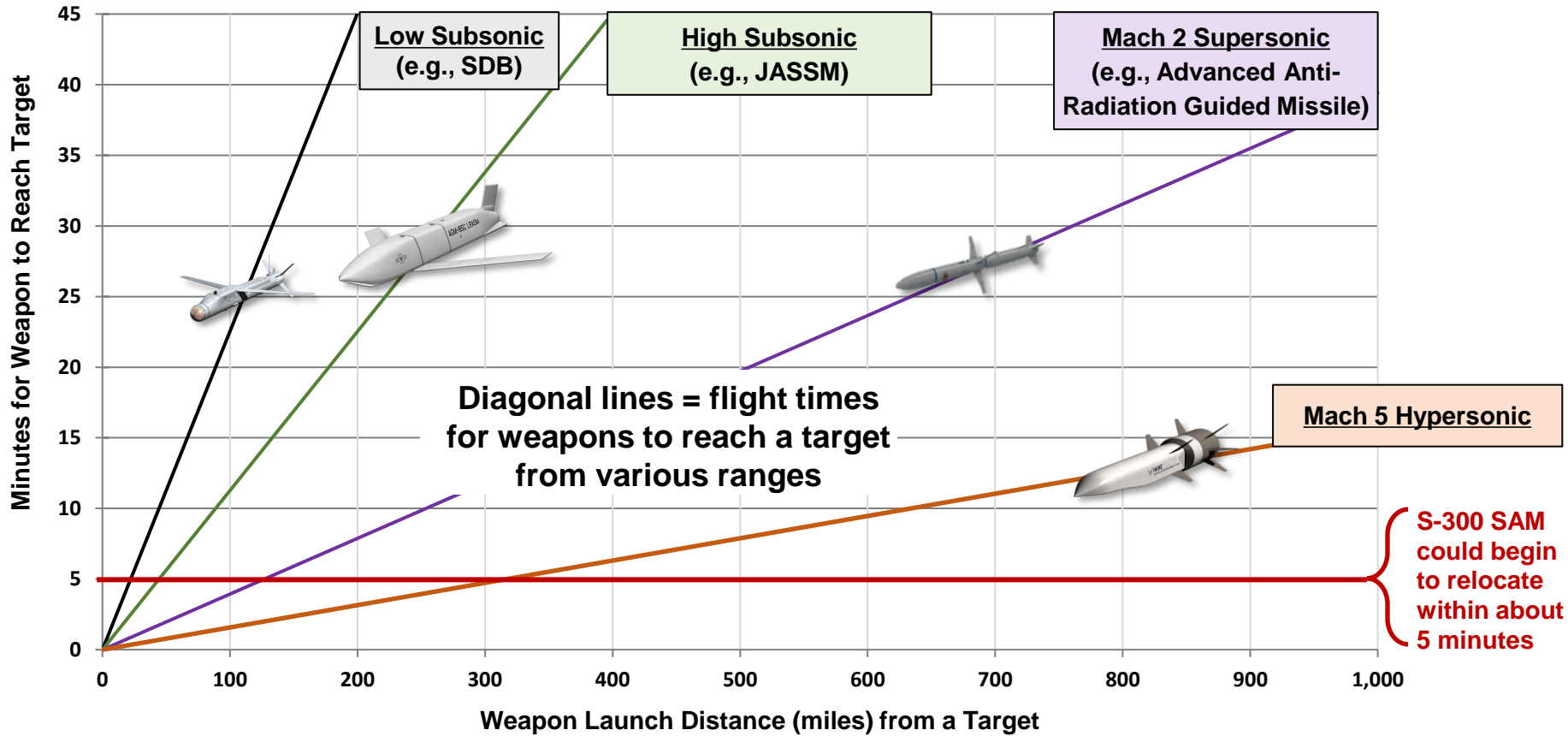


Mobile HQ-9 SAM

- As a rule of thumb, standoff weapons can't carry conventional warheads big enough to penetrate and kill very hard/deeply buried targets
- Kill chain latency can also reduce standoff weapon effectiveness against mobile/relocatable targets



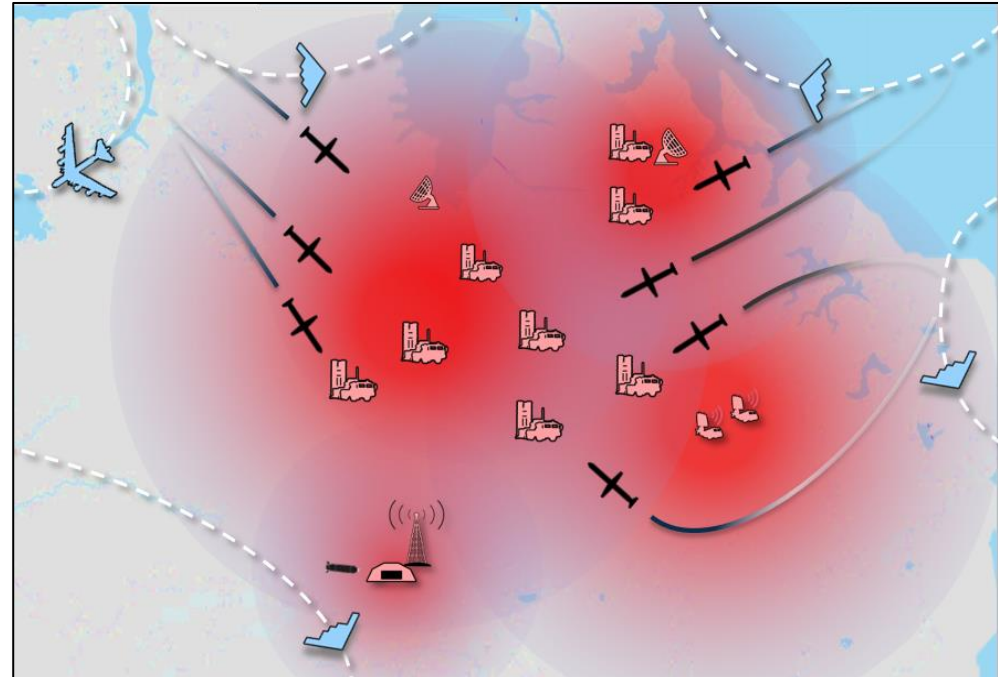
Hypersonic weapons are needed, but kill chain latency will still be a challenge for mobile/relocatable targets





Long Range Standoff weapon (LRSO) critical to maintaining an effective airborne leg of the triad

- **LRSOs will begin replacing AGM-86B ALCMs around 2030**
 - ALCMs originally designed for a ten-year operational life
- **LRSOs are designed to penetrate advanced IADS, operate in GPS denied environments, and hold high-value targets at risk from significant standoff ranges**
- **Not a redundant capability**
 - Cruise missiles enable long-range attacks from multiple azimuths, complicating an enemy's defensive challenges
 - The LRSO will ensure B-52Hs remain a viable part of the triad throughout the bomber's projected service life
 - LRSOs will give B-21s the ability to strike without overflying targets





Cruise missiles are not “destabilizing”

- There is little evidence that cruise missiles were destabilizing during the Cold War
- Bombers with cruise missiles and gravity weapons may be the *most* stabilizing element of the triad
 - Visible means to send signals in crises; for instance, can generate bombers to alert status, disperse the force to other locations
 - Bombers have longer flight times relative to ballistic missiles and can be recalled after launch
 - Cruise missiles can be withheld or retargeted
- China’s and Russia’s acquisition of modern, dual-capable air-launched cruise missiles suggest they may not share this concern

Long sortie durations



Russian Kh-102



Chinese CJ-20



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