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SPACE WEAPONS, THE KEY TO ASSURED SURVIVAL

INTRODUCTION

As a result of congressional efforts to ban U.S. testing of weapons in space[1] and the recent testing of an anti-satellite (ASAT) weapon by the United States, increased attention is being directed to the question of whether the United States should have a space weapons[2] capability. Given the Soviet space weapons and treaty compliance record, along with the benefits to U.S. military security, the continued development of space weapons is in the U.S. national interest. Perhaps more important, a ban on space weapons would prevent the U.S. from deploying defensive space weapons as part of the strategic defense system envisioned by President Reagan. Such a strategic defense system would help protect the U.S. homeland from nuclear attack, reinforce deterrence, protect U.S. conventional forces and satellites from Soviet threats, and help stabilize crisis situations.

The control of space weapons through a negotiated agreement with the Soviets is a flawed idea. First and foremost, an ASAT ban would deny the U.S. the opportunity to develop and deploy the most essential feature of a strategic defense system--a ballistic missile defense (BMD) system. A BMD system would inevitably have ASAT capabilities and would be banned also. The U.S. thus would be locked into reliance on offensive nuclear forces to deter attack, and the threat of almost total societal destruction in a nuclear conflict would remain.

Second, an ASAT ban would not even accomplish what its proponents claim it would, that is, the protection of U.S. space assets. Such a ban would be virtually impossible to verify, and the Soviets' compliance with past arms control agreements is poor enough to suggest that, given the opportunity, they would find ways to circumvent an ASAT ban.

There are, of course, many technological barriers left to cross before the U.S. achieves an effective strategic defense. But the potential benefits of space weapons are far too great--and the present dangers far too real--to bargain away a chance for real security.

BACKGROUND

Soviet long-range, nuclear-tipped ballistic missiles could destroy the U.S. as a viable society in hours, if not minutes. Early in the missile age U.S. scientists recognized the potential of space weapons to shoot down Soviet missiles as they travelled through space in high arcs to targets in the United States. The Eisenhower Administration in 1959 initiated a crash research and development effort, called Project Defender, to develop a multi-tiered ballistic missile defense force with space weapons in the first layer.[3] Although early studies were optimistic about technical feasibility, Project Defender was cancelled in part because the Soviet ICBM threat did not materialize as soon as expected and because the Kennedy Administration wanted to build up U.S. strategic offensive and conventional forces for deterrence.

Since the mid-1960s, the U.S. has based its security against nuclear attack solely on deterrence through retaliation. U.S. thinking about strategic nuclear affairs has been dominated by the view that defending populations against missile attack is not cost-effective. Many opponents of strategic defense also have subscribed to the doctrine of "mutual assured destruction" (MAD), which holds that to deter nuclear war the U.S. and the Soviet Union must have the capability to inflict "assured destruction" (massive civilian casualties and economic devastation) on each other. According to MAD, defending populations is bad, because it would upset the "balance of terror" and be perceived as a threatening bid for nuclear superiority by the other side. The result: a futile arms race and increased tensions between the superpowers. Under the sway of MAD, the U.S. government abandoned plans for a nationwide anti-ballistic missile (ABM) system in the mid-1960s, virtually dismantled U.S. civil and air defenses, and in 1972 signed a treaty with the Soviet Union limiting deployment of ABM systems to two sites (later reduced to one), thereby foreclosing the option of population defense.

Changes in the decade and a half since anti-missile defenses were rejected, however, are sufficient to warrant a reappraisal of strategic defense. Science has made tremendous breakthroughs on many fronts. A 1983 study by a group of top scientific experts (the Defense Technologies Study Team) concluded that technological advances of the last 25 years and those anticipated in the next 10 years make space-based ballistic missile defense feasible even against sophisticated Soviet countermeasures.[4] Advances in ground-based missile defense technology and anti-bomber/anti-cruise missile technology also have been considerable.

The strategic need for population defenses is far greater today than in the mid-1960s. The Soviet Union has never accepted U.S. views of deterrence, which stress the need for mutually secure second-strike forces. In accordance with its explicit nuclear war-winning strategic doctrine,[5] the Soviet Union has deployed a large force of very powerful land- and sea-based ballistic missiles. Using less than one-half of its total force, the USSR could destroy in a first strike up to 90 percent of America's silo-based ICBMs, 70 percent of the U.S. strategic bomber force, 40 percent of U.S. missile firing submarines, and key components of the U.S. command and control structure essential for effective retaliation.[6]

Soviet Strategic Defense

The Soviets also have invested heavily in strategic defenses to protect vital Soviet military, economic, and political assets from whatever retaliation the U.S. could muster after a Soviet first strike. Soviet air defenses, for example, comprise 2,500 interceptor aircraft, 10,000 surface-to-air missiles (SAMs), and 5,000 radars--which are being upgraded with new interceptors with look-down/shoot-down radars and missiles, new SAMs, and airborne warning and control aircraft (AWACs) to defend against low flying U.S. bombers and cruise missiles.[7] The Soviets spend about $3 billion a year on civil defense programs, which are capable of reducing Soviet civilian casualties to World War II levels under certain conditions.[8] (Congress appropriated $169 million for U.S. civil defense in FY 1984.)

