

Space Weapons: Good for Us or Bad?

by

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Lynford Lecture

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Why Space Weapons?

- Defensive counter-space
(active protection of space assets)
- Offensive counter-space
(deny adversaries' use of space)
- Global and rapid power projection
Less than 90-minutes (QDR)

Counterspace Operations

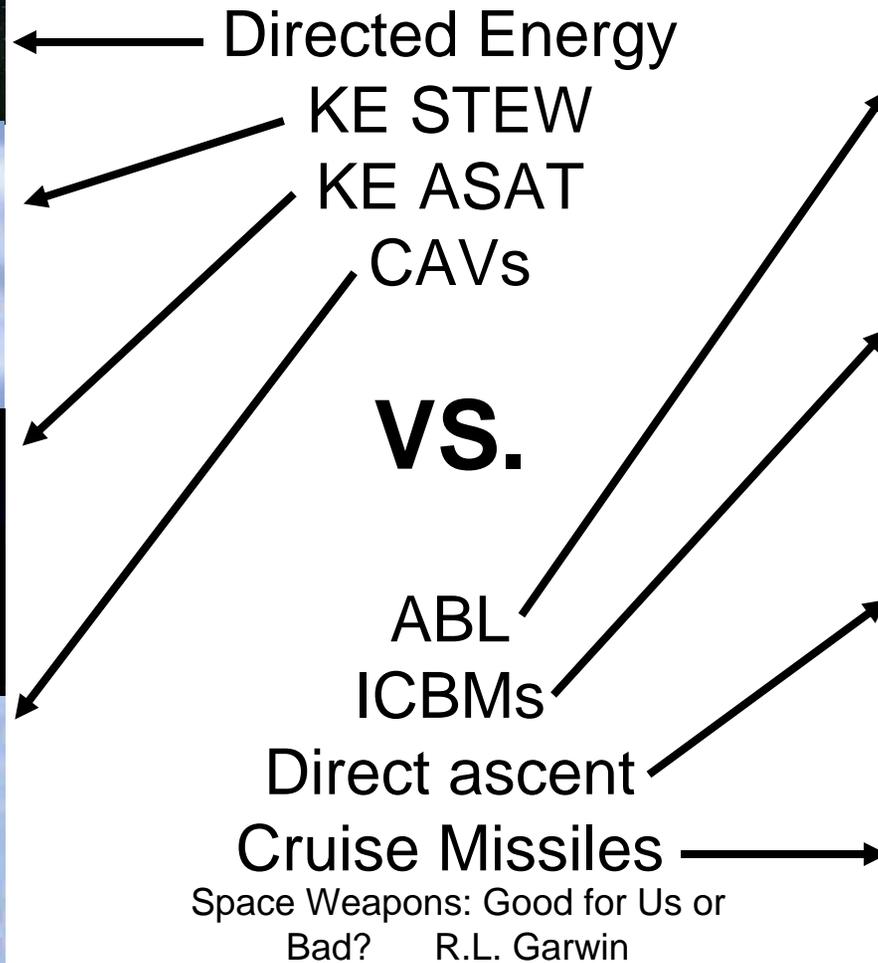
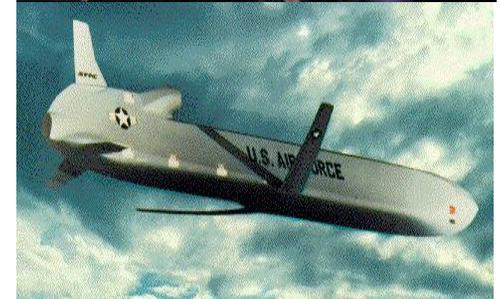
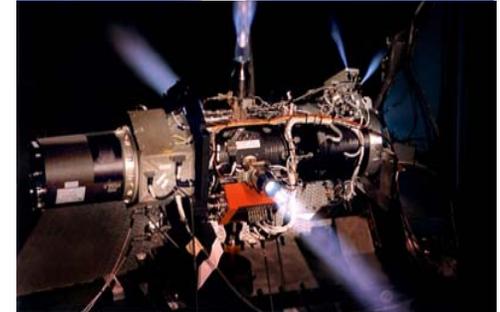
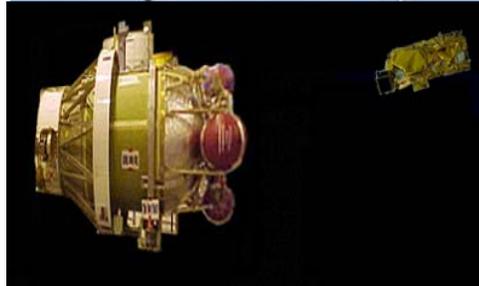
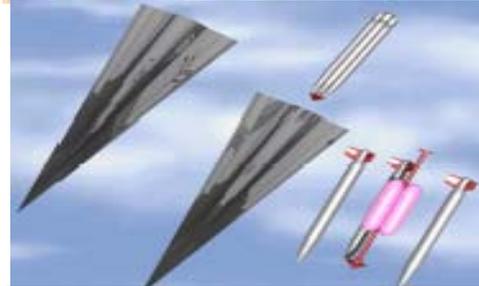
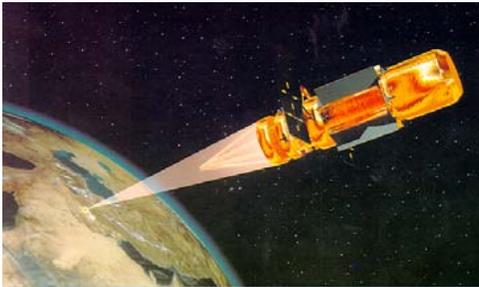


