Foreign Policy at BROOKINGS

POLICY BRIEF

SAFEGUARDING THE HEAVENS: THE UNITED STATES AND THE FUTURE OF NORMS OF BEHAVIOR IN OUTER SPACE

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EXECUTIVE SUMMARY

Access to outer space and space-derived data is becoming increasingly important to the national and economic security of the United States and its allies. Yet that access is increasingly at risk due to the growth of orbital debris and the development of anti-satellite capabilities by potential adversaries like Russia and China. The United States will need a comprehensive strategy in order to manage this increasingly congested and contested environment. A key element of that strategy should be the development of effective bilateral and multilateral norms of behavior in outer space.

Over the past decade, the Bush, Obama, and Trump administrations have all supported the development of such norms of behavior. Moving forward, the United States should:

- pursue non-legally binding norms of behavior;
- consult closely with allies and partners;
- engage potential adversaries such as Russia and China;
- aim to reduce the risk of miscalculation among major spacefaring powers;
- advance practical measures that seek to maintain the long-term sustainability of the outer space environment; and
- continue working closely with commercial actors.

INTRODUCTION

Today, over 60 nations and government consortia, along with numerous commercial, scientific, and academic entities, operate satellites. This use of space has led to tremendous advancements and benefits for people on Earth. The cooperation between countries and the private sector on these space systems and their associated services and applications are vital to people's daily lives around the world, enhancing economic growth and development as well as security.

The utilization of space helps us warn of natural disasters, facilitate navigation and transportation globally, expand our scientific frontiers, monitor compliance with arms control treaties and agreements, provide global access to financial operations, and scores of other activities worldwide.

However, there has been a downside to these systems that is too little discussed: decades of space activity have littered Earth's orbit with defunct satellites and pieces of debris, and as we continue to increase activities in space, the chances of a

collision increase. The United States is currently tracking over 22,000 pieces of space debris 10 centimeters or larger in various Earth orbits. About 1,700 of these objects are active satellites. Other objects in orbit include: spent rocket bodies, inactive satellites, a wrench, and even a toothbrush! Experts warn that the current quantity and density of man-made debris significantly increases the odds of future collisions either as debris damages space systems or as colliding debris creates more space debris.

Because of the high speeds in which these objects travel in space, even a sub-millimeter piece of debris could cause a problem for human or robotic missions. This serious problem is continually growing as more debris is generated by routine operations as well as by accidents and mishaps such as the 2009 collision between a Russian Cosmos satellite and a commercially-operated Iridium satellite.

Other debris is a result of deliberate acts, like China's 2007 destructive missile test against one of its own satellites. That single test created over 3,000 pieces of debris larger than 10 centimeters and will stay in low earth orbit for potentially hundreds of years, presenting an ongoing threat to the space systems of all nations, including China itself. Over the past several years there have been hundreds of occasions when debris from China's 2007 anti-satellite test has come close to their own satellites. Indeed, the development of anti-satellite systems is one of the most pressing challenges to the outer space environment.

In testimony before the Senate Select Committee on Intelligence on February 18, 2018, Director of National Intelligence Daniel Coats warned about the increasing threat to U.S. and allied space systems from countries like Russia and China. He stated that "Russia and China continue to pursue anti-satellite (ASAT) weapons as a means to reduce U.S. and allied military effectiveness."[1]

Therefore, how does the United States respond effectively to these challenges? Some analysts argue that Washington should develop a more resilient space system comprised of smaller satellites that can operate in a contested space environment.[2] Others argue that the United States should develop its own ASAT capabilities to deter Russia and China.[3] While both of these views are not without merit and should certainly be part of a comprehensive response, diplomacy also needs to be part of the U.S. toolkit in responding to this growing threat. In particular, the United States must continue to take the lead in developing "norms of responsible behavior" or "rules of the road" for outer space.

Why do norms matter? First, it's very difficult to call out bad behavior if you don't define it. Second, in the increasingly congested space environment we live in, norms can improve the safety and sustainability of the space environment. Third, effective norms can help reduce the risk of miscalculations and accidental conflict between potential adversaries.

This paper will summarize some of the key initiatives over the last decade to develop norms of behavior for outer space; discuss how the Bush, Obama, and Trump administrations approached the development of space norms; and finally, highlight some lessons the United States might draw from as it seeks to promote the continued safety, security, stability, and sustainability of the outer space environment in the future.

