

Working Paper submitted by Brazil

Destructive Anti-satellite Weapons

Satellites have become essential components of almost all types of critical infrastructure on Earth and the functioning of essential services for societies and economies all over the globe depends largely on them. Space assets are the linchpins of essential economic activities, communications, information flows, and defense capabilities, including command and control. Any threat against space assets imperils prospects for the sustainable use of Earth's orbit for peaceful purposes.

In recent years, increasing competition and strategic tensions among spacefaring nations led to the rapid development of offensive space capabilities and to the return of the practice of developing and testing of destructive anti-satellite (ASAT) weapons.

Destructive anti-satellite weapons, both ground based and co-orbital, are a cause of particular concern, since the intentional destruction of satellites through the test or use of such weapons generates uncontrolled proliferation of debris at a massive scale.

In addition to leading to increased risk for safety of space navigation, the increase in space debris has a direct impact on the costs of launching and operating space assets. Such effects are particularly acute for developing States and States with fewer space objects, and might hamper their ability to access the benefits of the peaceful uses of outer space. Their testing also creates distrust and enhances the risk of weaponization of outer space, thus posing a significant threat to international peace and security.

The present working paper aspires to contribute to the debates of the ongoing OEWG on the issue of destructive ASAT weapons. It does so by analyzing the safety and security consequences of destructive ASAT weapons, highlighting elements of the existing framework of international space law and norms that are relevant for the issue and offering suggestions on how the recommendations of the Group could contribute to addressing it, with a view to the future adoption of legally-binding commitments on the prevention of an arms race in outer space (PAROS).

While this working paper focuses on destructive ASATs, this is without prejudice to the need for the OEWG to address other types of counterspace capabilities, such as non-kinetic ASAT weapons, interference (jamming and spoofing) or cyberattacks against space systems. These threats have been highlighted by Brazil's submission to the Secretary General's report (A/76/77) and specifically addressed by other States' submissions to the Group.

The safety and security consequences of destructive ASAT tests

In the case of development and testing of destructive ASAT weapons, the safety concerns over the significant creation of space debris go hand in hand with their impact on international security and the potential for escalation.

On the safety side, destructive ASAT tests threaten the stability and long-term sustainability of the space environment. Debris generated by destructive ASAT tests make up a sizable proportion of existing debris in low-earth orbit (LEO). Out of the 29.000 trackable debris currently in orbit¹, it is estimated that approximately 4.300 have been generated by destructive ASAT tests². In addition to the trackable debris (generally understood as those of a diameter of 10cm or more), these tests very likely generated tens of thousands of additional non-trackable debris, which also pose a grave threat to the safety of space operations.

Each new destructive ASAT test dramatically increases the problem of space pollution, thereby significantly raising the likelihood of cascading collisions, which may ultimately render low-earth orbits unusable (a scenario commonly known as “Kessler Syndrome”).

Even when destructive ASATs are carried out in low-altitude with the objective of minimizing long-lived debris, the uncontrolled dispersion of debris may place them on eccentric orbits that can extend more than 1000 km above the test altitude³.

In addition to the potential risk of cascading collisions, the debris clouds generated by destructive ASAT tests have tangible and immediate negative implications for space operators. By increasing the need for collision-avoidance maneuvers, they indirectly contribute to the reduction of the operational lifespan of existing space assets. The increase in space debris generated by destructive ASAT tests also contributes to obstructing and complicating the deployment of new space assets, thus increasing its cost and technical complexity.

Consequently, the debris generated by destructive ASAT tests contribute to increasing the risk and the cost of using space. This effect is particularly acute for States with few space assets (for which the loss of even one satellite can have critical effects) and for developing States, which have less budgetary resources to absorb the additional costs of launching and operating satellites. Developing States usually count with limited situational awareness capacity, modest capabilities for monitoring assets in orbit, and space-based assets without propulsion systems, therefore lacking the ability to carry out complex collision-avoidance maneuvers.

On the security side, destructive ASAT tests directly contribute to increasing mistrust and tensions. The increased reliance of militaries on space for conventional operations on Earth increases the incentives for the use of ASAT weapons in conflict. Any new ASAT test adds another dimension of uncertainty to security dynamics on Earth. If left unabated, the practice of developing and testing destructive ASATS will contribute to generalized weaponization of space, while at the same time rendering all States, spacefaring or not, vulnerable to its possible political, environmental and economic consequences.

