LIBERTY UNIVERSITY

HELMS SCHOOL OF GOVERNMENT

Anti-satellite Tests: A Risk to The Security and Sustainability of Outer Space

Submitted to Helms School of Government Conference

“A Nation Divided? Assessing Freedom & Rule of Law in a Post-2020 World”

by

McKayla Swan

March 24-26, 2022

Abstract

In November of 2021, The Russian Federation conducted an anti-satellite test (ASAT), destroying one of their defunct satellites in low earth orbit (LEO). This test, although not the first of its kind, created thousands of pieces of new space debris, threatening LEO satellites and the International Space Station (ISS). Russia's test has resurfaced discussions on the militarization of space and its long-term sustainability. Absent legally binding multilateral agreements aimed at long-term peace and sustainability in space, the area will continue to develop in a hazardous direction. Therefore, The United States should initiate a multilateral treaty to develop a partial ban on ASAT tests. Part of this initiative should include transparency and confidence-building measures focused on space situational awareness (SSA).

Key Words: space sustainability, ASAT, China, co-orbitals, Russia, arms control, test ban

Introduction

The new and perplexing challenges in the outer space domain have outgrown the framework that nation-states have used to address them. Due to the expansion and development of technology, the space environment has become congested and threatening, if not hostile. To preserve the domain for future use, the United States must take a leadership role in developing new international norms for space. Anti-satellite weapons are at the crux of the domain's security and sustainability issue. Therefore, the United States should propose a partial ASAT test ban and initiate confidence-building measures to secure the outer space environment for long-term use.

The Space Race

In October 1957, the Soviet Union launched their first satellite, Sputnik I, into space. The Soviet's satellite prompted the United States to develop its own capabilities in space, leading to the famous "space race." The United States launched its first satellite into orbit, Explorer 1, in January of 1958.[1] More shockingly, in April of 1961 Russian cosmonaut, Yuri Gagarin became the first man in outer space. Following this Soviet accomplishment, it seemed as if the Soviet Union had won the space race. Yet, in July of 1969, the most profound development of space exploration would occur. American astronauts Neil Armstrong and Buzz Aldrin became the first men to step foot on the moon.[2] On that day, Armstrong famously stated "That's one small step for man, one giant leap for mankind." With these words, the "space race" would transition into a new era: an era of scientific discovery, but more importantly one of strategic development.

The advancements in space technology during the space race placed science and prestige at the forefront of the nation's psyche.[3] After the launch of Sputnik I, the development of reconnaissance satellites increased dramatically. Reconnaissance satellites, also known as spy satellites, can collect imaging data as they orbit above another nation's territory. These satellites provide valuable intelligence previously impossible to gather without flying over another nation's territory, which would be a breach of sovereignty. The strategic value of reconnaissance satellites spurred the development of counter-space measures, such as antisatellite weapons.[4]

The United States conducted the first anti-satellite weapons test in 1959 under project Bold Orion. The missile was aimed to intercept the U.S. satellite, Explorer VI. Flight data revealed that the objectives of the mission were met, and the United States had just conducted the first successful ASAT test.[5] The United States' development of an anti-satellite system was explicitly designed for the inspection of orbiting satellites. To execute the inspection, the vehicle would situate itself within 50 feet of the satellite to be inspected.[6] This program was later canceled by the United States not only because of its expense but the risk of creating an international incident. In 1968 the Soviet Union began to test their first ASAT system, a satellite

---

[1] National Archives, "Space Exploration: timeline," Archives Library Information Center, last modified August 21, 2016, https://www.archives.gov/research/alic/reference/space-timeline.html

[2] National Archives, "Space Exploration," 2016.

[3] Paul B. Stares, *The Militarization of Space: U.S. Policy, 1945-84* (Ithaca, NY: Cornell University Press) 23.

[4] Stares, *The Militarization of Space*, 30.

[5] Ibid., 109.

[6] Ibid.

interceptor. The initial test was successful, and the Soviets continued to develop their ASAT programs throughout the 1970s. Through multiple antisatellite tests during this period, the Soviets demonstrated their ability to intercept and destroy satellites.