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1 Daniel Coats, "Worldwide Threat Assessment of the U.S. Intelligence Community," (Washington, DC: Office of the Director of National Intelligence, February 13, 2018), 13, https://www.dni.gov/files/documents/Newsroom/Testimonies/2018-ATA---Unclassified-SSCI.pdf.

2 Loren Thompson, "As Space War Looms, Air Force's Biggest Weakness May Be How It Buys Satellites," *Forbes*, April 23, 2018, https://www.forbes.com/sites/lorenthompson/2018/04/23/as-space-war-looms-air-forces-biggest-weakness-may-be-how-it-buys-space-systems/#5c54448f78ab.

3 Colin Clark, "STRATCOM Raises the Spectre of Offensive War in Space," *Breaking Defense*, April 5, 2017, https://breakingdefense.com/2017/04/stratcom-raises-spectre-of-offensive-war-in-space.

MULTILATERAL EFFORTS TO DEVELOP SPACE NORMS OF BEHAVIOR

U.N. Debris Mitigation Guidelines

One of the most successful multilateral efforts to develop norms of behavior for outer space has been the U.N. Debris Mitigation Guidelines, approved by the U.N. General Assembly in 2007.[4] In many ways, these guidelines laid the foundation for most of the productive work done by the international community on space security and sustainability over the past decade. The guidelines are based on recommendations initially developed by the Inter-Agency Debris Coordination Committee (IADC), which consists of representatives from the world's major space agencies such as the National Aeronautics and Space Administration (NASA), European Space Agency (ESA), and Russian State Corporation for Space Activities (ROSCOSMOS). The objective of these guidelines is to minimize the creation of man-made debris in earth's orbit and reduce the threat to human and robotic space flight.

The guidelines focus on limiting the amount of debris released during normal operations, reducing the probability of accidental collision in orbit, and avoiding intentional destruction and other harmful activities. While the guidelines themselves are not legally binding in international law, several countries have incorporated the guidelines into their domestic laws and regulations. The guidelines have also established a precedent as to what a responsible space actor does in orbit, and helped develop a strong international norm against conducting debris-generating events in outer space, such as China's 2007 anti-satellite test.

U.N. Committee on Peaceful Uses of Outer Space Long-Term Sustainability Guidelines

Building on the Debris Mitigation Guidelines, in 2010, the U.N. Committee on Peaceful Uses of Outer Space (COPUOS) began an effort to develop a broader set of voluntary, best practice guidelines to enhance the long-term safety and sustainability of the outer space environment. These draft guidelines were focused on four broad areas including sustainable space utilization supporting sustainable development on Earth; space debris, space operations, and tools to support space situational awareness (SSA) data-sharing; space weather; and regulatory regimes and guidance for new actors in the space arena.

In 2016, the COPUOS Working Group on Long-Term Sustainability reached agreement in Vienna on an initial set of 12 guidelines. These guidelines were subsequently agreed to by all 84 COPUOS member states and endorsed by the U.N. General Assembly. An additional set of nine more guidelines was agreed to by the Science and Technical Subcommittee in February 2018, with the final vote expected in June 2018.[5]

Additionally, as COPUOS has developed these guidelines, they have ensured that commercial industry has held a seat at the table. This is critical as commercial and other private entities are operating an increasingly larger number of space systems. For example, the Space Foundation notes in a recent report that in 2016, "commercial space activities made up 76 percent of the global space economy."[6] Given the increasing role that commercial entities are playing in space, ensuring that they are engaged in the development of norms will be critical.

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4 "Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space," (Vienna: U.N. Office for Outer Space Relations, 2010), http://www.unoosa.org/pdf/publications/st_space_49E.pdf.

5 Brian Weeden and Victoria Samson, "New U.N. Guidelines For Space Sustainability Are A Big Deal," *Breaking Defense*, April 4, 2018, https://breakingdefense.com/2018/04/new-un-guidelines-for-space-sustainability-are-a-big-deal/.

6 The Space Foundation, "Space Foundation Report Reveals Global Space Economy at $329 Billion in 2016," press release, August 3, 2017, www.spacefoundation.org/news/space-foundation-report-reveals-global-space-economy-329-billion-2016.