Air Force Doctrine Document 2-2.1
2 August 2004

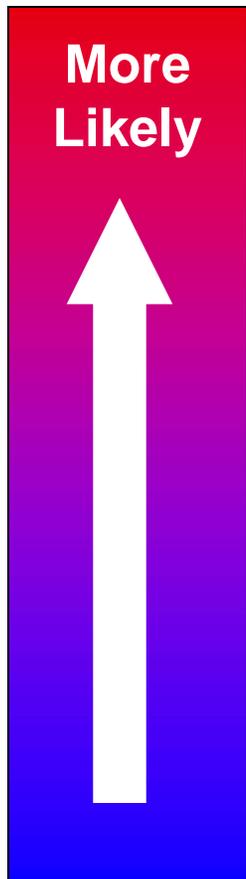
*This document complements related discussion found in Joint Publication 3-14,
Joint Doctrine for Space Operations.*

The United States relies on space operations for its security, and this reliance may make us vulnerable in some areas. Identifying vulnerabilities will allow us to apply our full range of capabilities to ensure space superiority and continued support to joint military operations across the spectrum of conflict. Space superiority is as much about protecting our space assets as it is about preparing to counter an enemy's space or anti-space assets. Counterspace operations, both defensive and offensive, supported by situation awareness, will ensure we maintain our superiority in space. We must protect our space assets. —
General John P. Jumper
Chief of Staff

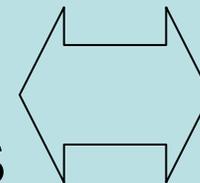
Space vs. Conventional Weapons



Threats to Space Assets

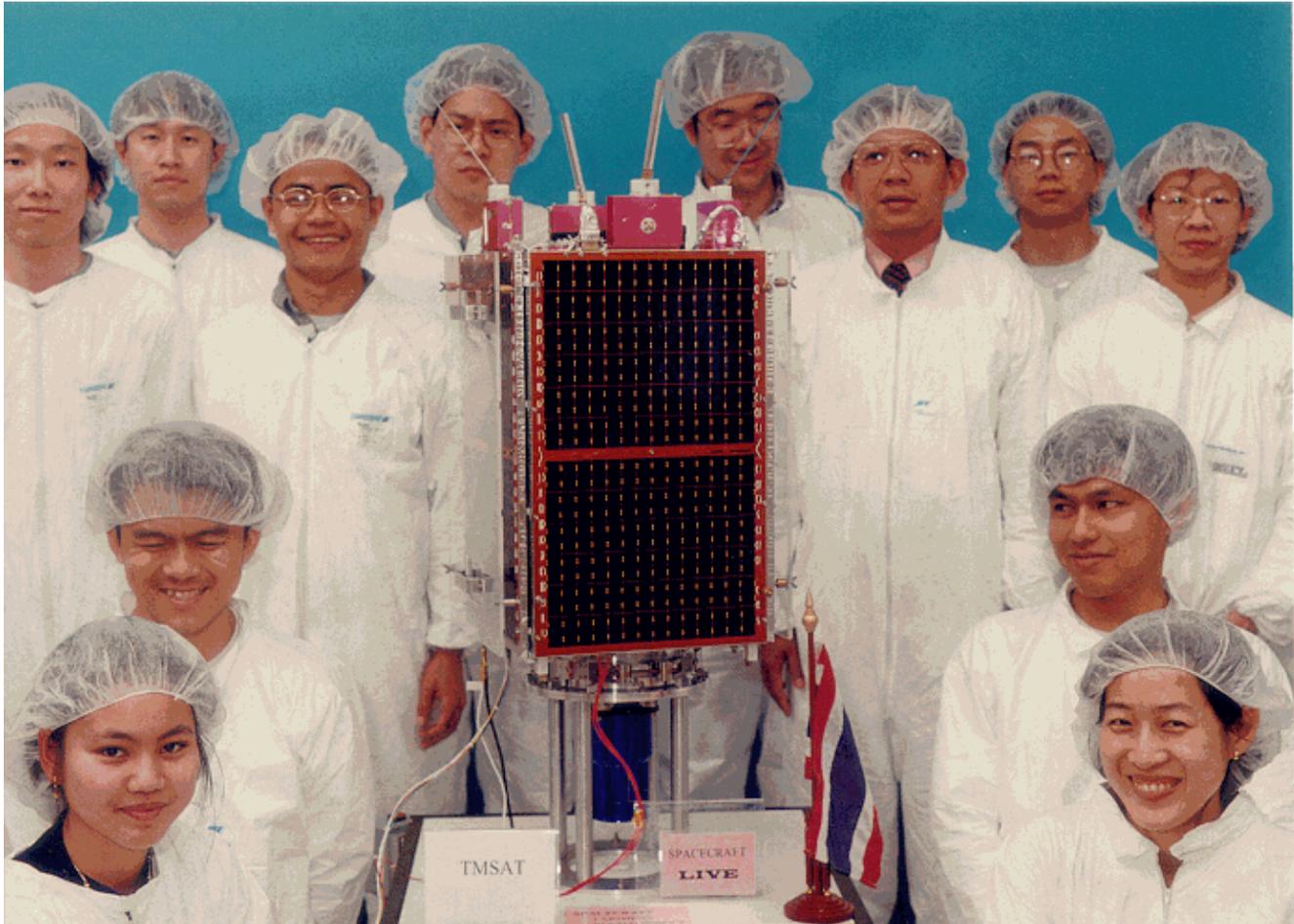


- 1) denial & deception
- 2) electronic warfare
- 3) ground station attack
- 4) sensor blinding
- 5) microsatellites
- 6) direct-ascent interceptors
- 7) nuclear detonation in space



