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The Past, Present, and Future of Space Security

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Space is a uniquely hostile environment for humans and man-made spacecraft. The physics of space makes orbital objects transparent and requires that they move in predictable trajectories, heightening their possible vulnerability to attack by potential adversaries. The history of human activity in space, therefore, has been characterized by dangers from a number of both natural and man-made threats. Nevertheless, the first 50 years of space activity have passed without direct conflict in space and without the deployment of space-based weapons. How has this been possible, and what are the prospects for the future?

This article surveys the reasons for this relative success in space to date by examining two key factors: the recognition by the main space actors of shared threats posed to their space security, and the political willingness of state leaders to cooperate in diffusing these threats.[1] Neither of these two factors has been inevitable at any point since 1957, and yet states have often exercised cooperative restraint. This is a positive outcome and even a surprising one, given the hostility of the early cold war years and the period from the late 1970s to the late 1980s. The core space security agreements, reached in the 1960s and early 1970s, endured throughout the cold war, as even the most hawkish of U.S. presidents and Soviet general secretaries found collective approaches to space security to be in their best interests.

The 2002 U.S. withdrawal from the 1972 Anti-Ballistic Missile (ABM) Treaty marked the first significant defection from this regime. While this action has spurred debates over space weapons, the main reason behind it stemmed more from non-space

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threats: that is, the perceived threat of ballistic missiles to the United States and its allies. But the United States—largely due to Congressional limitations and technical problems—has not yet exploited the ABM Treaty's demise to deploy space-based weapons. Moreover, while the George W. Bush administration is on record opposing new space agreements, technical and political factors are changing in a manner that may start pulling U.S. space policy more into line with the traditions of cooperative space security—a tradition followed even during the presidency of Ronald Reagan. If this shift occurs, broader restraint-based agreements may be achievable, given U.S. recognition of new debris-related threats and the presence of widespread international support for enhanced space security cooperation.

This article first examines what worked in international space security cooperation during the cold war and why. It looks particularly at the consensus agreements formed at various times between the U.S. and Soviet leaderships regarding space threats, as well as the gaps (and "hedging" behavior) that remained within this imperfect framework. It then considers changes in the technical and political factors affecting current space security—which is at risk because of the absence of such consensus and the lack of ongoing discussions. Finally, it reconsiders the logic of space security cooperation and suggests possible means of overcoming existing problems. Overall, both technical and political factors, as in the past, will matter in the success—or failure—of future agreements.

LESSONS FROM THE COLD WAR

During the initial period of space security relations from 1957 to 1962, the Soviet Union and the United States moved quickly to weaponize space, testing nuclear weapons on nine occasions in space (plus two failed U.S. tests) and numerous more times in the upper atmosphere. These tests emitted harmful electro-magnetic pulse (EMP) radiation that proved hazardous to both satellites and humans in orbit. The July 1962 Starfish Prime test alone disabled at least six U.S., British, and Soviet satellites. Still, both sides continued to conduct more tests. The generally accepted perspective of space security was aptly summed up by then–U.S. secretary of state Dean Rusk's observation: "There is an increasing danger that space may become man's newest battlefield."[2] Virtually nothing was accomplished in space security cooperation during this period due to initially limited knowledge about space, the hostility of existing cold war military competition, and the weakness of political support for meaningful cooperation.

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By the fall of 1962, however, the two sides had begun to recognize that nuclear

testing and unfettered military competition in space had self-damaging consequences for both sides and increased the possibility of nuclear war. The Cuban Missile Crisis stimulated a process of mutual learning that had already begun with regard to space. Instead of continuing on the path to space war, U.S. President John F. Kennedy and Soviet First Secretary Nikita Khrushchev took the unprecedented step of crafting a series of formal and informal agreements, in order to protect space for passive military, commercial, and scientific activities. The first step came in the banning of nuclear testing in space (codified in the 1963 Partial Test Ban Treaty), which was followed quickly by a new consensual norm against territorial and military competition on the moon (encompassed in the December 1963 UN Space Resolution). This progress did not stop military space competition in reconnaissance satellites or civilian rivalry in human spaceflight, but it made space considerably safer and reduced the chances of inadvertent war. Later in the 1960s, ongoing U.S.–Soviet communication over space risks led to the formation of the 1967 Outer Space Treaty, which formalized the demilitarization of the moon, banned the placement of weapons of mass destruction into orbit, called upon states to engage in only "peaceful purposes" in space, and encouraged consultations in case of planned activities that might harm another country's space assets.