U.N. Group of Government Experts Report on Transparency and Confidence-Building Measures

Another significant accomplishment in the development of norms for outer space was the U.N. Group of Governmental Experts (GGE) study of transparency and confidence-building measures (TCBMs), on which I served as the U.S. expert. The 2013 GGE report,[7] which was later endorsed by consensus in the U.N. General Assembly, highlighted the importance of voluntary, non-legally binding TCBMs to strengthen stability in space.

The report recommended that states take a number of voluntary actions to increase transparency and build confidence in outer space, including:

- publishing their national space policies and strategies;
- conducting bilateral and multilateral thematic seminars on space security;
- implementing the 2007 U.N. Debris Mitigation Guidelines;
- improving international cooperation on SSA;
- providing notifications on outer space activities aimed at risk reduction; and
- conducting visits to space launch sites and facilities.

The GGE report is of particular importance because it was a consensus report that included the United States, Russia, and China. After the GGE report was published, the three nations, for the first time ever, co-sponsored a U.N. General Assembly resolution on space security in 2013 urging all nations to implement the recommendations of the GGE.[8] What the GGE report shows is that despite the serious differences between the United States, Russia, and China, there are also opportunities to find common ground to solve practical problems.

No first placement of weapons in outer space

One initiative that has not achieved consensus has been the Russian and Chinese draft Prevention of the Placement of Weapons in Outer Space Treaty (PPWT)—first introduced in 2008 at the Conference on Disarmament in Geneva.[9] As the name suggests, the PPWT would prohibit nations from placing "weapons" in outer space. The United States and its allies have strongly opposed the PPWT for the following reasons: the treaty is not effectively verifiable; it remains silent on the issue of terrestrial-based anti-satellite weapons like the one China tested in 2007; and it doesn't adequately define what constitutes a "weapon in outer space."[10] Given the strong objections by the United States and other nations, no progress has been made on PPWT in the Conference on Disarmament.

The Russians and Chinese have been somewhat more successful with their "No First Placement of Weapons in Outer Space" resolution in the United Nations General Assembly,[11] which encourages

7 U.N. General Assembly, Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities, A/68/189 (July 29, 2013), https://www.stimson.org/sites/default/files/file-attachments/GGE_July_2013_1.pdf.

8 U.N. General Assembly, Resolution 68/50, Transparency and confidence-building measures in outer space activities, A/RES/68/50 (December 10, 2013), http://www.unoosa.org/pdf/gares/A_RES_68_050E.pdf.

9 Conference on Disarmament, Letter Dated 12 February 2008 from the Permanent Representative of the Russian Federation and the Permanent Representative of China to the Conference on Disarmament ... Transmitting the Russian and Chinese Texts of the Draft "Treaty on Prevention of the Pacement of Weapons in Outer Space and of the Threat or Use of Force Against Outer Space Objects," CD/1839 (February 29, 2008), http://www.spacelaw.olemiss.edu/library/space/IntOrg/CD/2008/documents/CD_1839.pdf.

10 Ambassador Cristina Rocca, "Statement by Ambassador Christina Rocca, Permanent Representative of the United States to the Conference on Disarmament," (speech, Geneva, February 15, 2008), https://www.unog.ch/80256EDD006B8954/(httpAssets)/DE7EEEEB629D982FC12573F0004A1E07/$file/Statement+by+Ambassador+Rocca.pdf.

11 U.N. General Assembly, No first placement of weapons in outer space, A/C.1/69/L.14 (October 16, 2014), http://reachingcriticalwill.org/images/documents/Disarmament-fora/1com/1com14/resolutions/L14.pdf.

nations to undertake political commitment "not to be the first to place weapons in outer space."[12] The United States opposed the resolution for the same reasons it opposed the PPWT.[13] While 121 countries voted in favor of the resolution, over 50 nations, including the United States, have either voted against or abstained on the resolution, demonstrating that the proposal does not enjoy widespread international support.

European Union's proposed International Code of Conduct for Outer Space Activities

The EU proposal for an International Code of Conduct for Outer Space Activities, introduced in 2008, is another initiative that has not garnered international consensus.[14] The objective of the Code was to develop a comprehensive set of non-legally binding norms to encourage responsible use of outer space. Despite some modest differences among nations, the text of the Code was largely acceptable to the majority of the international community. Indeed, when I served in government, Russian colleagues frequently asserted their belief that the EU had "stolen the idea" for the Code from Russia, arguing that the Code was based on a prior U.N. General Assembly resolution sponsored by Russia.

