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Mitigating Risks to Space Sustainability

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SYNOPSIS

While there have been calls for space sustainability, geopolitical tensions and lack of trust between major powers have made it difficult to achieve. ***WICHUTA TEERATANABODEE*** *suggests that key space-faring nations, particularly the United States, China and Russia, pursue an open dialogue to address their different approaches to space sustainability.*

COMMENTARY

Similar to how it defines the concept of sustainability on earth, the United Nations defines space sustainability as the ability to maintain the conduct of space activities for peaceful purposes indefinitely into the future. The guidelines provided by the UN Office for Outer Space Affairs are intended to ensure that humankind can continue relying on the benefits of outer space technologies through services and infrastructure such as satellite navigation, weather forecast, communication, remote-sensing, and reconnaissance and surveillance.

Two topics that have come to the forefront of conversation on space sustainability are the use of direct-ascent anti-satellite (ASAT) missiles and space debris. The two are related, with use of ASAT weapons contributing to more debris in space. Ostensibly in recognition of this concern, the United States introduced a resolution to the First Committee on Disarmament and International Security at the 77th UN General Assembly in October 2022, calling for a multilateral effort to ban the testing of ASAT measures.

However, while countries such as Canada, New Zealand, Germany, Japan, the United Kingdom and South Korea joined the United States in announcing a moratorium on

ASAT tests, a rival coalition of Belarus, China, Nicaragua, North Korea, Syria, Venezuela and Russia denounced the resolution. The *PLA Daily*, an official media outlet of the Chinese People's Liberation Army, even charged that the resolution was "[concealing] evil intentions".

As geopolitical fault lines threaten to hinder efforts to address ASAT usage and space debris, it is important to explore the histories behind them and identify paths for moving towards space sustainability.

ASAT and the Militarisation of Space

Outer space is considered offensive-dominant as it is deemed easier to disrupt an adversary's space systems than to defend one's own due to exorbitant costs and technological limitations. Consequently, instead of defensive measures, many space-faring nations have prioritised developing offensive tactics and technologies, including ASAT.

ASAT is a broad category of weapons used to deceive, disrupt, deny, degrade or destroy satellites. As space is increasingly becoming a new domain for warfare, ASAT can yield strategic advantages for space-faring countries.

ASAT has a long history — almost as long as satellites themselves. Broadly, it can be divided into two types: kinetic, such as ballistic missiles and drones, and non-kinetic, such as cyber-attacks and jamming. The kinetic, destructive type can be further divided into two broad categories: co-orbital and direct-ascent ASATs.

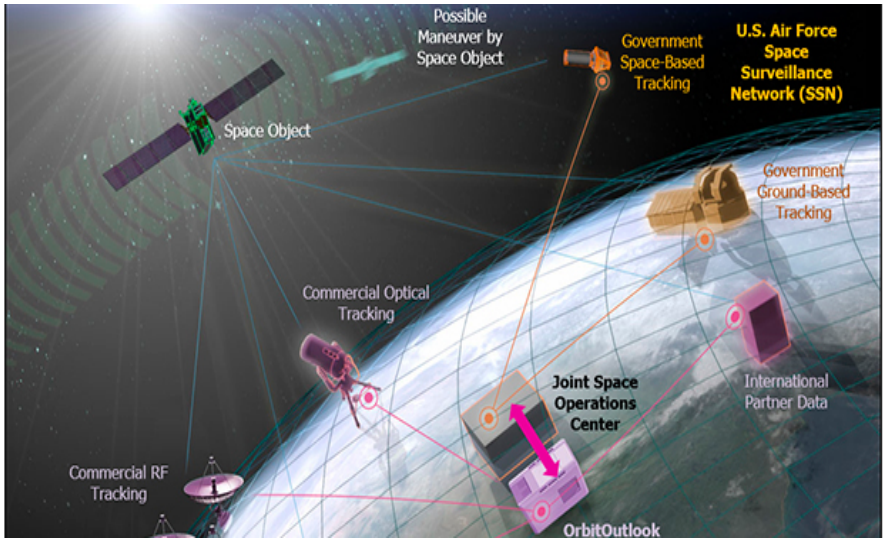
According to one definition, co-orbital ASATs are weapons that are placed into orbit "and manoeuvre close to a target and attack it", while direct-ascent ASATs are "launched from the earth's surface or from the air to destroy a satellite". Most ASATs tested in the 21st century are of the latter type, and it is these that the recent US draft resolution proposed to ban.