At the beginning of the 1980s, the Reagan administration prioritized the continued development of the U.S. ASAT program.[7] The U.S. pursued a strategy of deterrence in space. The administration believed that an operational U.S. ASAT program would deter the Soviet's use of their weapons system. In 1981 The Soviet Union brought an arms control proposal called the "Draft Treaty on the Prohibition of the Stationing of Weapons of Any Kind in Outer Space" to the UN General Assembly. The proposal was focused on the placement of orbiting weapons in outer space but did not prohibit ASAT systems.[8] Although it prohibited the destruction of or disturbance of another states' space systems, the United States rejected the proposal. The Soviets submitted another draft of the proposed treaty in 1983. The draft included major developments including a complete ASAT test ban and a provision that required the destruction of current ASAT systems, including the Soviet's interceptor system. The United States denied the treaty because it was unverifiable and lacked provisions for attribution in the event of an attack.[9] After failing to ratify the agreement, both nations continued to develop their counter-space capabilities. Although since the 1980s, there have been significant advancements in technology, little progress has been made on the creation of norms in outer space. Yet, the environment has grown increasingly congested and contentious due to space debris and the proliferation of weapons systems.

Examining the Problem

The future preservation of the space domain is a multifaceted dilemma, yet the most pressing issues are the security and sustainability of the environment. Both security and sustainability are interconnected. Neither can exist independently, thus both are equally vital to the preservation of space for future generations. In the present context, security in space refers to a state's military interests. Sustainability refers to the preservation of the environment for long-term use. Unlike during the Cold War period, more nations and private companies are utilizing space. The increased access and use of space have contributed to the congested environment, threatening its sustainability. Further, global powers such as the United States depend on space systems to conduct virtually all military operations. Therefore, the increasing levels of debris and the militarization of the environment are risks to space security. Anti-satellite weapons and their destructive testing are issues that intersect both space security and sustainability. These weapons threaten a nation's space security because they are a form of asymmetric warfare. Anti-satellite systems can be used to destroy a state's critical security systems such as satellites used for military communications or early-warning satellites. Some forms of ASAT testing create large debris fields contributing to the congestion of the domain and threatening its sustainability. The existence and testing of ASAT weapons are areas that must be addressed to protect the stability and sustainability of space. Currently, there are limited international guidelines that regulate activities in space and functionally none that regulate anti-satellite capabilities. This must be addressed if space is to remain secure and sustainable.

---

[7] Stares, The Militarization of Space, 219.

[8] Ibid., 229.

[9] Ibid., 232.

Space Security

Due to the proliferation of space weapons, the security of the space domain is at risk. The United States has a strong interest in the protection of space satellites. From communication systems to intelligence gathering and early warning satellites, space is a strategic domain. The value of these space-based systems has caused the proliferation of technology, such as ASAT weapons, designed to protect against an attack on critical national security infrastructure.[10] Recently, testing of such weapons has significantly increased; "Since 2005, there have been 20 ASAT weapons tests in space or against satellites by four different countries, a rate of testing that has not happened since the 1960s."[11] The United States' current strategy in space security, is deterrence. Thus, U.S. leadership has not pursued legally binding arms control agreements, which could restrict this strategy. As other space-faring nations begin to develop capabilities aimed at the destruction of U.S. military capacity, it may be necessary to pursue a fair and equitable agreement.

The United States' greatest strategic threats in space are Russia and China. Russia is the apparent competitor, with a long history of U.S. competition and cooperation. Though the relationship on the ground can be tense and adversarial, in space, the accord has been largely cooperative. For example, the close cooperation on the International Space Stations (ISS), and the use of Russian rockets. Yet, the cooperative spirit in space relations does not negate Russia's strategic capabilities. More recently, China has developed a strong presence in space and has developed counter-space capabilities.[12] China's continued development of strategic capabilities will become a challenge for the United States. The Chinese are developing various counter space capabilities ranging from on-orbit systems, ground-based ASAT weapons, and cyberspace systems.[13] They have not been transparent with these technological developments, which suggests they are building up covert weapons systems. For example, Tianjin University, has developed a space robot supposedly intended to attach to space debris to remove it from orbit. However, its design would make it difficult to attach to debris. The targeted debris "would likely need to be in a predictable motion in an established orbit in order for capture by the robotic arm to be possible. The design of this satellite lends itself to a co-orbital ASAT, even if that is not the stated intent."[14] Space weapons have already been developed, and there is no going back. The question thus becomes, what is the best way to mitigate their negative effects?