**Space
Weapons
Addressable**

Microsatellite Proliferation



A Non-military cooperative development effort of
Surrey Satellite Technologies and Thailand

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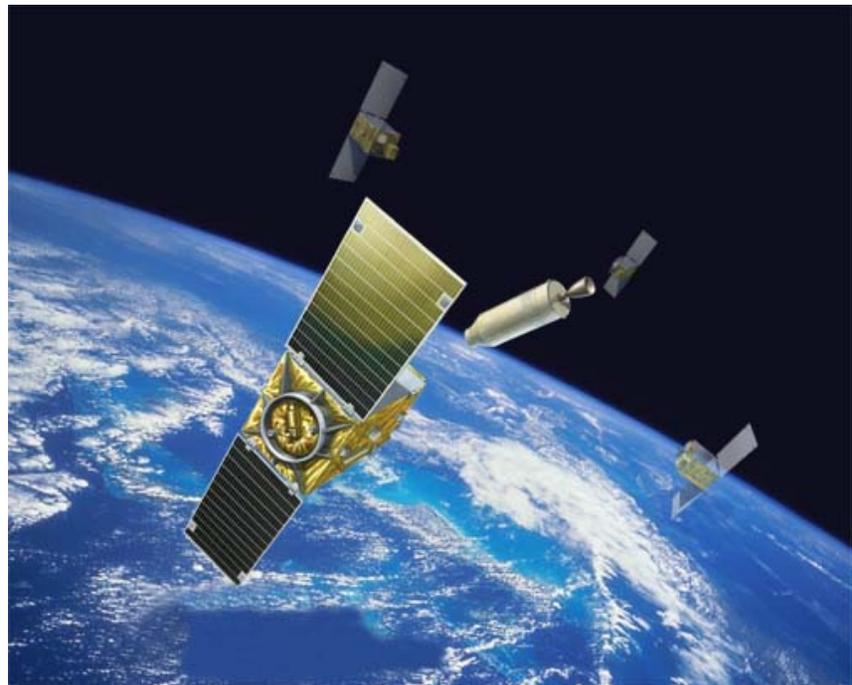
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Microsatellites



A space mine trailing behind a satellite



Four “body guard” microsatellites protecting a satellite

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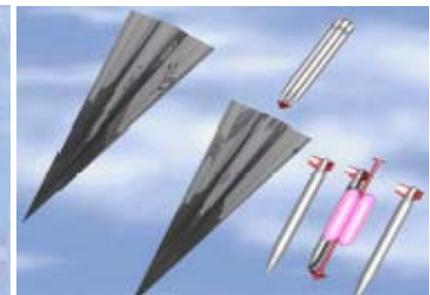
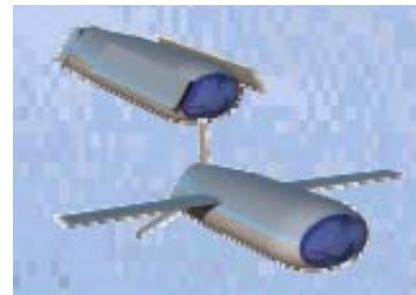
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Force Projection

The three most promising weapons?

- Long Rods
Hard and deeply buried targets
- Common Aero Vehicle
Conventional munitions
- Space-Based Laser
Very rapid force projection

