
Chapter 2

Introduction

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Introduction

OVERVIEW

This report examines the issues raised by the development of weapons capable of attacking objects stationed in space. It analyzes the military utility of space systems, describes the technical characteristics and military value of anti-satellite (ASAT) weapons, and discusses the effectiveness of a number of satellite defenses and technical countermeasures. Finally, the report examines how various levels of ASAT arms control might contribute to U.S. national security when combined with various survivability measures and various levels of ASAT development and deployment.

Believing that the development of weapons capable of attacking missiles in flight or objects in space would likely have a strong effect on “deterrence, crisis stability, arms control and . . . national security policy,” the House Committee on Armed Services’ and the Senate Committee on Foreign Relations’ asked the Office of Technology Assessment to prepare this report. The committees requested that the report should, among other things, assess:

- the feasibility, effectiveness, and cost of various space-based or space-directed concepts;³
- the relationship between capabilities that can reasonably be expected and the impact of the technology exploitation effort on the overall strategic policy of the United States;⁴

³Letter from Melvin Price, Chairman, William L. Dickinson, Ranking Minority Member, and Les Aspin of the House Armed Services Committee, to John H. Gibbons, Director, Office of Technology Assessment, Mar. 5, 1984.

⁴Letter from Charles H. Percy, Chairman, Claiborne Pen, Ranking Member, Larry Pressler, and Paul E. Tsongas of the Senate Foreign Relations Committee to John H. Gibbons, Director, Office of Technology Assessment, Mar. 20, 1984.

⁵Ibid.

⁶Supra, note 1.

- the implications of anti-satellite weapons and space-based or space-directed missile defense concepts for standing arms control agreements, particularly the Anti-Ballistic Missile, Outer Space, and Limited Test Ban Treaties;⁵ and
- the prospects for future space-related arms control agreements, including an assessment of advantages, disadvantages, and verifiability.⁶

The subject of ballistic missile defense (BMD)—particularly space-based BMD—was of special interest to both the House Armed Services and Senate Foreign Relations Committees. This subject is dealt within a companion OTA report, *Ballistic Missile Defense Technologies*.

There is a strong relationship between ASAT and BMD technologies and the technical, political, and diplomatic actions taken in one sphere will almost certainly affect the other. For this reason, OTA assessed the two subjects at the same time, with a single staff, and with the advice of a single advisory panel. In each of these reports, OTA has endeavored to make clear the relationship between these two sets of technologies, and where appropriate has provided cross-references to further assist the reader.

In producing this unclassified report, OTA was able to draw on a wide range of classified material. Appendices of classified notes on this report are available to individuals having appropriate security clearances and who require access to that material.

⁷Supra, note 2.

⁸Ibid.

SPACE WEAPONS: ATTITUDES AND CONTROVERSY

Assuming that highly capable and militarily useful ASAT weapons can be built at an acceptable cost, then why not proceed with development and deployment? Why should the U.S. Congress give more attention to ASATS than it gives to other new terrestrial weapon systems (e.g., anti-ship or anti-aircraft weapons)?

ASATS and BMD

Going forward with ASAT weapon development or, alternatively, agreeing to restrict such development through arms control measures, could have important consequences for advanced, space-based BMD technologies. Over the past several years a major debate on strategic defense has been taking place in the United States. Some believe that ballistic missile defenses can be developed that may eventually allow the United States to abandon the current policy of deterrence through assured retaliation. Others believe that even increased research on BMD alternatives might precipitate an offensive arms race with each side hastening to counter possible defenses with more and better offensive arms. This debate was intensified by President Reagan's March 23, 1983, speech which outlined what was later to become the Strategic Defense Initiative.

Since the debate over ballistic missile defense involves a fundamental reassessment of this country's strategic policy, decisionmakers are reluctant to proceed with ASAT weapon development, deployment, or arms control decisions that may tie their hands with respect to future technologies or that may commit them irrevocably to a course with unforeseen consequences. Some people believe that ASAT weapon development programs will be used to accomplish BMD research, thereby avoiding the strictures of the ABM Treaty and the scrutiny of Congress. Others believe that ASAT arms control restrictions would impede future BMD research and development programs. Given these opposing viewpoints, the decision to go forward with or, alternatively, to restrict ASAT development must be made in the

broader context of this country's reassessment of its strategic posture and the military utility of space.