In a testimony before the House Science, Space, and Technology Committee, Todd Harrison, director for the Aerospace Security Project at the Center for Strategic and International Studies stated that "the real objective of this [new space] race is to see who can build the

---

[10] Victoria Samson and Brian Weeden, "Enhancing Space Security: Time for Legally Binding Measures," Arms Control Association, December 2020, https://www.armscontrol.org/act/2020-12/features/enhancing-space-security-time-legally-binding-measures

[11] Samson and Weeden, "Enhancing Space Security," 2020.

[12] Mark Stokes, et al. "China's Space and Counterspace Capabilities and Activities," report prepared for The U.S.-China Economic and Security Review Commission. March 30, 2020, 22. https://www.uscc.gov/sites/default/files/2020-05/China_Space_and_Counterspace_Activities.pdf

[13] Todd Harrison et. al., "Space Threat Assessment 2021," A Report of The CSIS Aerospace Security Project, CSIS, 2021, 10. https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/210331_Harrison_SpaceThreatAssessment2021.pdf?gVYhCn79enGCOZtcQnA6MLkeKlcwqqks

[14] Tod Harrison et. al., "Space Threat Assessment," 10.

broadest and strongest international coalition in space. Whatever group of nations emerges as the leading coalition in space over the next decade will be the ones that set the de facto norms for the space commerce and exploration that follows."[15] The United States must continue to lead in the space environment, by introducing equitable norms which align with U.S. national security and commercial interests. Although the United States faces formidable competition from Russia and China, cooperation is still possible. One example Harrison cites is the cooperation that took place between the United States and the Soviet Union during the Cold War.[16] Cooperation and increased transparency between the two nations created a framework for future dialogue. The same can be true in the increasingly militarized space environment.

Space Sustainability

The sustainability of the space environment is critical to its long-term use for peaceful purposes. Currently, the greatest threat to sustainability is the growing volume of space debris. Much of modern technology relies on space-based satellites. Thus, Low Earth Orbit (LEO), has become congested with new space objects and continues to worsen. New orbital debris is created in various ways, including satellite collisions, launching debris, and ASAT weapons tests. Concern over the increase in space debris in LEO is often articulated using the "Kessler Syndrome," which explains the impact of continued in-orbit collisions. The theory predicts that in a congested orbit space debris will collide and produce more debris. New debris will continue to collide at higher velocities creating a cascade of collisions. Ultimately, the orbit will become too crowded and unusable.[17] Kessler cites three different types of collisions: negligible non-catastrophic, non-catastrophic, and catastrophic.[18] The first two types of collisions do not create large debris fields and at worst impact the environment in the short term.[19] A catastrophic collision impacts both the short-term and long-term sustainability of the environment. This collision produces small and large fragments. The large fragments impact the long-term suitability of space through collision cascades. Data suggests that any fragments 20cm or larger colliding with an intact space object would result in a catastrophic collision.[20] Generally, anti-satellite tests are examples of catastrophic collisions. Thus, the debris created from a single test may continue to produce more debris after the initial collision.

Although the United States, China, and India have all conducted debris-creating ASAT tests, Russia's most recent test has drawn international criticism. On November 15, 2021, Russia

[15] Todd Harrison, Statement before the House Science, Space, and Technology Committee Subcommittee on Space and Aeronautics, "NASA's Future in Low Earth Orbit: Consideration for International Extension and Transition" (Washington, D.C., CSIS) September 21, 2021, 3.

[16] Harrison, "NASA's Future in LEO," 3.

[17] Donald J. Kessler et. al., "The Kessler Syndrome: Implications to Future Space Operations," American Astronautical Society, February 2010, https://www.threecountrytrustedbroker.com/media/kesseler_syndrome.pdf

[18] Kessler et al., "The Kessler Syndrome," 2010.

[19] Ibid.