The Soviet Union signed the 1972 ABM treaty not because Soviet leaders agreed that populations should remain defenseless but, more likely, because they wanted to prevent the U.S. from protecting its ICBMs and other strategic assets from a Soviet attack.[9] Since 1972, the Soviet Union has energetically pursued ABM research and development--the U.S. dismantled its one ABM site in 1976--and is currently upgrading its ABM system around Moscow with new radars and interceptors.[10] Some of the upgrades violate the 1972 ABM Treaty. Reportedly, the Soviet Union has built facilities for mass production of ABM system components that would give the USSR the capability for rapid deployment of a nationwide ABM system.[11]

The Soviet Union is also developing ground- and space-based directed energy weapons (lasers and particle beams)[12] for destroying U.S. ballistic missile warheads. According to the Defense Department, the USSR is spending three to five times more than the U.S. on research and development of laser weapons and could deploy the world's first orbiting laser weapon satellite in the next five years,[13] thus providing valuable operational experience for a multi-platform space missile defense system that could be deployed around the turn of the century.[14] The Soviets are already conducting tests of pointing and tracking mechanisms for laser weapons[15] (similar U.S. experiments are not scheduled until 1987) and apparently have test fired an experimental ground laser weapon located at Sary Shagan against Soviet reentry vehicles.[16]

Thus, it is clear that the unrelenting offensive buildup by the Soviets jeopardizes the survival of American nuclear deterrent forces. The Soviets' defensive measures have further degraded the effectiveness of the U.S. deterrent and their continued research, development, and production confront the U.S. with the disconcerting possibility of a rapid expansion of Soviet defensive capabilities and a potentially decisive Soviet strategic superiority.

BENEFITS OF U.S. SPACE WEAPONS

Why Strategic Defense?

To offset Soviet advantages in the strategic nuclear balance, the U.S. must enhance the survivability of its offensive nuclear forces and improve their capability to threaten important Soviet military targets. To maintain U.S. security in the long run, however, requires a fundamental change in the U.S. force posture: deployment of defense systems to protect the U.S. homeland from nuclear attack.

There are at least four strong arguments for the development of a strategic defense capability:[17]

1) Strategic defense would bolster deterrence by denying the Soviets the ability to destroy U.S. retaliatory nuclear forces and other U.S. economic and military assets. With less certainty of success, the Soviets would be less inclined to attack, even in crisis situations.

2) Strategic defense would more effectively deter the Soviets from limited nuclear aggression against U.S. allies. By defending the U.S., the credibility of an extended U.S. nuclear umbrella could be improved. The confidence of U.S. allies in U.S. ability and will to assist in their defense would also be restored.

3) Strategic defense would limit the danger of accidental nuclear war. Additional reaction time for leaders would be provided. Accidental launches, rather than detonating on U.S. soil, would be destroyed, thus lessening the chances of escalation.

4) Strategic defense is specifically intended to save lives and limit damage. Given the potentially catastrophic consequences should deterrence fail, such an approach is eminently practical and profoundly more moral than current strategic doctrine which relies heavily on mutual assured destruction.

Space weapons would play a critical role in a strategy of U.S. homeland defense, the key to which is to deploy multiple layers of defense. As Soviet missiles passed through each defense layer, fewer and fewer would survive, thus making the task of defense easier and more effective for each successive layer. It is important to attack Soviet missiles as soon as possible to allow

for multiple defense engagements and to destroy missiles before they disperse their multiple warheads. An effective strategic defense force posture, then, should include space-based anti-ballistic missile weapons capable of destroying Soviet missiles in their vulnerable boost phase (the first few minutes of flight) and space- or ground-based weapons capable of destroying missiles during their gliding stage in space.

The Soviet ASAT Threat

In addition to their contribution to strategic defense, space weapons could help protect U.S. satellites from a growing Soviet ASAT threat. The U.S. depends heavily on satellites for a number of military functions--communications (over 70 percent of U.S. overseas military communication travels by satellite), surveillance, reconnaissance, navigation, and meteorology. This dependency is increasing. Of particular importance to U.S. security are those satellites supporting the U.S. nuclear deterrent forces by providing command, control, and communications channels, early warning of Soviet missile launches, tracking of missile flight paths, damage assessment, and post-attack reconnaissance. These functions are critical for planning and executing controlled retaliatory nuclear strikes against strategically vital Soviet targets (such as nuclear missile silos, command bunkers, and centers of political control). As the Scowcroft Commission and nuclear strategists in both Democratic and Republican administrations have recognized, the capability to reply in kind in a controlled war to the full spectrum of possible Soviet nuclear attacks is essential for stable deterrence.[18]

Destruction of U.S. command, control, and intelligence satellites in a surprise first strike to paralyze U.S. strategic nuclear retaliatory forces seems to be a high priority in Soviet war plans.[19] A large-scale 1982 Soviet nuclear war exercise,[20] for example, commenced with a simulated attack on a U.S. strategic satellite by a Soviet ASAT system--the only ASAT system currently operational.[21] This system consists of a "killer satellite" launched from a variant of the SS-9 Scarp ICBM into a co-planar, intersecting or near orbit to the target.[22]

Two versions of the Soviet ASAT system have been tested: a radar guided satellite that explodes on command near the target; and an infrared guided system that fires pellets at the target. The capability of the Soviet orbiting ASAT system is limited but not insignificant. Although the infrared system has not yet been tested successfully, the success rate of the radar system is 70 percent. Only a few launch pads are dedicated to the ASAT mission, and the Soviet ASAT system is effective only against U.S. satellites orbiting below 900 miles, primarily reconnaissance satellites. On the other hand, the Soviets are modifying their huge SL-12 booster to launch "killer satellites" against U.S. early warning and communications satellites in high orbit,[23] and they may be able to modify their ASAT weapon to perform multiple kills and to function as a space mine.

The USSR is also developing and testing ground- and space-based directed energy and conventional weapons for attacking U.S. satellites in all orbits. Launch of a Soviet prototype orbiting laser ASAT weapon is expected within the next five years, with perhaps six orbiting laser ASAT platforms deployed by 1990.[24] In April 1981, the Soviets launched a large 15-ton maneuvering spacecraft, Cosmos 1267, which reportedly "carried ejection ports for small infrared homing torpedoes capable of destroying military satellites on impact."[25]

U.S. Space Weapons and the Defense of U.S. Satellites

Ensuring survivability of U.S. satellites against Soviet ASAT weapons poses a major challenge to U.S. defense planners. Four methods of enhancing the survivability of U.S. satellites have been discussed: (1) a treaty banning the testing and deployment of ASAT weapons; (2) use of passive survival aids; (3) deployment of U.S. ASAT weapons to deter Soviet ASAT attacks; and (4) deployment of a space defense system to defend U.S. satellites.