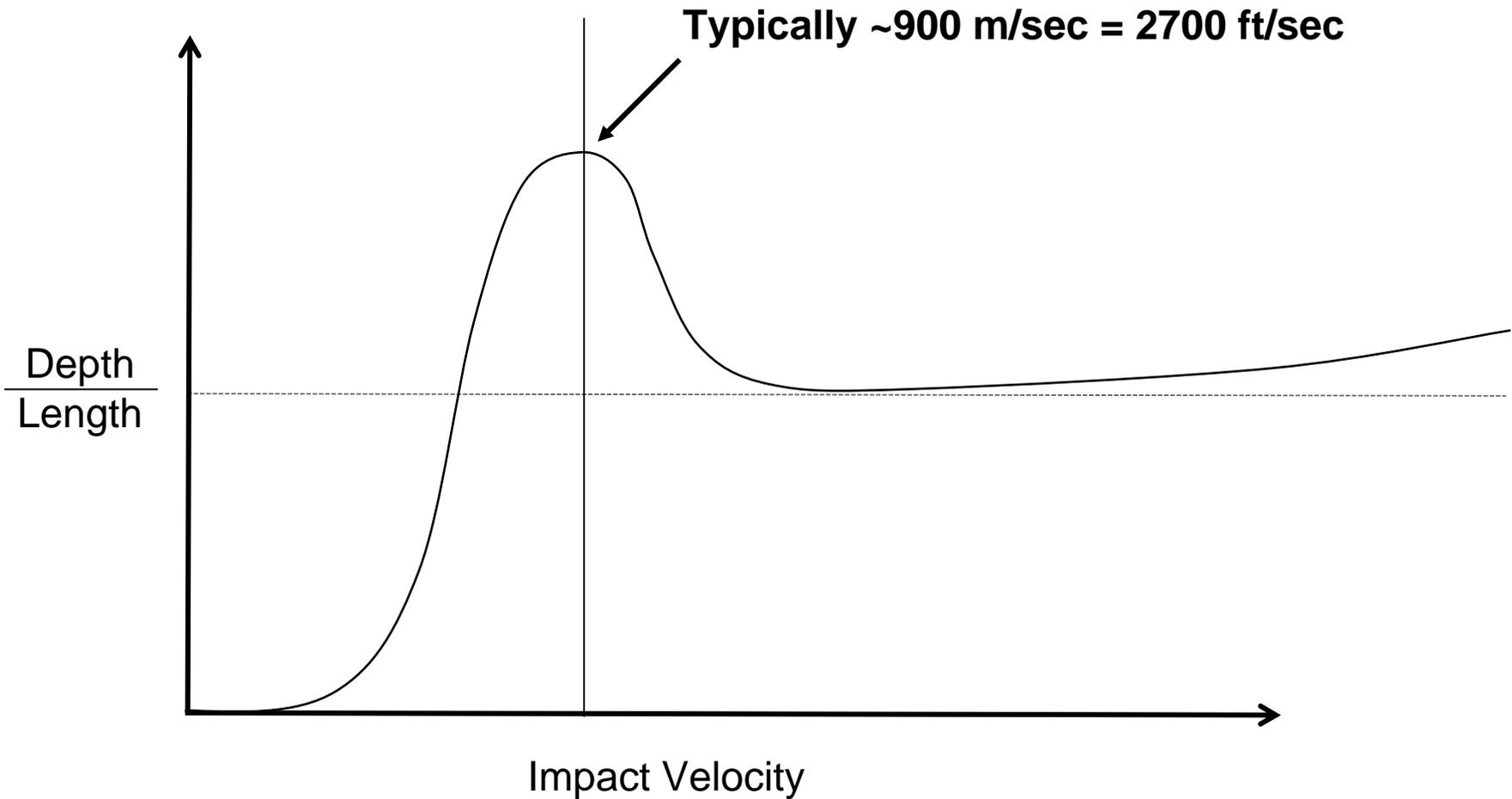


Finite Strength of Penetrator

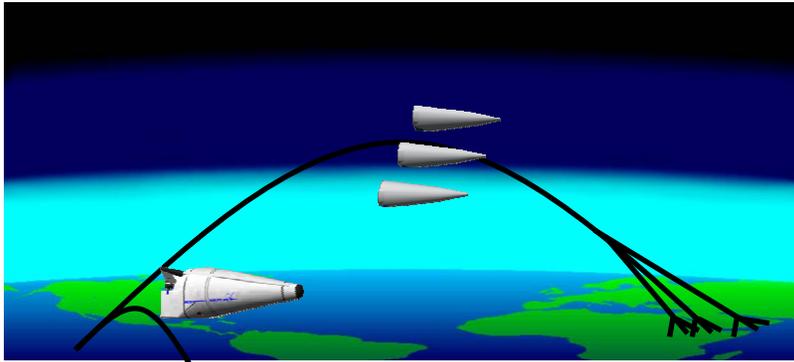


.30 cal. bullet impacting hard steel at 2750 ft/sec

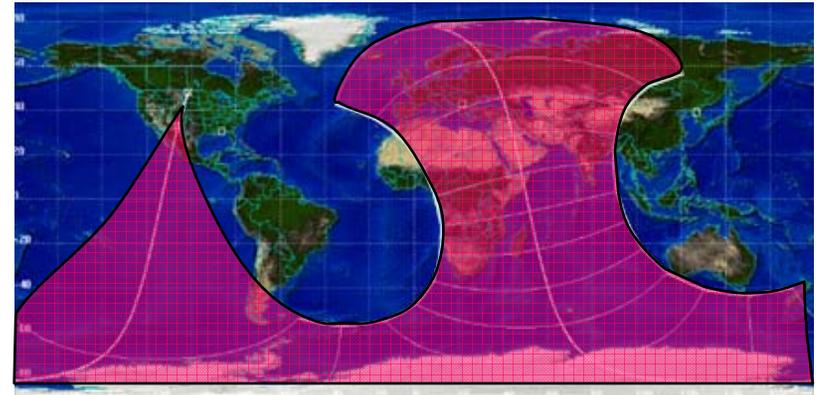