Efforts to develop a Code failed for two primary reasons in 2015. First, the EU did not effectively gather the support of the major spacefaring powers early on in the process, especially Russia and China. While Russia would almost certainly not have discarded the PPWT in favor of the Code, they initially saw it as a stepping stone to development of a legally binding instrument at some point in the future. Indeed, a series of non-legally binding U.N. General Assembly resolutions laid the groundwork for the 1967 Outer Space Treaty. Had the Russians signed on to the Code, China would most likely have followed.

Second, the EU lacked an effective engagement strategy to build broader international support for the initiative. For example, during my tenure at the State Department between 2009 to 2017 there were numerous occasions when officials from non-EU countries would inform me that the EU had never consulted with them on the Code.

That said, while the international community failed to reach consensus on the Code, the process did have some benefits. It demonstrated that the vast majority of the international community saw some benefit to creating a non-legally binding document to codify what responsible behavior in outer space consisted of. It also provided a forum for international discussions about norms of behavior and how responsible actors should behave in outer space.

BUSH, OBAMA, TRUMP, AND THE DEVELOPMENT OF SPACE NORMS

Let's turn to how the United States has handled the development of norms for outer space over recent decades. Though there have certainly been differences, there has also been a significant level of continuity across the last three U.S. administrations. While the Bush administration rejected the idea of space arms control via the 2006 National Space Policy, which stated that the "United States will oppose the development of new legal regimes or other restrictions that seek to prohibit or limit U.S. access to or use of space," it played a very important role in the development of norms of behavior for outer space.[15] For example, it strongly supported creation of the U.N. Debris Mitigation Guidelines, which laid the foundation for the subsequent COPUOS Long-Term Sustainability Guidelines. The Bush administration also conducted productive

12 U.N. General Assembly, Resolution 69/32, No First Placement of Weapons in Outer Space, A/RES/69/32 (December 4, 2014), https://digitallibrary.un.org/record/785136/files/A_RES_69_32-EN.pdf.

13 Robert Wood, "Explanation of Vote in the First Committee on Resolution L.54, Agenda Item 97(b): No First Placement of Weapons in Outer Space," (speech, New York, October 30, 2017), https://usun.state.gov/remarks/8084.

14 "DRAFT International Code of Conduct for Outer Space Activities," (Brussels: European External Action Service, March 31, 2014), https://eeas.europa.eu/sites/eeas/files/space_code_conduct_draft_vers_31-march-2014_en.pdf.

15 "U.S. National Space Policy," Obama White House Archives, August 31, 2006, https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/national-space-policy-2006.pdf.

consultations with the European Union in its effort to develop an International Code of Conduct for Outer Space.

While the Obama administration did not explicitly reject space arms control proposals as the Bush administration did, it too had serious questions on whether agreements like the PPWT could be effectively verified. However, as directed in the 2010 U.S. National Space Policy, the Obama administration actively pursued multilateral and bilateral transparency and confidence-building measures for outer space.[16] It also set out three conditions for space arms control: that it was equitable, effectively verifiable, and enhanced the national security interests of the United States and its allies, language that dates back to the George W. Bush administration's National Space Policy.[17]

At the multilateral level, the administration played a key role in ensuring the successful conclusion of the COPUOS Long-Term Sustainability Guidelines in 2016, and the 2013 GGE on space transparency and confidence-building measures.

However, the Obama administration's most significant accomplishments with regard to the development of space norms was at the bilateral level. The administration worked to improve SSA cooperation with foreign partners and commercial operators around the world. It also established over 20 bilateral space security dialogues with both existing allies (e.g., France, Japan, Australia, and Germany) and new partners (e.g., India, United Arab Emirates, and Brazil). Furthermore, it actively engaged potential adversaries such as Russia and China on space security issues. While the Obama administration had significant concerns about Russia and China's development of anti-satellite weapons, it also believed that it was critical to maintain lines of communications with both nations.