Attitudes Toward the Military Uses of Space

In addition to understanding the complex relationship between ASAT and BMD technologies, one must also recognize that people think about the military use of space in radically different ways. There are a great many views—both pro and con—regarding weapons that would operate in or from space; it is useful to examine several of the more frequently stated positions.⁷

Opposition to Space Weapons

Some people oppose the development of weapons that would operate in or from space because they feel such activities run counter to the legal and political history of space. They point to the many examples of successful international cooperation in space science, commerce, law, and politics and see these activities as reducing international tension and contributing broadly to peace and development. Space weapons are seen as violating the spirit and, in some cases, the letter of the treaties and agreements to which the United States is a party. They point to the language of the 1967 Outer Space Treaty, which states that space activities should be conducted "in the interest of maintaining international peace and security and promoting international cooperation and understanding."⁸ Adherents of this viewpoint emphasize that every American President since Eisenhower has stated

⁷For a discussion of various "space doctrines," see: "Space Doctrines," Lt. Col. D. Lupton, USAF (Ret.), *Strategic Review*, fall 1983, pp. 36-47; see also: Lt. Col. D. Lupton, USAF (Ret.), *On Space Warfare: A SpacePower Doctrine*, U.S. Air Force, Air University Command, Center for Aerospace Doctrine, Research, and Education, Maxwell Air Force Base, Alabama, 1985.

⁸"Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies," 18 U.S.T. 2410, T. I.A. S. 6347, Article III.

support for the idea that space should not be an arena of conflict and that space exploration should contribute to peace. The web of commitments that the United States has fashioned over the past 25 years through its agreements and unilateral declarations is seen as imposing a positive burden on the United States to support the broad ideals stated in the Outer Space Treaty.

Others—although acknowledging the importance of the laws and the history of space—base their opposition to space weapons on the belief that the deployment of such weapons in space, if not halted now, will be impossible to reverse. Since neither the United States nor the Soviet Union now has weapons that are based in space, they feel that it is both possible and desirable to prevent the arms race from extending to this new environment. This view is widely held in countries other than the United States and the Soviet Union. Over the last several years, the Soviet Union has made a strong effort to place the blame for the militarization of space on the United States. The American point of view is that the arms race is a burden imposed on the United States by the inordinate military preparations of the Soviet Union. Nonetheless, many nonallied governments, as well as important segments of the populations of even our allies, view the superpower arms race as a dangerous and destabilizing activity.⁸ Those who see the superpower arms race as a dangerous process which the protagonists are doing little to halt are likely to see military development in space as an integral part of that process.

Some opposition to space weapons derives from the fact that such weapons would place at risk critical communication and information-gathering satellites that contribute to the stability of the U.S./Soviet relationship.⁹ Space weapons are seen as destabilizing and likely to increase the possibility that a nuclear

war might occur either through accident or intention. At present, nations can use space to peer within the boundaries of other sovereign states to obtain otherwise inaccessible information and early warning of attack. For this reason, many believe that space is of greater value to the United States than to the Soviet Union, since the Soviet Union has other means of gathering information in the open U.S. society. Adherents to this position maintain that, though there are many potential military uses of space, the communication and information-gathering activities are the most important. They argue that these benefits will be jeopardized by U.S./Soviet military space activities such as ASAT weapons development or space-based BMD. Although these latter activities also have military utility, they are not seen as outweighing the risk that such systems would create.

Support for Space Weapons

Those who support the development of weapons that would operate in or from space generally emphasize the importance of being able to exert military power in space. Some supporters view space as merely another sphere of military activity; others feel that military space activities might offer a means by which to fundamentally alter the U.S./Soviet strategic balance. Advocates of the former viewpoint emphasize that the increase in the number of Soviet military space systems with enhanced capabilities creates a threat to which the United States must be prepared to respond. In particular, supporters of this position stress the importance of being able to destroy satellites which assist the Soviets in targeting U.S. terrestrial forces. They believe that in order to deter or, alternatively, to prevail in terrestrial conflicts, the United States must be able to operate in, and respond to threats from, space just as it does on land, at sea, or in the air.¹¹

⁸U.S. Congress, Office of Technology Assessment, "Um"space '82: A Context for Cooperation and Competition—A Technical Memorandum, OTA-TM-ISC-26 (Washington, DC: U.S. Government Printing Office, March 1983).