During the détente era (1970–1975), the U.S.–Soviet space security dialogue continued both within the framework of nuclear arms control and beyond it. The two sides enacted strict bans against interference with each other's reconnaissance satellites and against testing and deploying space-based missile defenses (codified in the non-interference clause in the Interim Agreement of the Strategic Arms Limitations Talks and the 1972 Anti-Ballistic Missile Treaty, respectively). Military support functions continued to expand during this period, particularly in the areas of communications, early warning, reconnaissance, and navigation. But prior Soviet tests of a conventionally armed, co-orbital anti-satellite (ASAT) weapon now halted, and the United States similarly refrained from such tests. The favorable political environment of 1970 to 1975 also led to unprecedented cooperation in space science and human spaceflight, helping to expand the scope of mutual engagement and limit the incentives for space conflict.

However, the decline of U.S.–Soviet political relations over such non-space issues as mutual nuclear modernization and disputes in the Third World brought the end of détente, causing less essential forms of U.S.–Soviet cooperation in space science and human spaceflight to wane. Importantly, however, the core of the space security framework remained. Still, the period from 1976 to 1987 highlighted its gaps, as the Soviet Union resumed its earlier co-orbital ASAT tests, and the United States began research on and eventually conducted a test of its own ASAT weapon in 1985 (launched from an F-15 aircraft). In 1983, moreover, the Reagan administration began a radically dif-

ferent approach to space security by calling for the Strategic Defense Initiative (SDI), a multi-tiered defensive system with extensive plans for space weapons. Ironically, President Reagan's plan remained within the context of collective security, given his ultimate (and oft-repeated) goal of cooperative nuclear elimination and the sharing of SDI technology with the Soviet Union.[3] In the end, a U.S. Congress unwilling to violate the ABM Treaty and domestic changes in the Soviet Union caused the SDI issue to become moot, allowing the two sides to move ahead with dramatic arms control agreements and expanded space cooperation.

Progress and Slippage in the Post–Cold War Period

During the 1990s, the framework of cooperative space security regained its strength and became even more deeply rooted, as U.S.–Russian civil space cooperation burgeoned in the joint construction of the International Space Station (ISS). Industrial barriers between the two sides became much smaller, as U.S. companies and former Soviet enterprises formed unprecedented joint ventures and shared in all phases of production and mission planning for both the ISS and for private commercial flights. Meanwhile, even as the United States began to expand its research activities in the area of ballistic missile defense, the administration of President Bill Clinton hewed to a policy of negotiating a demarcation agreement with Russia, rather than withdrawing from the ABM Treaty and pursuing a unilateral approach. However, the Clinton administration failed to adopt any significant new initiatives in the area of space security. Under pressure from the Republican-led Congress, it decided to pursue a limited missile defense test program, while also pre-conditioning the opening of talks concerning a new space arms control treaty at the UN Conference on Disarmament (CD), on Chinese willingness to open negotiations over a Fissile Material Cut-Off Treaty (FMCT). Similarly, as new actors emerged in space, the security framework expanded from its previous bilateral context to an increasingly complicated multilateral negotiating arena. No progress would be made in plugging gaps in the existing space security framework during the Clinton years.

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The administration of George W. Bush brought a very different perspective on space security into office; it emphasized near-term withdrawal from the ABM Treaty and the pursuit of active space defenses, and—if necessary—offensive systems. Aided by Democratic loyalty to the president following the attacks of 9/11, the Bush administration was able to double the missile defense budget. It also announced in December 2001 plans to exit from the ABM Treaty (over Russian objections) and build nation-

wide missile defenses. Programs to research a range of space-based weapons received a new influx of funding. Meanwhile, work began on revisions to the 1996 U.S. National Space Policy.

Accordingly, the U.S. stance at the CD in Geneva stiffened considerably, ruling out even "discussions" on space security questions, despite a series of concessions by China. As U.S. ambassador to the CD Eric Javits explained the U.S. position in 2002, "There simply is no problem in outer space for arms control to solve."[4] For the first time, however, the United States found itself isolated in space security debates, as all other major space powers supported talks toward plugging gaps in the existing space security framework, both at the CD and at the United Nations. Only the United States took the unprecedented step in the fall of 2005 of voting against the long-standing UN resolution on Prevention of an Arms Race in Outer Space (PAROS), and Washington also cast the only negative vote against a Russian-sponsored space resolution calling for greater transparency in space activity.[5] The administration's policy now seemed to be a rejection, not only of prior multilateral efforts by the United States in space, but also of the cooperative security approach of the Reagan administration, which had engaged consistently in space security–related talks with the Soviet Union even as it conducted research on SDI. The reasons for this move away from cooperative security were threefold: the administration's perception of rising threats to U.S. space assets; its belief that new international agreements would limit only U.S. capabilities and not those of less treaty-conscious actors; and an assumption that national means would be more effective in providing for U.S. security, even at the risk of inducing possible foreign space weapon deployments. In many respects, the new administration adopted a technologically deterministic view of space conflict, treating space weapons as essentially inevitable and leaving open only the questions of what type, how many, and when. To be the second to deploy such systems, supporters argued, was to risk being "dead" in space.