An ASAT weapons ban is not the solution to the problem. Because ASAT weapons tend to be small, easy to hide, and easy to disguise, verification of such a treaty would be most difficult.[26] And lack of Soviet compliance with existing arms control treaties raises serious doubts about their compliance with an ASAT treaty.

There are a number of "passive" measures by which the U.S. could enhance satellite survivability, some of which the U.S. government is already funding.[27] Using a wide variety of such measures, the U.S. could probably ensure a high degree of survivability for its satellites against current Soviet ASAT capabilities. The effectiveness of passive measures against later generation ASAT weapons, however, is uncertain.[28]

Trying to deter a Soviet attack on U.S. satellites by deploying a U.S. ASAT system to threaten Soviet satellites (survivability through deterrence) is probably not the solution to U.S. satellite vulnerability. The Soviets are less dependent on satellites for military operations than is the U.S. and, hence, might find it militarily worthwhile to sacrifice their satellites for those of the United States.[29]

In the absence of an ASAT ban, the U.S. could use space missile defense weapons to help protect U.S. satellites against Soviet ASAT attacks. U.S. laser missile defense weapons, for example, or even the new unsophisticated U.S. ASAT weapons just tested could be used to shoot down Soviet space mines. A ballistic missile defense would also improve the survivability of the vulnerable ground installations, which control many U.S. satellites.

In the final analysis, if the U.S. cannot ensure an adequate level of survivability for its satellites at an affordable cost, it may have to rely on more survivable atmospheric systems to perform those functions now performed by satellites. As John

Pike, space analyst for the Federation of American Scientists, has pointed out:

> Surrogate satellites offer a very attractive survivability option. Indeed, the most survivable "satellite" may be an airplane. High Altitude Remotely Piloted Vehicles can provide excellent in-theater weather and reconnaissance information, and a network of these drones could provide theater and transoceanic communications links.[30]

In short, even if U.S. satellites cannot be adequately protected by passive and active measures, there remain ways to ensure that U.S. armed forces can still successfully perform their military missions.

Space Weapons and U.S. Nuclear Force Survivability

Under current conditions, even more than satellites, many ground- and air-based elements of the U.S. strategic deterrent force--satellite tracking and control facilities, airborne and underground command posts, ground-based communications receivers and transmitters, radars, strategic bomber bases, and land-based ICBMs--would suffer extensive damage from a Soviet first strike. U.S. nuclear forces probably would be left blind, paralyzed, and seriously weakened, significantly impairing U.S. ability to implement its nuclear strategy of controlled limited nuclear counterstrikes against Soviet strategic forces. To some extent, passive measures could increase the survival chances of the U.S. nuclear force. Examples: ICBMs could be redeployed in a mobile or multiple protective shelter mode; communication systems could be hardened against nuclear effects, made mobile, or supported with redundant systems. Yet passive measures might not offer enough protection.[31] Active defenses, including weapons to intercept Soviet missiles in space, could substantially enhance strategic force survivability against present and future Soviet first-strike threats. At the minimum, space weapons would complicate Soviet planning for a first strike. The Soviets would not be able to foresee which of their missiles would be destroyed and which of their targets would consequently escape destruction. Adding to Soviet uncertainties clearly enhances deterrence.

Space Weapons and Conventional Force Survivability

The Soviets deploy spacecraft that pose serious threats to U.S. military forces. These include:

- radar and electronic ocean reconnaissance satellites (RORSATs and EORSATs), which track U.S. aircraft carrier battle groups and provide targeting data for Soviet air- and sea-launched cruise missiles and Soviet anti-carrier ballistic missiles;[32]
- manned orbiting space stations, which could provide extremely valuable reconnaissance information about U.S. force deployments;[33]

- navigation, communications, and reconnaissance satellites
- unmanned "space plane" weapons now being developed, which could deliver nuclear weapons against U.S. carrier task forces.[34]

In some limited way, a U.S. ASAT capability might deter Soviet aggression. Despite the fact that the USSR is less dependent on satellites than the U.S. for important military functions, Soviet satellites contribute significantly to their military potential and that dependence is growing. Should conflict occur, there are passive measures, such as electronic jamming, that U.S. conventional forces could use to counter Soviet space systems. Their effectiveness is uncertain, if only because "counter-countermeasures" are closely guarded Soviet military secrets. Given the current asymmetry of this significance, for the U.S. to attack Soviet satellites first during a conflict makes little sense. If, however, the Soviets were to initiate a war in space by attacking U.S. satellites, a U.S. ASAT capability would be useful in defending U.S. forces. While ideally U.S. forces should be able to fulfill their missions facing threats enhanced by Soviet spacecraft, there can be no argument that reduction of the threat would be desirable.

As noted previously, if the Soviet ASAT threat grows, the utility of U.S. ASAT capability also will grow because of its ability to provide active defense for U.S. space assets. This will make U.S. ASAT capabilities even more essential in the future.

U.S. SPACE WEAPONS PROGRAMS

Technological Options

The U.S. at last is developing and testing a variety of space weapons. In response to the Soviet ASAT threat, the Carter Administration in 1977 approved development of a U.S. ASAT weapon and supported research and development of directed energy weapons (DEWs) for possible use in a variety of space missions, including defense of U.S. satellites (DSAT). In March 1983 President Reagan endorsed the development of space weapons for missile defense of the U.S. population.

The Air Force has just begun testing the booster stage of its ASAT weapon.[35] This system consists of an "impact kill" infrared guided miniature homing vehicle (MHV) launched from a two-stage rocket carried to high altitudes by an F-15 supersonic fighter. As currently configured, the MHV can destroy only Soviet satellites orbiting below 250 miles, but it could be effective against high altitude Soviet spacecraft and "killersats" if mounted on an earth launched booster.