[20] Ibid.

tested a direct ascent ASAT missile hitting their defunct COSMOS 1408 satellite.[21] The United States has reported that their test created at least 1,500 fragments of trackable debris (at least 10cm in diameter), with many smaller fragments.[22] The test forced astronauts at the ISS to undergo safety procedures in the event of a collision. In a press release Bill Nelson, NASA administrator, condemned the Russian's action stating, "It is unthinkable that Russia would endanger not only the American and international partner astronauts on the ISS but also their cosmonauts. Their actions are reckless and dangerous… all nations have a responsibility to prevent the purposeful creation of space debris from ASATs and to foster a safe, sustainable space environment."[23] Nelson calls for all nations to refrain from conducting debris-creating ASAT tests, yet there is no international legally binding framework to prevent such actions, this must change.

The current international perspective on intentional debris creation is evidenced through non-legally binding agreements. First is the 2010 Debris Mitigation Guidelines established by the U.N. Committee on the Peaceful Uses of Outer Space. The guidelines primarily address debris mitigation for the construction, orbiting, and de-orbiting of satellites. In addition to these measures, Guideline 4 states that the "intentional destruction of any on-orbit spacecraft and launch vehicle orbital stages or other harmful activities which generate long-lived debris should be avoided."[24] Russia is a signatory of this agreement yet did not honor its provisions. Further, Russia did not honor its submission of space norms to be included in the U.N. Resolution "Reducing Space Threats Through Norms, Rules, and Principles of Responsible Behavior." This resolution, adopted in December of 2020, asked states to submit suggestions for responsible norms in outer space. Russia suggested that states should "not construct, test or deploy space weapons, regardless of where they are based, for any purpose, including for missile defense or as anti-satellite capabilities."[25] Russia's actions have proven that voluntary norms will not suffice to prevent reckless weapons testing, rather legally binding norms are necessary.

Lack of Norms and Regulation

The primary governing law related to the use of outer space is the multilateral *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*. More commonly referred to as the Outer Space Treaty (OST), which was adopted in the UN General Assembly in 1967. The treaty recognizes the "interest of all mankind in the progress of the exploration and use of outer space for peaceful

---

[21] Ankit Panda, "The Dangerous Fallout of Russia's Anti-Satellite Missile Test," Carnegie Endowment for International Peace, November 17, 2021, https://carnegieendowment.org/2021/11/17/dangerous-fallout-of-russia-s-anti-satellite-missile-test-pub-85804

[22] Panda, "The Dangerous Fallout" 2021.

[23] "NASA Administrator Statement on Russian ASAT Test," Press Release, NASA, November 15, 2021, https://www.nasa.gov/press-release/nasa-administrator-statement-on-russian-asat-test

[24] "United Nations, "Space Debris Mitigation Guidelines of the committee on the Peaceful Uses of Outer Space," Office for Outer Space Affairs, 2010, https://www.unoosa.org/pdf/publications/st_space_49E.pdf

[25] United Nations, "Reducing space threats through norms, rules and principles of responsible behaviours" Prevention of an arms race in outer space, Report of the Secretary-General, 2020, https://undocs.org/A/76/77

purposes."[26] This purpose statement reflects the interest of all states to preserve the security and sustainability of the environment. Further, the treaty stipulates that "States Parties to the Treaty undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner."[27] The OST only makes provisions against nuclear weapons and does not prohibit the use of other weapons such as anti-satellite systems.

The most recent attempt at a legally binding arms control agreement was jointly proposed by Russia and China in 2008. Their proposal, which was later revised and resubmitted in 2014, was the *Prevention of Placement of Weapons in Outer Space, the Threat of Use of Force against Outer Space Objects* (PPWT). The purpose of the treaty was articulated as, "desiring to prevent outer space turning into a new area of weapons placement or an arena for military confrontation and thereby to avert a grave danger to international peace and security."[28] The draft prohibits the placement of any weapons in outer space.[29] Under the treaty, a "weapon in outer space" is defined as "any outer space object or component thereof which has been produced or converted to destroy, damage or disrupt the normal functioning of objects in outer space."[30] In addition, the draft emphasizes the implementation of transparency and confidence-building measures (TCBMs).[31] It suggests that nations should "develop procedures for collective data sharing and information analysis."[32] The United States did not sign either version presented in 2008 or 2014 because there was not a verification protocol. The PPWT simply suggests the need for potential "additional protocol" to verify treaty compliance.[33] In addition, the proposal does not address the use of terrestrially based ASAT weapons. This was another major concern for the U.S. and its allies. The PPWT is important to the discussion of space arms control for two reasons. First, it was proposed by Russia and China. Although it was largely a political strategy to make the U.S. look bad for developing space weapons, it demonstrates an openness to a legally binding arms control agreement.[34] Secondly, it reveals gaps in the treaty which must be shorn up before a similar treaty could be ratified.