But the administration's unilateralist space security policy began to face critics even within the president's own party. By 2004, the Republican-led Congress began to cut back funds for some of the administration's more controversial space-based systems—such as the space-based laser—because of technical problems and mounting costs. It eventually became apparent that despite the administration's early pro–space weapons rhetoric, its main accomplishment in two terms of office would be the deployment of a small number of ground-based interceptors in Alaska and California, plus additional Aegis missile defense systems aboard U.S. destroyers at sea. Indeed, in the fall of 2006, conservative critics of the administration issued a report that lambasted the Bush administration for failing to deploy space-based missile defenses.[6]

The official issuance of the revised U.S. National Space Policy in October 2006,

however, reiterated the Bush administration's refusal to consider new treaties for space security, implicitly rejecting any Reagan-era linkage between space defenses and arms control.[7] It also asserted the U.S. right to deny space access to rivals, despite possible ramifications such as the likely stimulation of foreign space military programs. Many domestic and almost all foreign observers (including U.S. NATO allies) viewed the administration's repudiation of both multilateral and cooperative security approaches as harmful to the future of space security, leading to considerable criticism. The one exception to the Bush administration's non-engagement policy in space security concerned debris mitigation, where the administration supported voluntary efforts through the UN Committee on the Peaceful Uses of Outer Space (COPUOS) to adopt international debris guidelines. However, these guidelines were not binding on states and therefore did not ban weapons tests in space.

The sweeping election of a Democratic-led Congress in November 2006 has changed the factors affecting the space security debate in two ways. First, the power of the purse has now come under committee chairs in both the House of Representatives and Senate largely critical of the Bush administration's hegemonic approach to space security. Second, President Bush's swift removal of Secretary of Defense Donald Rumsfeld—preceded and followed by a series of defections by top neo-conservatives from the administration—moved the balance of power in space security decision making to more moderate voices, such as the new secretary of defense, Robert Gates, and Secretary of State Condoleezza Rice.

China's test of an ASAT weapon in January 2007 further shook the foundations of the administration's largely isolationist space security policy, which had presumed that future problems could be solved primarily by military means and without the need for further space diplomacy. While critics from the right (such as Republican Senator Jon Kyl) argued for near-term space weapons, internationalist opponents of the administration both in the United States and abroad argued that the threat of space debris now required a more cooperative policy from the White House. For the first time, business leaders—such as the head of Intelsat—broke ranks with the administration and called for strict guidelines against debris and the initiation of international talks on banning destructive ASAT testing.[8] Suddenly, technical factors had intervened to bring a dose of reality to the previously highly polemical space security debate, as nearly all actors recognized the futility of unilateral approaches to this collective problem.

Factors affecting Future Space Security

While the conditions influencing space security have changed markedly since the fall of 2006, they have not yet brought significant new forms of cooperation. Still, there

are signs that the ice of the past decade—beginning in the late Clinton years—is melting.

First, the Democratic-led Congress has become increasingly skeptical of plans for space-based missile defenses and of the need for other space-based weapons. It also questions their affordability. The current Congress is therefore working to revise U.S. military space policy and adopt a stance calling for greater openness to international cooperation as a tool for addressing space security threats.

Second, the Chinese ASAT test has been a shock to the international system, releasing 35,000 pieces of debris, putting hundreds of spacecraft at risk of damage or destruction, and placing the United States on notice that "space dominance" strategies will be more complicated than their supporters once thought. More and more states, their space agencies, and their militaries now realize that greater action is needed to stem the rapidly worsening orbital debris problem. The international space industry is also putting unprecedented pressure on national legislatures and international organizations to enact concrete steps to protect their valuable assets in orbit. The passage by COPUOS of a voluntary debris convention at its June 2007 meeting puts states on record as opposing unnecessary debris generation, and it may also stimulate further steps. Notably, the Bush administration quietly eased its policy of no discussions on space security at the CD during its first session of 2007. Rather than stating its opposition (as in the National Space Policy), the administration now voiced its support for such talks in tandem with Fissile Material Cut-Off Treaty negotiations, thus putting China and India (both FMCT holdouts) on the spot for blocking such efforts. While the change may in part simply be tactical, the positive rhetoric may help bring some progress toward addressing shared security problems in space.