On that note, the Obama administration made significant bilateral progress with China on space security issues, especially with regard to finding ways to minimize the creation of long-lived orbital debris and prevent collisions in outer space. For example, in 2015, the United States established a direct link between the U.S. Joint Space Operations Center (JSPOC) and the Beijing Institute for Telecommunications and Tracking (BITT) to provide China more timely conjunction assessment and collision avoidance notifications.[18] Prior to that, all notifications were sent to China via the Chinese Ministry of Foreign Affairs, which was not the most effective way to share these types of notifications.

Furthermore, in 2016, the United States and China convened the first ever U.S.-China Space Security Talks.[19] In addition to addressing the orbital debris issue, the talks also addressed measures to build mutual confidence and reduce the risk of miscalculation in outer space. The two sides also established a complementary Civil Space Dialogue, focused on exploring options for increasing bilateral and multilateral civil space cooperation.[20]

During President Obama's September 2016 visit to China, the White House released a jointly negotiated factsheet noting the commitment of China and the United States to work together to reduce orbital debris. The factsheet states:

> The United States and China recognized that space debris can be catastrophic to satellite and human spaceflight, and that, due to the global dependence on space-based capabilities, the

16 "National Space Policy of the United States of America," National Aeronautics and Space Administration, June 28, 2010, https://www.nasa.gov/sites/default/files/national_space_policy_6-28-10.pdf.

17 David Wright, "National Space Policies Past and Present," *All Things Nuclear*, June 29, 2010, https://allthingsnuclear.org/dwright/national-space-policies-past-and-present.

18 Sam Jones, "U.S. and China set up space hotline," *The Financial Times*, November 20, 2015, https://www.ft.com/content/900870f4-8f9f-11e5-a549-b89a1dfede9b.

19 Mike Gruss, "U.S., China will meet this year to talk space debris," *Space News*, September 22, 2016, http://spacenews.com/u-s-china-will-meet-this-year-to-talk-space-debris/.

20 "The Second Meeting of the U.S.-China Space Dialogue," U.S. Department of State, October 24, 2016, https://2009-2017.state.gov/r/pa/prs/ps/2016/10/263499.htm.

> creation of space debris can seriously affect all nations. Therefore, as two Permanent Members of the UN Security Council with major space programs, the United States and China committed to intensify cooperation to address the common challenge of the creation of space debris and to promote cooperation on this issue in the international community.[21]

The release of a factsheet may not seem significant, but it contributes to the establishment of an international norm against the creation of orbital debris; and if you take that thought one step further, against use of kinetic, debris-generating anti-satellite weapons.

Since assuming office in January 2017, the Trump administration has made outer space a high priority. Indeed, the Trump administration's National Space Strategy calls for "strengthening the safety, stability, and sustainability of our space activities."[22] The development of norms for outer space appears to be a key element of this strategy. For example, since assuming office, senior-level Trump administration officials have noted the important role that norms play in helping manage the increasingly congested, contested, and competitive space environment.

In a December 13, 2017 speech at the Eilene Galloway Space Law Symposium, Dr. Scott Pace, executive secretary of the National Space Council, stated:

> the Administration seeks to develop non-binding international norms that are complementary to the existing legal regime through both "bottom-up" best practices developed cooperatively with other space actors, and "top-down" non-legally binding confidence-building measures.[23]

Additionally, Secretary of the Air Force Heather Wilson has repeatedly expressed support for the development of norms of behavior for outer space.[24] That said, while the Trump administration has expressed rhetorical support for the development of space norms, it is unclear what specific norms it will promote. However, given its general aversion to multilateral diplomatic approaches, it's likely that the Trump administration will focus the majority of its efforts in this area on developing bilateral mechanisms.

LESSONS FOR MOVING FORWARD

So, what are the lessons the United States should draw from the last decade of work on the development of norms of behavior for outer space?

First, non-legally binding approaches appear to be the most practical method for developing norms of behavior for outer space. Looking back, the most successful norm-building initiatives over the last decade have been non-legally binding measures. Even though these norms aren't legally binding, that has not prohibited nations from incorporating them into their domestic laws and regulations. Let's be honest: it is extremely difficult and time-consuming to negotiate and ratify legally binding instruments. With the rapidly changing nature of the space environment, it's unlikely that the international community has the luxury of time on its side to wait for the negotiation and ratification of new legally binding agreements.