---

[26] United Nations Treaties and Principles on Outer Space, Treaties and Principles Governing the Activities of States in the Exploration and use of Outer Space (New York: United Nations, 2002), 1.A.

[27] Ibid., Art. IV.

[28] Conference of Disarmament, *Draft Treaty on the Prevention of Placement of Weapons in Outer Space the Threat or Use of Force against Outer Space Objects* (Geneva: CD/1985, 2014), Preface.

[29] CD, *OST,* Art. II.

[30] Ibid., Art I.

[31] Ibid., Art. V.

[32] Ibid., Art VI (f)

[33] Ibid., Art. V.

[34] Samson and Weeden, "Enhancing Space Security," 2020.

Risks of Current U.S. Strategy

First, on the issue of space security, policymakers have been hesitant to pursue any agreement which would undermine the United States' freedom to pursue specific activities in space. This presupposes that the United States is ahead of its competitors in spacefaring capabilities. The increasing competition from Russia and China in space should change the United States' calculus.[35] The proliferation of space weapons and increased technological capabilities demonstrate that the United States' strategic edge in space is waning. Thus, it is time for the United States to consider a legally binding agreement.[36] Next, on the issue of sustainability, destructive ASAT tests have and will continue to contribute to a congested LEO. An overcrowded space environment increases the likelihood of collision cascades and the potential of a miscalculation. Ultimately, this reduces the long-term sustainability of the domain and should be a considerable concern for the United States.

Paths Forward for U.S. Space Policy

The future of U.S. space policy could move forward in multiple directions. First, is the status quo strategy of deterrence. The Biden administration's space policy aims "to deter aggression against the U.S., allied, and partner interests in a manner that contributes to strategic stability, the United States will accelerate its transition to a more resilient national security space posture and strengthen its ability to detect and attribute hostile acts in space."[37] The U.S. can continue to meet these goals through improvements in technological resiliency. To address current challenges, the Space Force is updating and enhancing existing GPS satellites with anti-jamming software.[38] In addition, they are creating many smaller satellites, more difficult to destroy, and placing less value in each target. This is a strong strategy to increase the resiliency of U.S. systems.[39] These actions will continue to bolster U.S. deterrence and is a viable path for future space operations.

Second, the United States could pursue an alternative strategy to deterrence by engaging in talks for a limited legally binding option. A partial ASAT test ban and increased TCBM's would be the first step to comprehensive norms for outer space. The agreement would ban debris causing ASAT tests and involve TCBM's on debris tracking and non-sensitive space situational awareness information (SSA). The TCBM's should also include discussion on rules of engagement, and responsible norms in space.[40] This double-layered approach would mitigate some sustainability issues arising from space debris, and it would build confidence in legally binding measures to eventually bolster space security.

Lastly, the United States could pursue a more comprehensive legally binding arms control agreement. This would be similar to the PPWT proposed by Russia and China. For an

---

[35] Samson and Weeden, "Enhancing Space Security," 2020.

[36] Ibid.

[37] The White House, *United States Space Priorities Framework,* (Washington D.C., 2021), 6.

[38] U.S. Senate Committee on Armed Services Subcommittee on Strategic Forces, *Space Force, Military Space Operations and Programs*, 117th Cong., 2021, 12.

[39] Ibid., 53.