Third, many senior officials in the U.S. Defense Department have gradually come to realize that the most desirable stance for the United States in space is one of taking the technological high road: developing non-destructive methods of defending U.S. satellites and interfering with hostile spacecraft, as well as preparing for so-called "operationally responsive" space capabilities.[9] The latter category refers to efforts to reduce reliance on single spacecraft for critical military support functions and to develop the ability to quickly replace any significant assets that might be damaged or destroyed in a time of war. This strategy is believed by its supporters to be more effective, more sustainable, more cost-effective, and less likely to generate hostile foreign reactions than previous concepts of "space dominance."

Still, these positive changes in the direction of cooperative space security do not decrease a series of remaining technical and political obstacles to future international rules of the road (ad hoc agreements not to engage in harmful behavior) or more formal measures (such as treaties). These include the difficulty of reaching and verifying agree-

ments, the greater number of actors in space since the cold war, and the uncertainties and mistrust that remain among major militaries in space—particularly between the United States and China. The growing number of state and non-state actors in space with access to military space technology via the international market also complicates the current space security environment. Nevertheless, given the relatively lower levels of political hostility among major space actors compared to the cold war, the increasing capabilities of space surveillance technologies for verification, and the willingness of all major states to at least consider new space security discussions, there are possibilities that favorable agreements might be reached.

CONCLUSION

While this article does not predict the future success of international efforts to prevent space conflicts, it does suggest that there are strong incentives for states to cooperate in space. Historical experience, however, shows that creative and sustained national leadership will be required if states are to overcome their mistrust and restrain natural tendencies toward active defenses in space. Critical among these factors will be the development and institutionalization of international space security talks toward a reconceptualized framework. Such a framework should downplay the current state-versus-state focus of many countries, and instead emphasize the notion of common security against shared threats in space—threats such as traffic control, conflicting broadcast frequencies, increasingly scarce geo-stationary orbital slots, and debris-producing space weapons.[10] Perhaps greater awareness of the range of multilateral technical problems in space will encourage states to rethink some of their political assumptions about space competition, thus stimulating leaders to seek out new mechanisms for restraint-based cooperation.

Nonetheless, holding out for perfect agreements in space security talks—such as the complete bans on all possible means of space interference sought after by arms control purists and the doubt-proof verification required by hard-line skeptics—will continue to be the enemy of many good (and useful) space security agreements, unless national leaders show increased pragmatism. As in past periods, real-life agreements will never provide perfect security against all possible technologies of interference, and verification mechanisms will never be able to "prove" the complete absence of weapons-related capabilities (although they will get better and better at detecting and limiting them). However, partial or incremental solutions—such as rules of the road or specific bans against destructive ASAT testing—might work well enough to prevent near-term space conflict, if the relevant actors are willing. Steady engagement among key players over time may then have the chance to limit hostility and mistrust, leading to even

better mechanisms. This type of step-by-step approach is not ideal, but, as both past and recent events have shown, it will likely serve the interests of all parties in space more effectively than taking no steps at all.

Notes

1. *Space security* is defined here as the ability to access and use space without fear that one's space assets will be tampered with or destroyed.

2. Secretary of State Dean Rusk (address, 16 June 1962), *U.S. State Department Bulletin*, 2 July 1962.

3. SDI's testing and deployment, however, would have ruined low-Earth orbit for other purposes, given its likely generation of large amounts of space debris. Conceivably, if discussions continued, a cooperative deployment process might have uncovered and halted the program after the intervention of two side's national reconnaissance and space agencies.

4. Eric M. Javits, "A U.S. Perspective on Space," in *Future Security in Space: Commercial, Military and Arms Control Trade-Offs*, ed. James Clay Moltz (Monterey, CA: Center for Nonproliferation Studies, 2002), 52, http://www.cns.miis.edu/pubs/opapers/op10/op10.pdf. This article was based on an official speech given shortly before.

5. See "The First Committee Monitor, Final Edition: 31 October–1 November 2005," http://www.reachingcriticalwill.org/political/1com/FCM05/week5.html#4. Israel abstained and all other countries supported the two resolutions.

6. Independent Working Group, "Missile Defense, the Space Relationship, and the Twenty-First Century: 2007 Report," http://ifpa.org/pdf/IWGreport.pdf.

7. See the full text of "U.S. National Space Policy" (unclassified version), White House Office of Science and Technology Policy, http://ostp.gov/html/US%20National%20Space%20Policy.pdf.

8. See, for example, an opinion piece by Intelsat Chief Executive Officer David McGlade, "Preserving the Orbital Environment," *Space News*, 19 February 2007.

9. See, for example, the negative comments by Air Force Undersecretary for Space Programs Gary Payton about kinetic-energy ASATs in Jeremy Singer, "USAF Interest in Lasers Triggers Concerns About Anti-Satellite Weapons," *Space News*, 1 May 2006.

10. On *common security* and its differences from *collective security*, see K.K. Nair, *Space: The Frontiers of Modern Defence* (New Delhi, India: Knowledge World, 2006).