Long Rod Penetration vs. Velocity



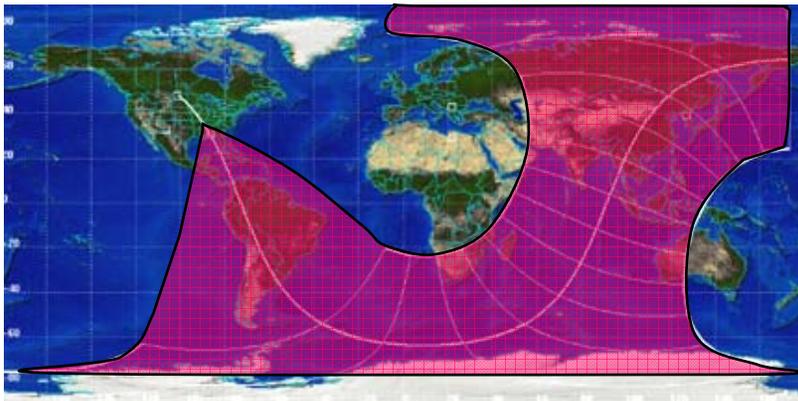
Common Aero Vehicle



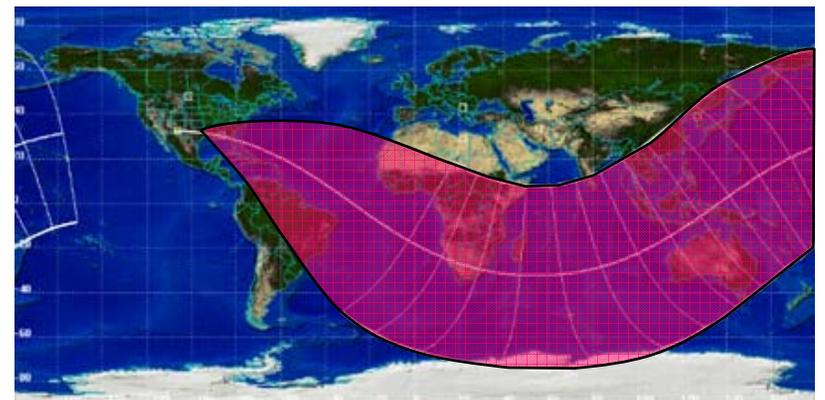
Deployment Configuration



Minot to Holloman



Minot to Eglin



Holloman to Eglin