[40] Ibid., 37.

agreement to be successful it must adequately address treaty verification. It must address verification and ground-based ASAT systems. Although challenging, verification is not impossible. Debris creating collisions or a close approach by another nation's satellite can be verified.[41] Further, the United States and Canada have tested systems that would allow in-orbit inspection of a satellite. These systems contain sensors that can inspect an object in orbit. This tactic analyzes the form of the inspected object; therefore, it assumes that the form is built for its function.[42] The technology could be utilized to verify the function of other states' satellites. It would be the space equivalent to on-site inspection of nuclear facilities.[43] To address concerns on ground-based ASAT systems, the treaty would include limits on how many weapons could be developed. This aligns with aggregate limits placed on nuclear warheads and ICBMs under the New START treaty.[44]

Criteria for Analysis: Viability, Benefit, Equity

To determine the best policy path for the United States, it is important to identify criteria for analysis. The three criteria that will be used to analyze the policy alternatives are viability, benefit, and equity. Viability is the likelihood that the policy could be successfully implemented. This includes the probability that other states would agree to the policy. The second criterion, benefit, is the projected success of the policy to solve the problem. In this case, the ability of the policy to improve both the stability and sustainability of the space domain. Lastly, equity refers to the fairness of a policy both to the United States and other nations operating in space.

Projected Outcomes and Tradeoffs

The first policy option for the U.S. is the status quo deterrence. This is a viable option for the United States. It does not require participation from other states; therefore, consensus and quick decision-making are benefits to this policy. The focus is U.S. strategic benefit. This may bolster U.S. strategic interests in the short term by enhancing technological resilience, but it will not be successful as a long-term strategy. If other spacefaring nations pursue deterrence the domain will continue to militarize. This increases the probability of negative consequences such as a miscalculation. Lastly, deterrence is an equitable option for the United States because it enhances U.S. national security interests and does not concede ground to other states' objectives.

In the short term, this policy may preserve the somewhat stable space environment, yet it is passive stability that will not produce long-term benefits. In a hearing before the U.S. Senate Armed Services Committee, Senator Fisher asked Assistant Secretary of Defense for Space Policy, Mr. John Hill, if a defense-only approach will be successful in the space domain. Mr. Hill stated that "defense is one piece of mission assurance, but it is better to start off with architecture and do not require so much defense in the first place. What we face today is the legacy of having designed architectures in an era when we did not face the kinds of threats we face today and

---

[41] Samson and Weeden, "Enhancing Space Security."

[42] Ben Baseley-Walker and Brian Weeden, "Verification in Space: theories, realities and possibilities," (Geneva: United Nations Institute for Disarmament Research, 2010), 42.

[43] "New START Treaty," U.S. Department of State. https://www.state.gov/new-start/#:~:text=Treaty%20Structure%3A%20The%20Treaty%20between,all%20Russian%20deployed%20intercontinental%2Drange

[44] U.S. Department of State, "New START."

transitioning to a new era."[45] Mr. Hill's statement demonstrates that a short-term policy solely focused on deterrence does not address more substantial, long-term issues. Thus, deterrence is a short-term strategy that trades off with long-term security and sustainability.

The second policy option for the United States is a ban on debris causing ASAT tests and an increase in TCBMs on SSA and data sharing. To determine if this path is viable, it is important to analyze the space policy of the most dominant space powers, the U.S., Russia, and China. First, the United States would support a partial test ban because it does not hurt strategic interests, it simply bans dangerous, debris-causing explosions. The current U.S. policy affirms that the U.S. will "demonstrate leadership in both the responsible use of space and stewardship of the space environment."[46] It also affirms that "the United States will engage diplomatically with strategic competitors in order to enhance stability in outer space."[47] Proposing an agreement that prevents the creation of new debris is a leadership action that would improve space stability. The U.S. has also previously participated in TCBMs, thus they will likely be open to them in the future. China, as a growing space power has expressed its willingness to participate in the creation of international norms. In a recent white paper published by the Chinese, they affirmed their commitment to form international norms and ensure the long-term sustainability of space.[48] Lastly, on paper Russia affirms its commitment to space sustainability, but its recent actions demonstrate otherwise. Russia may be willing to ratify a binding treaty if it is articulated as a precursor to a more comprehensive arms control agreement.