Second, the Trump administration should reinvigorate its consultations with allies and partners on space security issues. While the Department of Defense has continued efforts to increase cooperation and interoperability with allies on space security, the

21 "U.S. Fact Sheet for President Obama's Bilateral Meeting with President Xi Jinping," White House, September 3, 2016, https://obamawhitehouse.archives.gov/the-press-office/2016/09/03/us-fact-sheet-president-obamas-bilateral-meeting-president-xi-jinping.

22 "President Donald Trump is Unveiling an America First National Space Strategy," White House, March 23, 2018, https://www.whitehouse.gov/briefings-statements/president-donald-j-trump-unveiling-america-first-national-space-strategy.

23 Scott Pace, "Space Development, Law, and Values," (speech, IISL Galloway Space Law Symposium, Washington, DC December 13, 2017), https://spacepolicyonline.com/wp-content/uploads/2017/12/Scott-Pace-to-Galloway-Symp-Dec-13-2017.pdf.

24 Scott Maucione, "Air Force has a long to do list for space operations, Wilson says," *Federal News Radio*, October 5, 2017, https://federalnewsradio.com/air-force/2017/10/air-force-has-long-to-do-list-for-space-operations-wilson-says/.

State Department-led efforts on space security have largely remained dormant during the first 18 months of the Trump administration. Effective diplomatic coordination with our allies on space norms is critical if the U.S. efforts to develop space norms are to be successful. The Trump administration would be wise to reinvigorate space diplomacy dialogues with long-standing allies (e.g., Australia, France, Germany, and Japan) and new partners (e.g., India and the United Arab Emirates).

Third, the United States should continue to engage potential adversaries, such as Russia and China, in a dialogue on space security-related issues. There are two primary reasons why this is important: it provides a forum to both reduce the possibility of miscalculations in outer space and send deterrence messages, and these types of dialogues can also help identify areas of practical cooperation with potential adversaries. For example, the U.S.-Russia Space Security Dialogue and the U.S.-China Space Security Talks played an important role in advancing bilateral efforts to reduce the risk of collisions in outer space. Thus far, the Trump administration has been extremely slow in restarting either of these dialogues. Given the increasing tensions with these countries, the Trump administration would be wise to restart both dialogues as soon as possible.

Fourth, obtaining agreement from all the major spacefaring nations is critical to making progress on multilateral norms of behavior. As demonstrated over the past decade, initiatives where there was buy-in from the major powers (e.g., U.N. Debris Mitigation Guidelines, COPUOS Long-Term Sustainability Guidelines, and the GGE) were generally successful. On the other hand, initiatives that didn't have a similar level of buy-in from all the major powers (e.g., the PPWT, No First Placement, and Code of Conduct) were unsuccessful. Therefore, effective engagement at the bilateral level is critical to ensuring multilateral success. Indeed, it was the engagement between the United States and Russia in their bilateral space security dialogue that laid the foundation for the successful outcome of the 2013 U.N. GGE on Space Transparency and Confidence-Building Measures.

Fifth, the most significant advances in space security have occurred when there's been a direct connection between security and the need to maintain the long-term sustainability of the space environment. Prime examples of these advances have be the Limited Test Ban Treaty in 1963, prohibiting the testing of nuclear weapons in outer space; the U.N. Debris Mitigation Guidelines; and the COPUOS Long-Term Sustainability Guidelines. Instead of attempting to solve impractical problems such as preventing the weaponization of outer space, the United States should continue to focus its space diplomacy efforts on practical measures that seek to both maintain the long-term sustainability of the space environment and reduce the risk of miscalculation among major spacefaring powers.

And finally, given the increasing role that commercial actors are playing in outer space, it is critical that they are consulted as governments discuss the development of future behavioral norms. The United States has a long history of including commercial partners in diplomatic discussions on the development of space norms, including through industry membership on the U.S. delegation to COPUOS. The Trump administration should continue these efforts and encourage other nations to do the same.

Assured access to outer space and space-derived data is becoming increasingly important to the national and economic security of the United States and its allies. Yet that access is increasingly at risk due to the growth of orbital debris and the development of anti-satellite capabilities by potential adversaries like Russia and China. The United States will need a comprehensive strategy in order to manage this increasingly congested and contested environment. A key element of that strategy should be the development of effective bilateral and multilateral norms of behavior in outer space.

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