Like the Soviet Union, the U.S. is developing directed energy weapons. The laser development effort, managed by the Pentagon's Defense Advanced Research Projects Agency (DARPA), has focused so

far on a 5-megawatt chemical laser suitable for limited ASAT missions. The Administration's Defense Technologies Study Team, however, has recommended parallel development of more powerful laser weapons, including ground-based "excimer" lasers and nuclear powered X-ray systems, for use against Soviet ballistic missiles.[36] A restructuring of the laser program is in progress to reflect the new mission of ballistic missile defense. Other laser technology programs include development of target acquisition, laser pointing, and tracking mechanisms (Project Talon Gold) and development of large mirrors for laser beam focusing and control. The development timetable of laser weapons is contingent on funding levels, but some experts believe that a U.S. prototype orbiting space defense laser weapon could be ready for operational testing in the early 1990s.

Because of their high energy density, neutral particle beam weapons would be more effective than lasers against Soviet ballistic missiles, but their development lags considerably behind that of lasers.[37] As an alternative to directed energy weapons, some scientists have urged the Defense Department to look at conventional off-the-shelf technology for a rapidly deployable space missile defense system. The "High Frontier" study, for example, recommends deployment of a multi-tiered BMD system with the first line of defense held by 432 orbiting platforms each armed with about 45 infrared rockets for intercept of Soviet missiles in their "hot" boost phase.[38] If effective, such a system could be cheaper and quicker to deploy than a laser system.

OTHER ISSUES

Military Effectiveness

Obviously, space weapons will not be cheap. There are no reliable cost estimates yet, but a baseline space defense missile force, capable of destroying a high number of Soviet missiles, could cost from $100-$200 billion. Even if space weapons could be overcome, deployment would still be desirable, if the cost to the Soviets of defeating them were roughly equivalent to, or greater than, the cost of deployment to the U.S. Such a system would presumably offer some benefit by retaining at least a degree of effectiveness and would, at the very least, divert Soviet military resources from more directly threatening programs.

Although space weapons present serious technological challenges, almost all scientists agree that they are technically feasible in the sense that the U.S. (and the Soviet Union) can build beam weapons powerful and accurate enough to destroy ballistic missiles. Critics claim, however, that space weapons have two fatal defects. First, the Soviets can cheaply counter U.S. space weapons by: using ablative coatings or fluids to shield Soviet missiles from lasers; spinning missiles to prevent laser heat buildup; polishing missile skins to reflect laser beams; jamming laser wavelengths; and shielding booster rocket plumes, deploying flares, or modifying boosters for shorter rocket burns to confuse infrared sensors. Second, they claim that U.S. space

weapons would be vulnerable to attack by Soviet space mines, nuclear weapons, amd laser weapons.[39]

These countermeasures pose significant challenges to U.S. space weapons. It is not clear, however, that Soviet countermeasures would be cheap or that the U.S. could not successfully deal with them at an affordable cost. For example, the Soviets spent massive sums of money to develop and procure their current force of multiple and single warhead ICBMs and submarine launched ballistic missiles. To ensure adequate penetration of a U.S. space missile defense force, the Soviets would have to rebuild missiles with hardened skins or deploy more missiles--at considerable cost.

There are also potential U.S. countermeasures to protect U.S. space weapons against Soviet attack. For example, U.S. space weapons could be hardened against nuclear effects, such as electromagnetic pulse. It is a long way from the "back of the envelope" design of countermeasures to deployment of a cheap effective capability. There are, for example, countermeasures to tanks such as anti-tank guns, missiles, mines, and other weapons (many much cheaper than tanks), yet tank forces still win battles. The Defense Technologies Study Team reviewed a wide range of possible Soviet counters to U.S. space defense weapons. It concluded that an effective space anti-missile defense is still achievable and affordable. While the DTST may be wrong, it is too early in the development of space weapons for confident assessments that space weapons are not cost-effective. The history of military technology is replete with false predictions about the lack of feasibility and ineffectiveness of various weapons systems. Certainly, the military potential of space weapons justifies a well-funded program of research, development, and testing.

Space Weapons and Stability

Many critics of space weapons worry that U.S. deployment of such systems would be "destabilizing," that is, it would make war more likely. More specifically, these critics argue that:

- U.S. deployment of space weapons would create a hair-trigger situation in which each side would be tempted to attack the other side's satellites and space weapons first in time of crisis to prevent the destruction its own valuable satellites and space weapons;[40]

- Soviet leaders are likely to see U.S. space missile defense weapons as giving the U.S. a war winning capability and decide to destroy U.S. space weapons before they become fully operational;

- U.S. deployment of space weapons would intensify the arms race, as each side deployed weapons to prevent the other side from achieving military superiority. The result is increased superpower tension.

Stability is a proper concern of U.S. defense planners, but these arguments are based on some questionable assumptions.

It is, of course, quite possible that the U.S. can protect its satellites and space weapons from Soviet attack. As long as U.S. defensive systems were reasonably secure, the Soviets would be less certain of military success and thus less likely to strike in a crisis situation. However, even if the U.S. deployed space weapons with a reasonable degree of confidence in their effectiveness and survivability, there would be a possibility that the Soviets could develop unforeseen countermeasures that would place those space weapons in jeopardy. Even this development would not necessarily be destabilizing.

First, space defense weapons complement strategic nuclear offensive forces but do not replace them. The U.S. should maintain retaliatory forces that are survivable in their own right. Thus even if the Soviets could overcome U.S. defenses, they would still face a retaliation in kind to the full spectrum of attacks they might launch.