A partial ASAT test ban and increased transparency measures would be effective to bolster the security and sustainability of space. It is effective at increasing suitability by preventing deliberate human debris creation currently contributing to the issue. Greater SSA sharing will prevent accidental collisions, hence reducing more preventable debris creation. The TCBMs in this policy are key because they produce trust and provide a framework for future cooperation. Data sharing and communication are key to the verification of actions in space. Therefore, this aspect of the policy may be a necessary first step before there could be a more comprehensive space arms control agreement. Lastly, the policy is relatively equitable. The debris-producing test ban applies to all nations equally. It is plausible that the data sharing involved in the TCBMs would not take place equally among signatories of the treaty. Either due to lack of ability or lack of transparency. Yet generally this policy would be a beneficial first step toward concrete norms in space.

Lastly, is the more comprehensive space arms control agreement. The viability of this option is low, because of the serious concerns expressed by the United States and its allies. Although there may be some ability to verify actions in space, the United States does not consider current technology to be sufficient to verify treaty compliance. Further, if the issues of verification and ground-based ASAT systems could be addressed in a revised PPWT there is no assurance that Russia and China would still support the agreement. As to the benefit of the

---

[45] Senate Committee, *Space Force, Military Space Operations*, pg. 24.

[46] White House, *U.S. Space Priorities*, 6.

[47] Ibid.

[48] China National Space Administration, "China's Space Program: A 2021 Perspective" The State Council Information Office of the People's Republic of China, January 2022 http://www.cnsa.gov.cn/english/n6465652/n6465653/c6813088/content.html

policy, this option would be the most comprehensive in addressing the security challenges of space. In theory, it would prevent the continued militarization of the domain and address some sustainability concerns. Yet these benefits would only exist if there was complete compliance by all parties. Without a strong verification mechanism, there is no way to assure the treaty is applied equally to all parties. Thus, this presents an interesting tradeoff. The policy could significantly reduce space militarization, but there is a risk that other parties do not comply. Therefore, the tradeoff would be a significant loss of U.S. dominance in space.

General Recommendations

The United States must pursue a policy that both benefits strategic interests and one that preserves the space environment for long-term use. A partial ASAT test ban and an increase in TCBMs satisfy both goals. The United States' proposal of a partial ASAT test ban will demonstrate leadership in space sustainability. Further, it prevents purposeful debris creation, thus protecting the space domain for U.S. military and commercial assets. The policy mitigates sustainability issues, but it does not hurt the U.S. strategic interests in space.

In addition to the partial ASAT test ban, the focus on TCBMs is critical to space sustainability and future arms control measures. Data sharing increases capacity for conjunction assessment, allowing satellite operators to maneuver to prevent accidental collisions and debris creation. Currently, the United States operates the largest surveillance system known as the Space Surveillance Network. It currently tracks over 21,000 objects which are at least 10 cm in diameter. Russia currently has a similar system, with a smaller catalog.[49] At the moment, there is no streamlined way to share collision information, especially with U.S. competitors. Because there is no streamlined mechanism, Russia and China do not easily engage with the United States on basic data-sharing. To contact satellite operators from Russia or China, it must be done through diplomatic channels. For example, communication through defense attachés.[50] The goal is to easily communicate data which is key for safety and flight operations. This data sharing would not involve strategic information, rather data which pertains to safety operations.[51]

Lastly, increased data sharing is a first step to preventing the continued militarization of space. Data sharing and better SSA are crucial to the development of a verification regime, to be used in a future arms control agreement. Sharing of SSA information could eventually be used to create a surveillance system with the capacity to track and catalog the orbital measurements of satellites. This system could differentiate between an ASAT attack or an accidental collision.[52] Thus, TCBMs mitigate debris creation, but also increase the probability of developing a verification mechanism crucial for future norms in the domain. Russia and China, with their goal of a comprehensive arms control agreement, should accept the proposed treaty as a necessary first step.

Conclusion

To secure the space environment for future use, the United States must take a leadership role in the development of new international norms. The current U.S. deterrence strategy will not benefit the long-term security and sustainability of the environment. It only encourages other nations to proliferate counter-space capabilities. The opposite of the current U.S. strategy is a

49 Walker and Weeden, "Verification in Space," 43.

50 Senate Committee, *Space Force, Military Space Operations*, 38.

51 Ibid.

52 Walker and Weeden, "Verification in Space," 43.

comprehensive space arms control agreement like the PPWT proposed by Russia and China. The lack of a verification mechanism means that this policy is not viable and could not be implemented equitably to all state parties. The United States should pursue a mediated approach through a partial ASAT test ban and increased TCBMs that emphasize SSA data sharing. This path aligns with the space policy of most critical spacefaring nations; hence it is a viable option. Further, it benefits the security and sustainability of space by providing a framework for a verification mechanism that could be used for a future arms control agreement. Lastly, debris causing ASAT attacks and tests are highly attributable because current technology is sufficient to determine which state deployed an ASAT weapon. Attribution is critical because it means the treaty could be equally applied to all signatories. These measures are key to the preservation of the space environment and peaceful relationship-building among nations.