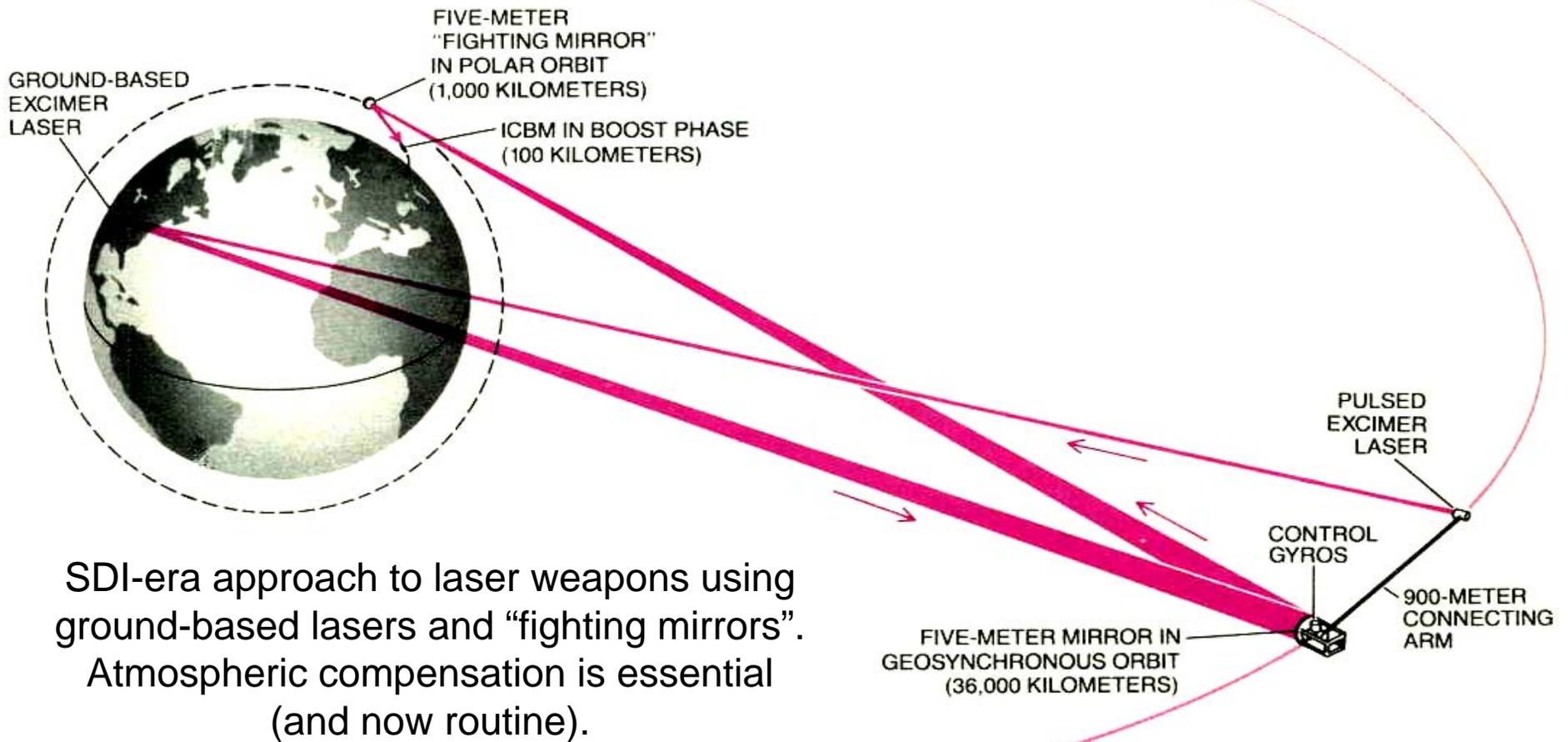
Space Based Laser



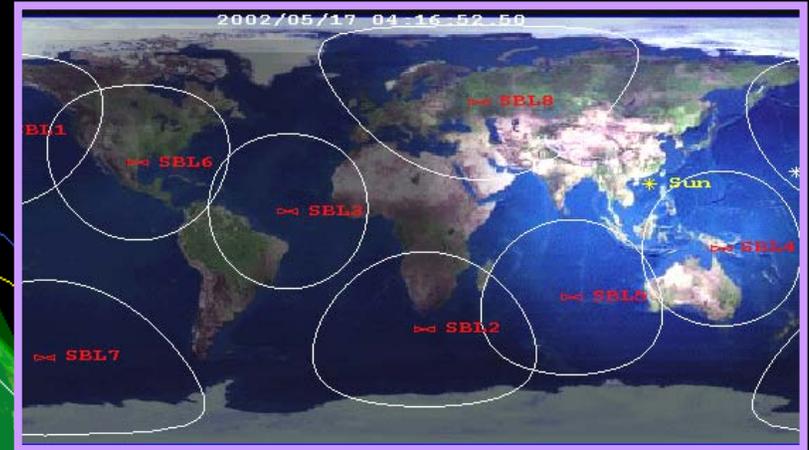
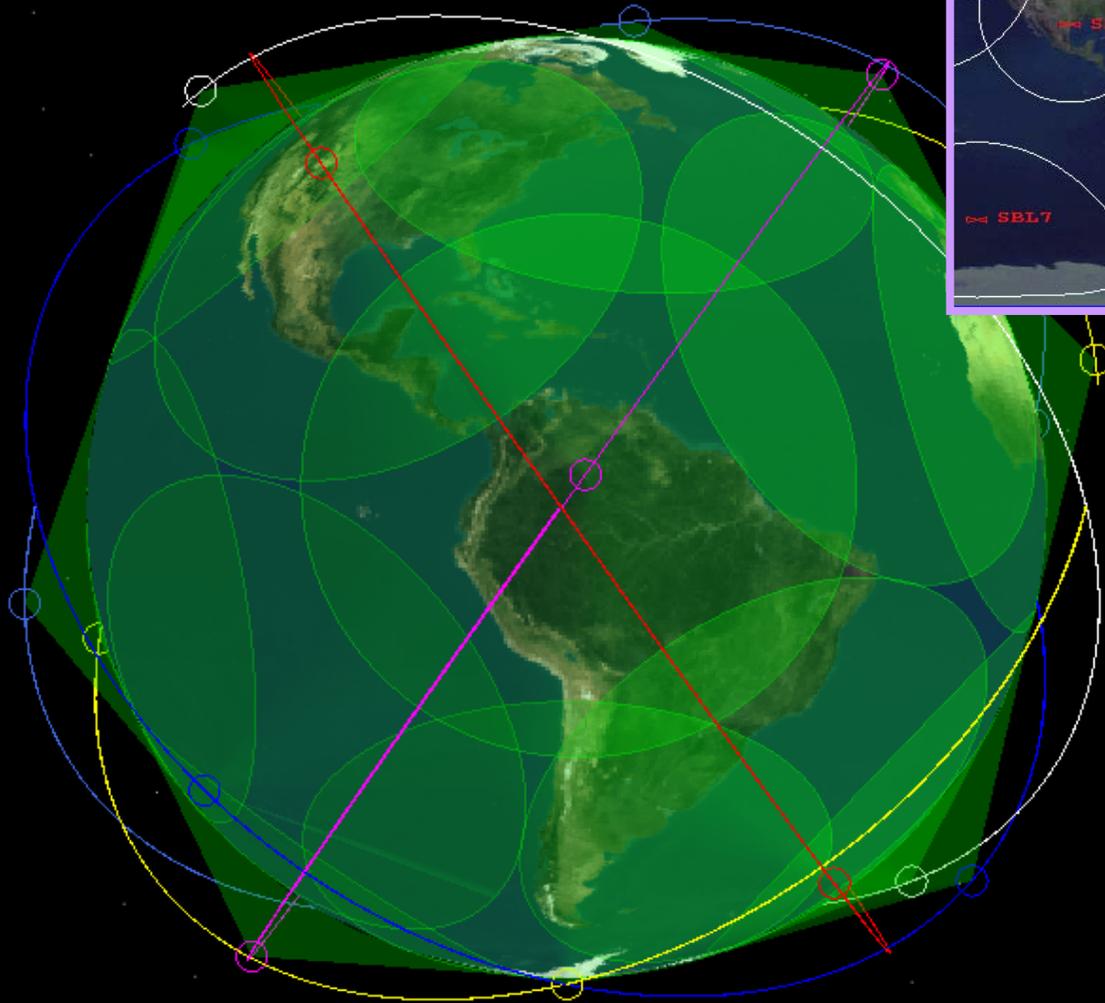
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SBL Constellation