Second, given the direction of recent Soviet research and development and the significance of strategic defense in Soviet doctrine, it is likely that the Soviets will attempt to deploy a force of space-based missile defense weapons, particularly if the U.S. does so. If both sides' space weapons are vulnerable, the result is not destabilizing. Mutual vulnerability of offensive nuclear weapons is destabilizing. The existence of defensive systems (vulnerable or not) means that, if war should come, the first shots would inevitably be fired in space, thereby providing an additional threshold to be crossed prior to the use of nuclear weapons. This threshold would provide additional time to communicate with the Soviets to try to stabilize a crisis. Chances for successful U.S. retaliation would also increase by providing additional reaction time for time sensitive U.S. strategic offensive forces, such as bombers. Deterrence should thus be strengthened as well. Provided the U.S. maintains a sufficient offensive deterrent, the USSR should have no incentive to attack U.S. defense systems, even if they were vulnerable.

The argument has also been made that ASAT weapons would destabilize a crisis situation because the destruction of communications and intelligence satellites would diminish the intelligence, command, and communication capabilities necessary to control escalation. Even with the advent of more capable ASAT weapons, this argument is flawed. An attack on U.S. satellites would be an act of extreme provocation that would make sense only in the context of a larger conflict. In a lower level crisis there would be little or no incentive to attack satellites, thus leaving U.S. crisis control assets intact. Even if the Soviets should attack U.S. satellites in a lower level crisis, there would be little chance of unjustified U.S. nuclear escalation. Current U.S. policy is not to retaliate with strategic nuclear forces until there is absolute confirmation of nuclear attack, that is, nuclear

explosions in the U.S. The destruction of U.S. satellites, however provocative, should not trigger U.S. nuclear retaliation.

Futhermore, deployment of new ASAT weapons will not take place in a vacuum; U.S. countermeasures (such as passive survival aids, active defenses, and more reliance on high altitude remotely piloted vehicles) can help ensure an adequate flow of information. It also seems odd that those arguing against ASAT weapons on the grounds of their effect on crisis stability are often opposed to strategic defense (which is designed to control escalation and limit damage) and wedded to MAD, a strategy that, in the event of a deterrence failure, logically ends in the deliberate execution of millions of people--hardly a model of escalation control.

The truly extraordinary suggestion has been made that the mere prospect of deployment of ballistic missile defense systems might trigger World War III.[41] The odds that the Soviets would strike preemptively if faced with U.S. deployment of space defense weapons are, fortunately, extremely low. U.S. deployment of space weapons does not directly threaten the Soviet Union. It would tilt the strategic balance in favor of the U.S. only if the Soviets did nothing. A balance would be maintained, however, if the Soviets deployed a comparable defense capability. For any rational Soviet leaders, mutual survivability of the superpowers through space defense should be preferable to nuclear war.

The argument that U.S. deployment of space weapons would fuel the arms race assumes falsely that the current Soviet military activity buildup is in reaction to U.S. weapons programs. But as Jimmy Carter's Secretary of Defense Harold Brown has pointed out, "When we build, the Soviets build. When we don't build, the Soviets build."[42] Twenty years ago, the Soviet Union embarked on a defense buildup, evidently aimed at achieving overall military superiority. This has proceeded at a steady pace, undeterred by a decade of detente, SALT, and a voluntary near-freeze of its arsenal by the U.S.

What U.S. deployment of space weapons can do is redirect Soviet efforts into more stabilizing and less threatening defensive systems. Mutual deployment of strategic defenses would create a new stable order in which the Soviet Union would have no incentive to launch a nuclear attack against the U.S.

Space Weapons and Arms Control

Many critics of space weapons look to arms control as the primary means to deal with the Soviet military threat. Arms control, however, has failed to reduce that threat signficantly. Indeed, since the onset of strategic nuclear arms control negotiations in 1969, the balance has shifted dangerously in the direction of Soviet nuclear superiority. The U.S., therefore, must rely on its own defenses for its security. In particular, Washington should not sign an arms control agreement with the Soviet Union banning space weapons. Such an action would deprive the

U.S. of its most important means of defending the American people against Soviet missile attack.[43]

U.S. experience with the Soviets regarding earlier arms control efforts suggests that arms control would be inadequate to deal with the threat of Soviet space weapons. The Soviets consistently resist tightly worded treaty provisions. As with SALT I, the result invariably is that Moscow fully exploits treaty loopholes to continue developing weapons of strategic importance. Even within the distressingly loose constraints of flawed treaties, Soviet compliance has been poor. Specifically, the Soviets have tested SAMs in an ABM mode for upgrading air defenses for anti-ballistic missile missions, developed and tested mobile radars and missile launchers, deployed battle management radars for a nationwide ABM system, and tested rapid reload launchers--all in violation of the ABM Treaty. The Reagan Administration has just issued a report further detailing Soviet arms control violations.

Crucial to any arms treaty with the USSR is the U.S. ability to verify Soviet compliance. A U.S. State Department assessment,[44] however, finds that the arms control agreement banning the testing and deployment of space weapons recently proposed by the Soviet Union (and similar to that proposed by U.S. space arms control proponents) would not be verifiable by U.S. surveillance satellites or ground-, sea-, and air-based listening posts operating on the periphery of the USSR. These so-called national technical means of verification are the only verification instruments Moscow has approved.

Arms control advocates argue that passive measures could protect U.S. satellites against any ASAT capabilities the Soviets could develop and deploy covertly in violation of an ASAT ban. Because an ASAT ban is so difficult to verify, it would seem that the Soviets could covertly deploy space mines and ASAT missiles on manned and unmanned spacecraft, in addition to their current orbiting killer satellite. The Soviets might not be able to covertly test new generation weapons sufficiently to warrant high confidence in their capability, but such weapons might still be effective if war broke out. The effectiveness of passive measures against covert deployment of these more sophisticated ASAT weapons is very uncertain. The signing of an ASAT ban with the Soviet Union is thus very risky.