The first ASAT was launched in 1959 by the United States, two years after the Soviet Union's Sputnik 1 satellite was launched. The first ASAT test in the 21st century was conducted by China in 2007. This test destroyed China's own inactive weather satellites with a ballistic missile. It was a real wake-up call for the international community. India demonstrated a similar ASAT capability with a ballistic missile in 2019. Most recently, Russia tested and demonstrated its ASAT system in November 2021.

With the legacy of ASATs dating back to the Cold War and continuing competition between the major powers, the reasons behind the development, testing and demonstration of ASAT capabilities are very much grounded in national security and defence. Russia's test in November 2021 was seen as an enhancement of its defence and deterrence capabilities as well as a projection of power before international mechanisms prohibit such a test.

The Growing Threat of Space Debris

As forays into outer space have been growing in the past decade, with an increasing number of private sector actors launching satellites, debris is a growing threat to space sustainability. Even without ASAT tests, the commercial and civilian use of space is already unintentionally creating debris. Consequently, intentionally destroying satellites can aggravate the problem.



Tracking, and if possible removing, space debris represents a significant challenge for all countries with space programmes, Photo from DARPA. *The appearance of DARPA visual information does not imply or constitute DARPA endorsement.*

In June 2022, the International Space Station (ISS) was forced to perform an "unscheduled manoeuvre" to avoid orbital debris caused by Russia's ASAT test in November 2021.

NASA's May 2021 report said that the sensors from the US Department of Defense's global Space Surveillance Network (SSN) were tracking over 27,000 pieces of orbital debris larger than a softball. Travelling at 17,500 mph, such debris could cause serious damage to space vehicles and other active satellites. Yet, even smaller pieces of debris, ranging in size from a marble to a fleck of paint, can damage spacecraft. While NASA estimates there could be millions of such debris in space, their size hinders efforts to track them.

Although there have been technological developments to track and take down space junk, the process of doing so has been slow. A prominent reason is that the same technology that can target debris can also target active satellites. For instance, an award-winning debris-removing satellite developed by Astroscale, a Japanese start-up, was reported to constitute dual-use technology — having the ability also to target active satellites in outer space.

Amid geopolitical tensions, mistrust can lead to misperception and miscalculation. States with technologies advanced enough to remove debris with certainty and accuracy have been cautious about deploying those technologies lest they alarm their adversaries. Such caution complicates the effort to make outer space safe and sustainable.

Contending Visions

Despite attempts to create norms for space sustainability through the aforesaid US draft resolution, these efforts are hindered by geopolitical tensions. Among others, ongoing conflicts in Europe and tensions in the Taiwan Strait are likely to make negotiation and collaboration between the United States, China and Russia in the space realm more challenging.

In 2021, Russia and China tried to put together a resolution on No First Placement (NFP) of Weapons in Outer Space. However, the United States and its allies voted against the proposal, claiming its definition was ambiguous and that it did not adequately address the objective of strengthening space security and enhancing trust and confidence between states.

China's denouncement of the US-led resolution on the grounds that it concealed evil intentions showed a clear lack of trust between the two powers. As space is a common asset, its safety and sustainability are dependent on all actors, especially those with relatively advanced technologies like the United States, China and Russia.

Policy Recommendations

The efforts towards space sustainability will remain limited unless geopolitical tensions between the United States, China and Russia are addressed and trust — even if limited — is restored. Consequently, Washington and its allies should pay attention to confidence-building measures and the restoration of communication with Beijing and Moscow.

Some policy analysts have put forward a recommendation to consider diplomatic engagements towards this end. Such engagements could take place at the UN Open-Ended Working Group on Reducing Space Threats and could involve developing norms, rules and principles of responsible behaviour.

In the next two sessions of the Open-Ended Working Group to be held in 2023, participating states could leverage this inclusive platform to find potential areas that all parties could agree on, such as prioritising solutions for space debris mitigation. Along with this, they could also work on a longer process of norms creation.

In this context, the United States, China and Russia could consider taking the discussion further to find common ground between the two resolutions. This might not be an ideal arrangement, but certainly necessary, considering the pressing need for frameworks to ensure space sustainability.

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