⁹See: R. Garwin, K. Gottfried, and D. Hafner, "Anti-Satellite Weapons," *Scientific American*, vol. 250, No. 6, June 1984, pp. 45 ff.

¹¹Colin Gray, "Why an ASAT Treaty Is a Bad Idea," *Aerospace America*, April 1984, pp. 70 ff.; and R. F. Futrell, ideas, *Concepts, and Doctrine: A History of Basic Thinking in the United States & Force, 1907-1964*, U.S. Air Force, Air University Command, Maxwell Air Force Base, Alabama, 1974, pp. 279-282, summarizing views of Gen. Thomas D. White, USAF.

Some space weapons advocates see space as more than just another theater of military operation; they see it as a solution to the current stalemate in offensive nuclear weapons. They argue that space-based ballistic missile defenses can provide the opportunity for the United States to abandon its current doctrine of assured retaliation. Should both the United States and the Soviet Union possess space-based defensive forces, then more desirable offensive-defensive or purely defensive strategies can be developed. Other space power advocates see space weapons as a means to capture the "high ground."¹² The current U.S. lead in military space technology is seen as granting a military advantage over the Soviet Union—an advantage which, if not seized, will soon be lost.

Because views about the military uses of space vary so widely, it has been difficult to forge a national consensus on the subject of ASAT weapons. Some people oppose ASAT weapons as a matter of principle because these

¹²Lt. Gen. Daniel O. Graham, USA (Ret.), *High Frontier: A Strategy for National Survival* (Washington, DC: High Frontier, 1983).

weapons would operate in space, others oppose ASAT weapons because they believe the benefits of such weapons are outweighed by the risk they pose to current U.S. space systems. Some people support ASAT weapons simply because they feel the United States must be able to respond to Soviet threats from any theater. Other supporters see space as a means to project U.S. power, reduce the threat of conflict and global nuclear war, and reduce the damage done by such a war should it ever occur.

In its analysis, OTA has attempted to take into consideration this range of viewpoints and, to the greatest extent possible, show it leads to a variety of policy options. As this report demonstrates, the opportunities and risks that might result from developing or not developing ASAT weapons or from pursuing or not pursuing ASAT arms control cannot be simply stated. Many of the choices that will be made over the next several years will require a delicate balancing of strategic, economic, and political interests. There is little doubt that reasonable persons can and will disagree as to the most appropriate nature of this balance.

ORGANIZATION OF THE REPORT

The main body of this report begins with the discussion in chapter 3 of the military utility of satellites and ASAT weapons. This chapter provides the conceptual framework necessary to understand how these various space systems contribute to or threaten U.S. national security. Current and projected Soviet and U.S. military satellite capabilities are examined, as are a variety of responses to such capabilities.

Chapter 4 provides a detailed technical look at the existing and projected ASAT capabilities of the United States and the Soviet Union. This chapter discusses both existing technologies and the possibilities for more advanced kinetic-energy, nuclear, and directed-energy ASAT weapons. It also considers the wide range of technical and political responses

available to the United States to counter or compensate for Soviet ASAT capabilities.

Chapter 5 reviews the history of arms control related to ASAT weapons. This chapter describes the constraints imposed by treaties and agreements in force and discusses the international political barriers to ASAT development. The 1978-79 ASAT negotiations between the United States and the Soviet Union are examined, along with subsequent draft treaties proposed by the Soviet Union. Recent legislative and executive branch activities are also summarized.

Chapter 6 describes a number of different ASAT arms control provisions that might be sought by the United States. Restrictions on testing, possession, deployment, and use are

all examined to determine whether they might contribute to U.S. national security. Provisions restricting spacecraft operation and orbits—so-called “rules of the road” ’—are also examined.

Finally, chapter 7 provides a comparative evaluation of seven hypothetical legal/technical regimes. Each regime combines examples

of technical measures and countermeasures discussed in chapter 4 with examples of arms control as discussed in chapter 6. Each of these hypothetical regimes describes the advantages and disadvantages of different combinations of ASAT weapons development, employment policies, defensive countermeasures, and arms control.