In any case, space arms control advocates overestimate the determination of the U.S. to react promptly and forcefully to Soviet treaty violations. Although the U.S. government has substantial evidence of Soviet violations of SALT agreements, Washington has failed to adjust its arms control policy and defense programs. Pressure by U.S. arms control enthusiasts, who seem intent on preserving the arms control process despite Soviet treaty violations, has made it extremely difficult for the Administration to gain congressional support for a strong U.S. response to these violations.[45]

Arms control is not an end in itself. Proposals for limiting weapons deployments must be evaluated in terms of their effect on U.S. national security and their contribution to preserving world peace. A ban on space weapons would deprive the U.S. of the means to defend itself against nuclear attack even as the Soviets continued to build up their nuclear warfighting offensive and defensive capabilities.

CONCLUSION

Security sometimes is enhanced by new kinds of weapons. Example: the U.S. deployment of missile firing submarines, which gives the U.S. a survivable force that could retaliate if the Soviets attacked U.S. cities. Likewise, space weapons would enhance U.S. security by helping protect the U.S. population and U.S. military forces from Soviet nuclear attack.

Critics of space weapons are rightly concerned about the implications of space weapons deployment for the security of U.S. satellites. Their solution--an ASAT weapons ban--however, would foreclose the option of effective strategic defense. The U.S. must do much more to protect its satellites from new Soviet ASAT weapons. A full program of passive survival aids is needed, including deployment of spare satellites in space, design of satellites with a maneuvering capability, and hardening of satellites against nuclear effects. Deployment of space laser weapons in the 1990s would provide substantial additional protection. Ultimately, in wartime, the U.S. might have to reduce reliance on satellites for military support functions.

The Defense Department currently is constructing a detailed "road map" for the development of advanced space weapons. Congress should adequately fund a research and development effort leading to testing a prototype orbiting space laser weapon by 1990 and rigorous operational testing of a space missile defense system in the 1990s. At the same time, the U.S. should proceed with the testing and deployment of the miniature homing vehicle (MHV) anti-satellite weapon. It probably has some limited value in deterring Soviet attacks on U.S. satellites, and it could be used to defend U.S. satellites against Soviet killer satellites and to deny the Soviets use of valuable space systems in a conflict. It is essential, however, that the U.S. proceed immediately to reduce the vulnerability of its strategic nuclear forces to a Soviet first strike, for nuclear weapons will remain the bedrock of deterrence for the next twenty years at least.

Space weapons are not wonder weapons capable of giving the U.S. decisive military superiority. Nor are they cheap. But their potential contribution is a new kind of security--based on protecting U.S. lives rather than leaving them hostage in a dangerous "balance of terror."

If space defense could be achieved, it would be strategically imprudent and morally irresponsible not to deploy space weapons to defend the U.S. homeland against nuclear attack.

Robert Foelber*
and
Brian Green
Policy Analysts

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* After completing work on this study, Heritage Foundation Policy Analyst Robert Foelber joined the staff of the Library of Congress' Congressional Research Service.

NOTES

1 Resolutions to de-weaponize space have been introduced in both Houses of the 98th Congress. These include: H.J. Res. 87, introduced by Representative Robert W. Kastenmeier (D.-Wis.), and H.J. Res. 120, introduced by Joe Moakley (D.-Mass.) with 76 co-sponsors, which call on the President to resume talks with the Soviet Union aimed at banning all weapons from space. (From 1977 to 1979 the U.S. and USSR met in three rounds of negotiations to discuss a ban on ASAT weapons. The talks have been suspended since the Soviet invasion of Afghanistan.) S.J. Res. 28, introduced by Sen. Paul Tsongas (D.-Mass.) is identical to the Moakley resolution. Senator Larry Pressler (R.-S.D.) has introduced S. Res. 43 calling for negotiations to ban ASAT weapons as a first step toward a comprehensive ban on all space weapons. Attempts to delete funding for testing and advanced procurement of the ASAT system from the FY 1984 defense budget were defeated by Congress, although funding for testing is contingent on a presidential certification that the U.S. is proceeding in good faith to negotiate a treaty with the Soviet Union banning ASATs or that such tests are necessary for national security.

2 In this paper, "space weapon" refers to any ground-, air-, or space-based weapon which is capable of destroying or otherwise rendering inoperable objects orbiting in or transiting space, including satellites and ballistic missiles and their warheads.

3 John Bosma, "Space and Strategic-Defensive Reorientation: Project Defender," Defense Science and Electronics, September 1983, pp. 58-65.

4 The Defense Technologies Study Team, directed by former NASA head, James C. Fletcher, was formed by the Administration to study the feasibility of space-based ballistic missile defense. The DTST's report, delivered to the White House in October, has not been made public, but for a discussion of its major findings, see Clarence A. Robinson, Jr., "Panel Urges Defense Technology Advances," Aviation Week and Space Technology, October 17, 1983, pp. 16-18; "Study Urges Exploiting of Technologies," ibid., October 24, 1983, pp. 50-57; and "Shuttle May Aid in Space Weapons Test," ibid., October 31, 1983, pp. 74-78.

5 For an analysis of Soviet nuclear doctrine, backed with copious citations from Soviet military writings, see Mark E. Miller, Soviet Strategic Power and Doctrine (Washington, D.C.: Advanced International Studies Institute, 1982) and Joseph D. Douglass, Jr. and Amoretta Hoeber, Soviet Strategy for Nuclear War (Stanford, California: Hoover Institution Press, 1979). Soviet nuclear doctrine stresses that the Soviet Union must have the capability to deliver a crushing blow to U.S. offensive nuclear forces and to defend the USSR against retaliation from surviving U.S. nuclear weapons.

6 George Wilson and Walter Pinkus "Missile Survival Questioned," Washington Post, May 9, 1983, p. 1; Harold Brown, Department of Defense Annual Report to Congress, Fiscal Year 1982, p. 111. Roughly 30 percent of the U.S. bomber force is on alert and about half of U.S. submarines are at sea at any given time; those forces would have a good chance of escaping a Soviet first strike.