Bibliography

Ben Baseley-Walker and Brian Weeden. "Verification in Space: theories, realities and possibilities." Geneva: United Nations Institute for Disarmament Research, 2010.

China National Space Administration. "China's Space Program: A 2021 Perspective" The State Council Information Office of the People's Republic of China. January 2022 http://www.cnsa.gov.cn/english/n6465652/n6465653/c6813088/content.html

Conference of Disarmament. Draft Treaty on the Prevention of Placement of Weapons in Outer Space the Threat or Use of Force against Outer Space Objects. Geneva: CD/1985, 2014.

Kessler, J. Donald et. al., "The Kessler Syndrome: Implications to Future Space Operations," American Astronautical Society, February 2010, https://www.threecountrytrustedbroker.com/media/kesseler_syndrome.pdf

Mark Stokes, et al. "China's Space and Counterspace Capabilities and Activities." report prepared for The U.S.-China Economic and Security Review Commission. March 30, 2020. https://www.uscc.gov/sites/default/files/2020-05/China_Space_and_Counterspace_Activities.pdf

NASA. "NASA Administrator Statement on Russian ASAT Test." Press Release. American Astronautical Society, February 2010, https://www.threecountrytrustedbroker.com/media/kesseler_syndrome.pdf

National Archives. "Space Exploration: timeline." Archives Library Information Center. Last modified August 21, 2016, https://www.archives.gov/research/alic/reference/space-timeline.html

Panda, Ankit. "The Dangerous Fallout of Russia's Anti-Satellite Missile Test." Carnegie Endowment for International Peace. November 17, 2021. https://carnegieendowment.org/2021/11/17/dangerous-fallout-of-russia-s-anti-satellite-missile-test-pub-85804

Stares, Paul B. The Militarization of Space: U.S. Policy, 1945-84. Ithaca, NY: Cornell University Press, 1985.

The White House. *United States Space Priorities Framework*. Washington D.C., 2021, pg. 6.

Todd Harrison. Statement before the House Science, Space, and Technology Committee Subcommittee on Space and Aeronautics. "NASA's Future in Low Earth Orbit: Consideration for International Extension and Transition." Washington, D.C., CSIS. September 21, 2021.

Todd Harrison et. al. "Space Threat Assessment 2021." A Report of The CSIS Aerospace Security Project. CSIS. 2021. https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/210331_Harrison_SpaceThreatAssessment2021.pdf?gVYhCn79enGCOZtcQnA6MLkeKlcwqqks

United Nations. “Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space.” Office for Outer Space Affairs. 2010. https://www.unoosa.org/pdf/publications/st_space_49E.pdf

United Nations Treaties and Principles on Outer Space. Treaties and Principles Governing the Activities of States in the Exploration and Use of Outer Space. New York: United Nations, 2002.

United Nations. “Reducing space threats through norms, rules, and principles of responsible behaviours” Prevention of an arms race in outer space. Report of the Secretary-General. 2020, https://undocs.org/A/76/77

U.S. Department of State.“New START Treaty.” https://www.state.gov/new-start/#:~:text=Treaty%20Structure%3A%20The%20Treaty%20between,all%20Russian%20deployed%20intercontinental%2Drange

U.S. Senate Committee on Armed Services Subcommittee on Strategic Forces. Space Force. Military Space Operations and Programs.117th Cong., 2021. 1-60. https://www.armed-services.senate.gov/imo/media/doc/21-44_05-26-2021.pdf

Victoria Samson and Brian Weeden. “Enhancing Space Security: Time for Legally Binding Measures.” Arms Control Association, December 2020. https://www.armscontrol.org/act/2020-12/features/enhancing-space-security-time-legally-binding-measures