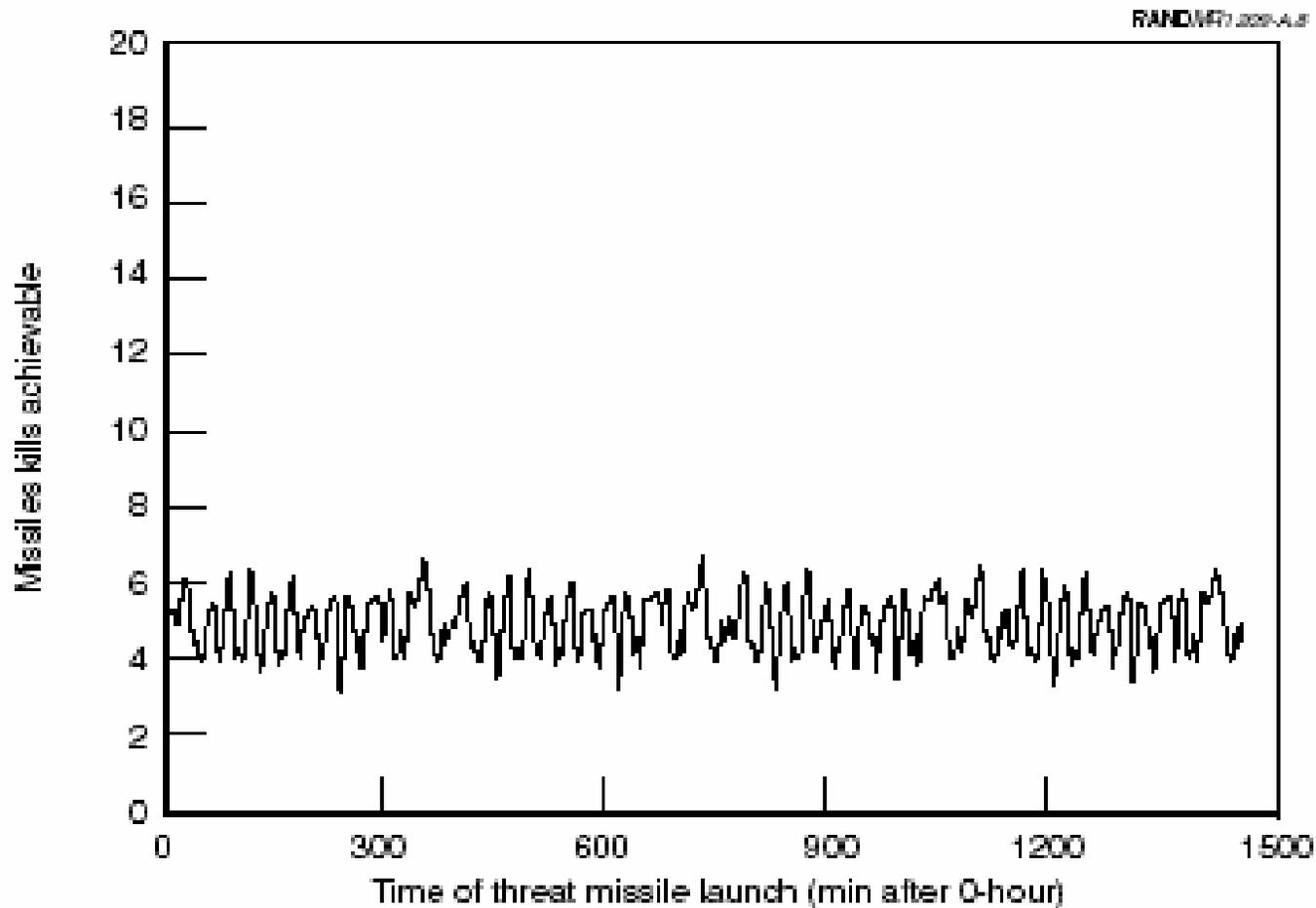
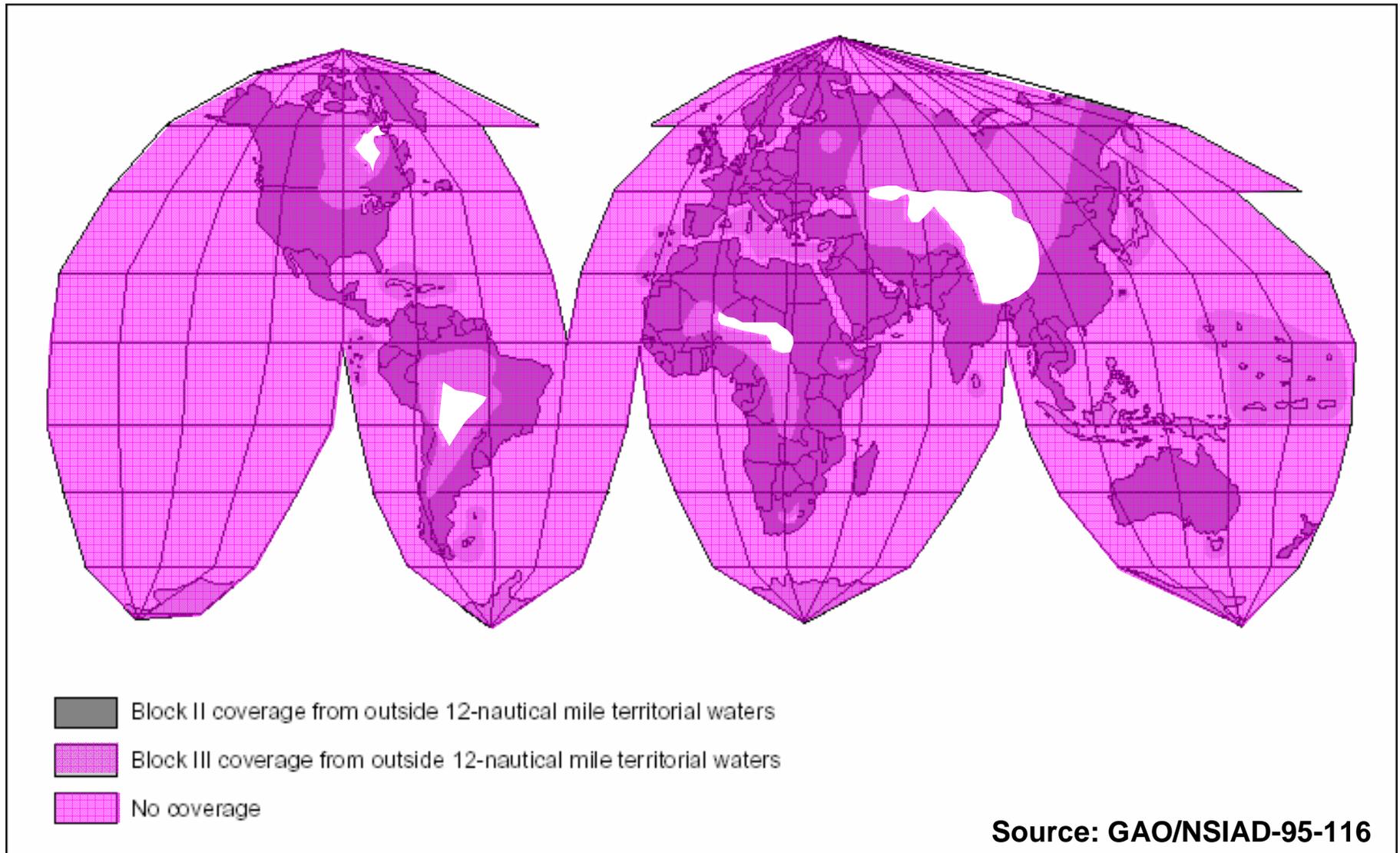