7 Clarence A. Robinson, Jr., "Emphasis Grows on Nuclear Defense," Aviation Week and Space Technology, March 8, 1982, p. 36.

8 Director of Central Intelligence, Soviet Civil Defense (N178-10003), July 1978. Department of Defense, Soviet Military Power (Washington, D.C.: Government Printing Office, 1983), p. 30.

9 See Carnes Lord, "The ABM Question," Commentary, May 1980, p. 34, and Robert P. Berman and John C. Baker, Soviet Strategic Forces: Requirements and Responses (Washington, D.C.: The Brookings Institution, 1983), p. 149.

10 Soviet ABM upgrades are discussed in "Soviets Test Defense Missile Reload," Aviation Week and Space Technology, March 8, 1983, p. 27, and Berman and Baker, op. cit., p. 149.

11 Clarence A. Robinson, Jr., "Soviets Accelerate Missile Defense Efforts," Aviation Week and Space Technology, January 16, 1984, pp. 14-16; Michael Getler, "Soviets Seen Progressing Toward a Missile Defense System," Washington Post, January 20, 1984, p. A25.

12 Laser weapons involve highly concentrated beams of light (photons) generated by a number of means including chemical reactions between hydrogen and fluoride gases (chemical lasers), exciting molecules of inert gases with electricity ("excimer" lasers), amplifying a laser beam with an electron beam (free electron lasers), or pumping a solid material with X-rays or gamma rays generated from a nuclear explosion. The different lasers produce different beams of different wavelength and strength. Laser weapons kill their targets by heating them, shock wave propagation, radiation, or a combination of these processes.

Particle beam weapons "work by accelerating subatomic particles--neutrons, electrons, or protons (a charged particle beam) or ionized hydrogen atoms (a neutral particle beam) at speeds approaching that of light, in very large quantities, creating an energy beam with a very high-energy density. Such a beam can best be described as a manmade lighting bolt which, upon reaching its target, shatters the surface and then penetrates deeply, thereby depositing its energy in a long narrow cone throughout the target." Kenneth Harmon, "Directed Energy Weapons," Grand Strategy: Countercurrents, August 15, 1982, pp. 2-8.

13 Craig Corvault, "Soviet Antisatellite Treaty Raises Verification Issue," Aviation Week and Space Technology, August 29, 1983, p. 20.

14 Soviet Military Power, p. 68.

15 "Soviet Tracking," Aviation Week and Space Technology, October 25, 1982, p. 15.

16 "Soviets Build Directed Energy Weapon," Aviation Week and Space Technology, July 28, 1980, pp. 47-50.

17 For a more detailed statement of these arguments, see Robert Foelber, "Strategic Defense: Avoiding Annihilation," Heritage Foundation Backgrounder No. 304, November 9, 1983.

18 For a classic statement of U.S. nuclear doctrine, formulated during the Carter Administration in Presidential Directive-59 and reaffirmed by the Reagan Administration, see Harold Brown, Department of Defense, Annual Report Fiscal Year 1981, p. 66.

19 For a discussion of Soviet ASAT doctrine, see Lawrence Freedman, "The Soviet Union and 'Anti-Space Defence,'" Survival, July-August 1977, pp. 16-23. In 1964, the USSR established a special anti-space branch of its air defense force "to destroy space systems used by the enemy for military purposes, in their orbits" using "special spacecraft and vehicles (e.g.,

satellite-interceptors), which may be controlled either from the ground or by special crews." Quoted in Freedman, p. 18.

20 The June 1982 test involved an anti-satellite test, two ICBM launches, an SS-20 launch, an SLBM launch, and two ABM firings simulating, according to some U.S. analysts, in logical sequence a first-strike against U.S. ICBMs coupled with an attacked against U.S. satellites, followed by defense against U.S. retaliatory strikes and a follow-up second strike against the U.S. using SLBMs. "Soviet Stage Integrated Test of Weapons, Aviation Week and Space Technology, June 28, 1982, pp. 20-21.

21 From 1963 to 1970, the U.S. experimented with two crude ASAT weapons--Thor and Nike-Zeus missiles armed with nuclear warheads. The Thor system was decommissioned in 1975, the Nike-Zeus in 1967. Presumably, the Soviet Union also has the capability to launch nuclear missiles at satellites. The Soviets claim that they have never tested ASAT weapons and that U.S. claims that the USSR has an operational ASAT system are "mythical." For a brief discussion of Soviet efforts to "disinform" the West about Soviet space weapons programs, see James E. Oberg, "Andropov's Orbiting Bombs: The Soviets' Outer-Space 'Peace' Strategy," Reason, December 1983, pp. 25-30.

22 The "near orbit" approach, whereby the killersat performs a "pop up" maneuver to bring it into close proximity to the target, is militarily the most effective approach, since attacks can be more easily disguised.

23 "Soviets Outspending U.S. On Space by $3-4 Billion," Aviation Week and Space Technology, July 19, 1982, pp. 28-29.

24 Covault, op. cit., p. 20.

25 David Baker, The Shape of Wars to Come (New York: Stein and Day, 1982), p. 167.

26 The difficulties of arms control as a method of securing U.S. space assets are discussed in greater length later in this paper; see also Colin Gray, op. cit., pp. 49-55.

27 Passive survival aids for satellites include: harden systems against nuclear effects, especially the electromagnetic pulse (EMP) phenomenon which can render electronic circuits inoperable, build maneuvering satellites that can evade Soviet ASAT weapons, stockpile spare satellites on the ground in high orbits in an inert state to be called down and activated in time of war, equip satellites with radar and infrared spoofing devices to provide false signatures to Soviet sensors, deploy decoy satellites, and equip satellites with umbrellas to deflect laser beams. For a discussion of threats and survival aids for U.S. satellites, see Robert B. Giffen, U.S. Space System Survivability: Strategic Alternatives for the 1990s (Washington, D.C.: National Defense University Press, 1982). Presidential Directive-37, signed in 1978, called for greater survivability of U.S. satellites.

28 This has led some space analysts, including military officers responsible for U.S. satellites, to favor an arms control agreement with the Soviet Union banning the testing and deployment of ASAT weapons. Civilian space arms control advocates tend to favor a treaty that would prevent the U.S. from testing and deploying its new ASAT weapon. Some military arms control advocates want to restrict only the testing and deployment of more advanced ASAT weapons.

29 For a description of Soviet satellites and the argument that loss of Soviet satellites would not constitute a major reduction in Soviet war-fighting capability, see Stephen M. Meyer, "Soviet Military Programmes and the 'New High Ground,'" Survival, September-October 1983, pp. 204-215. Colin S. Gray argues that Soviet dependence on satellites for successful nuclear operations is still considerable. American Military Space Policy: Information Systems, Weapons Systems, and Arms Control (Cambridge, Mass.: Abt Books, 1983).

30 "Anti-Satellite Weapons and Arms Control," Arms Control Today, December 1983, p. 1.

31 For example, U.S. airborne command posts can only stay aloft for 72 hours, even with air-to-air refueling, before they must land for brief maintenance. With defenses against Soviet missiles, the U.S. could selectively defend a certain number of airstrips to keep airborne command posts operating.

32 Soviet RORSATs use active radars powered by nuclear generators to detect U.S. surface naval vessels. EORSATs passively listen in on electronic emissions (radars, communications) to detect the location of surface vessels and possible submarines as well. Berman and Baker, op. cit., pp. 162-164. Robert Cooper, DARPA Director, has called Soviet ocean satellites "a major new threat" to U.S. naval forces. "Navy Warned of New Soviet Threat," Chicago Tribune, March 18, 1982, p. 5.

33 "Major aspects of the Soviet manned space programme are exclusively military. For example, it is well known that the Salyut space station has been outfitted in and tasked in two distinct versions: one for military missions and one for civilian missions. A wide range of reconnaissance, ELINT (electronic intelligence), and C3 (command-control-communications) tasks and experiments have been performed by Soviet cosmonauts during extended says in space....In 1981-2 cosmonauts were in orbit 286 days..." Meyer, op. cit., pp. 204-205. By contrast, the U.S. did not have a man in space from 1975-1981 and the U.S. record for space endurance is only 84 days vs. 211 for the Soviets. The Soviet Union is now developing a huge space station to be manned by 12-20 cosmonauts who could assist in constructing space weapons. "Soviets Outspend U.S. On Space by $3-4 Billion," Aviation Week and Space Technology, July 19, 1982, pp. 28-29.

34 The Soviets appear to be developing two versions of a space plane. The first is a small 2,000 pound unmanned orbiter which could be a more flexible weapon system than the Orbital and Fractional Orbital Bombardment Systems tested by the Soviets in the 1960s. The second Soviet space plane resembles the U.S. shuttle and could be ready for regular use within ten years. See Thomas O'Toole, "Soviet Test in Space May Be A-Weapons," Washington Post, March 17, 1983, p. A13; and James E. Oberg, "The Elusive Soviet Space Plane," Omni, September 1983.

35 For a brief account of the beginnings of the U.S. ASAT program, see U.S. Senate, Committee on Commerce, Science, and Transportation, Soviet Space Programs: 1976-1980 (Washington, D.C.: Government Printing Office, 1982), pp. 184-186.

36 Clarence A. Robinson, Jr., "Panel Urges Defense Technology Advances," Aviation Week and Space Technology, October 17, 1983, pp. 16-18.

37 Charged particle beam weapons would not work in space because the beams would be bent by the earth's magnetic field.

38 General Daniel O. Graham, High Frontier: A New National Strategy (Washington, D.C.: High Frontier Inc., 1982).

39 Daniel Kaplan, "Lasers for Missile Defense," The Bulletin of Atomic Scientists, May 1983, pp. 5-8.

40 A recent publication of the Center for Defense Information, for example, states: "Space weapons which threaten satellites increase incentives for a first strike. If both sides could suddenly lose their vital military satellites--and therefore much of their military capability--there is great pressure, especially in a crisis situation to launch nuclear weapons before the opportunity to do so is lost." "Militarizing the Last Frontier: The Space Weapons Race," The Defense Monitor, Vol. XII, Number 5, p. 7.

41 According to a publication of the Union of Concerned Scientists, "even the mere prospect of ABM deployment could spark hostilities. The imminent deployment of ABMs could temp an enemy to attack suddenly and decisively to disarm its opponent." The New Arms Race: Star Wars Weapons (Briefing Paper No. 5), p. 5.

42 Joyce Larson and William Bodie, eds., The Intelligent Layperson's Guide to the Nuclear Freeze and Peace Debate (New York: National Strategy Information Center, 1981), p. 19.

43 Space basing is required for a BMD system designed to intercept ballistic missiles in their flight. The most recent draft treaty proposed by the Soviet Union seeks to prohibit deployment and/or testing of space-based weapons "designed to hit targets on the Earth, in the air and in outer space." This presumably would exclude the Soviet ground-based ASAT weapons, but surely would include any space basing of U.S. ballistic missile defenses. A draft treaty by the Union of Concerned Scientists bans the deployment and testing of any ASAT weapons anywhere. It is difficult to conceive of a BMD system that would not have some ASAT capability also; to argue that the purpose of ASAT and BMD weapons is different does not change the inherent technological overlap. A copy of UCS treaty may be found in the Congressional Record, May 18, 1983, pp. S6991-6993.

44 Covalt, op. cit., pp. 20-22.

45 The deleterious effect on U.S. security of the lack of a coherent and determined compliance policy is discussed in "Soviet Treaty Violations and U.S. Compliance Policy," National Security Record, a monthly publication of The Heritage Foundation, December 1983.