Figure A.8—Space-Based Laser Kill Capacity, Higher-Altitude Constellation

Figure A.8 in Preston, Johnson, Edwards, Miller, and Shipbaugh, *Space Weapons, Earth Wars*. Reproduced with permission.

Cruise Missiles from Int'l Waters



Net judgments on space-weapon utility (1)

- For offensive counterspace—deny military space to others
 - jam uplinks or downlinks (from ground or space)
 - attack ground stations essential to satellite capability
 - obscure line of sight by screens in space
- For defensive counterspace—preserve US military space capability
 - attack ground systems which might be disabling satellites
 - interdict ASAT in powered flight
 - deter by promise of retaliation—not against satellites, but against military and political assets

Net judgments on space-weapon utility (2)

- For destructive antisatellite (ASAT)
 - the most prompt means of destruction is microsatellite-as-space mine, orbiting earth within 10-100m of its quarry
 - short-range missiles lobbing ton-class payloads of coarse sand to orbital altitude at the right time
 - homing kill vehicles as direct-ascent ASAT

The United States can do it best, but others will soon do it well enough

- Global and prompt force projection
 - kinetic-energy (KE) weapons on ICBMs or shorter-range missiles
 - advanced conventional weapons on ICBMs (CAV?), with observation/designation from space, ground, or UAV

Net judgments on space-weapon utility (3)

- Non-space *weapons* will provide more capability *and* sooner than space weapons.
- Destructive ASAT and space weapons are a serious threat to overall US military capability and its dependence on space.

How can US satellite vulnerability be countered?

- Reduce our dependence on satellites while maintaining the benefits of satellites at reasonable cost. Supplement satellite capabilities in wartime by theater resources:
 - High-power pseudolites (on the ground and on UAVs) in the theater of operations so that the adversary would obtain no benefit in theater conflict by destroying GPS satellites.

- UAV and rocket capabilities for imagery. At altitudes of 20-30 km, a 20-cm aperture would have the same resolution as a 2-m diameter mirror at a range of 300 km. Such platforms can provide near-constant presence, as well.

A primary means of reducing vulnerability is to reduce the threat—by agreements not to damage or destroy non-weapon satellites. This should be backed up by US developments to intercept or counter such weapons or ASAT used in violation of such an agreement.

We have found general acceptance of this (conditional) conclusion:

If space weapons and destructive ASAT could be avoided by the United States giving up such capability, it would be in our national security interest to do so.

Asserting a "might makes right" rule in space and elsewhere leads, again, to the asymmetric use of force—perhaps the destruction of critical US satellites in peacetime rather than holding them at risk for future destruction.

Nothing is forever--perhaps not even the regime we favor--so an aggressive campaign to prevent the deployment of weapons by others might best be implemented as a U.S. commitment:

not to be the first to deploy space weapons or to further test destructive antisatellite weapons¹.

This should be supported by a US initiative to codify such a rule and thus to legitimize the use of force against actions which would imperil satellites of any state.

¹ See also Michael Krepon with Christopher Clary, "Space Assurance or Space Dominance? The Case Against Weaponizing Space," www.stimson.org (2003).