¹https://www.esa.int/Space_Safety/Clean_Space/How_many_space_debris_objects_are_currently_in_orbit

² https://swfound.org/media/207350/swf_global_counterspace_capabilities_2022_rev2.pdf

³ http://outerspaceinstitute.ca/docs/OSI_International_Open_Letter_ASATs_PUBLIC.pdf

Elements of the existing framework of norms and rules on outer space applicable to destructive ASAT weapon tests

In its preamble, the 1967 Outer Space Treaty (OST) recognizes outer space as the “province of all mankind” and determines that its exploration should be carried out for the benefit and in the interests of all countries.

Furthermore, Article III of the OST states that space activities should be in accordance with International Law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding.

Article VII establishes that states are liable for the damage caused by objects launched from their territory or facilities, which also applies to ASAT weapon tests. This aspect was further developed by the 1972 Liability Convention, which holds a state liable for damage to space objects due to its fault or the fault of those for whom it is responsible, also creates a legal incentive to the prevention of creation of space debris.

Another relevant obligation is the 1978 Convention on the Prohibition of Military or any other Hostile Use of Environmental Modification Techniques (ENMOD). Its Article I obligates its Parties not to engage in “environmental modification techniques that create widespread, long-lasting or severe effects as the means of destruction, damage or injury to any other State Party. Article II, in its turn, defines environmental modification techniques as “any technique for changing — through the deliberate manipulation of natural processes — the dynamics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere and atmosphere, **or of outer space**”. It can be argued that the use of ASATs, which have been known to create long-lived debris on a massive scale, would qualify as an environmental modification under the convention.

The Space Debris Mitigation Guidelines established, in 2007, a set of voluntary recommendations elaborated by the Inter-Agency Space Debris Coordinated Committee that was further endorsed by the Committee on the Peaceful Uses of Outer Space (COPUOS).

In 2013, the Group of Governmental Experts (GGE) on Outer Space Transparency and Confidence Building Measures (TCBMs) also touched upon this matter in its report (document A/68/189), by recommending risk reduction measures, among which a reference to the need to avoid “*intentional destruction of any on-orbit spacecraft and launch vehicle orbital stages or other harmful activities that generate long-lived debris*”.

In 2014, the UN General Assembly adopted resolution A/RES/69/41, tabled by Russia, titled “No first placement of weapons in outer space”, which encouraged States “to consider the possibility of upholding as appropriate a political commitment not to be the first to place weapons in outer space”. The resolution has been adopted on a yearly basis ever since. To date, 32 countries have adhered to the moratorium called for by the resolution. Hardly can one argue that such moratorium does not include the placement of co-orbital ASAT systems in outer space.

More recently, in 2022, the UN General Assembly adopted resolution A/RES/77/41, tabled by the United States, titled “Destructive direct-ascent anti-satellite missile testing”, which calls upon all States to commit not to conduct destructive direct-ascent anti-satellite missile tests. The resolution was preceded by a unilateral moratorium announced by the US, which has since been adhered to by a number of countries, including many space-faring nations. Even though the moratorium called for by the resolution is limited to direct-ascent (land-based) ASAT tests, the resolution recognizes in its preamble that “the use of other types of anti-satellite systems might have a similar negative impact on the long-term sustainability of the outer space environment”. It also includes a reference to the negative impacts of use of destructive ASAT in conflict (“concerned that the use of destructive anti-satellite systems might have widespread and irreversible impacts on the outer space environment”).

In addition to the aforementioned legal obligations and non-binding rules, which are particularly relevant for the testing of destructive ASAT weapons, the issue of the actual use of such weapons in armed conflict must also be considered also from the perspective of international humanitarian law (IHL). As recognized by Article III of the OST, any activity in outer space would have to conform to existing international law, which includes the Charter of the United Nations and international humanitarian law. It should be noted as well that the International Court of Justice expressed its legal opinion that IHL “applies to all forms of warfare and to all kinds of weapons, those of the past, those of the present and those of the future”⁴. In this context, any use of destructive ASAT weapons in a possible conflict would have uncontrollable, unpredictable and potentially catastrophic persistent effects to the safety of space navigation, including to assets operated by neutral States. Such use would therefore be extremely hard to reconcile with the IHL principles of distinction, proportionality and precaution, as well as with the law of neutrality.

The OEWG and the issue of destructive ASAT tests

The importance of the issue of destructive ASAT tests has been highlighted in the report prepared by the Secretary-General pursuant to resolution A/RES/75/36. That report (document A/76/77), which serves as a basis for the work of the ongoing Open-Ended Working Group, summarizes the views submitted by several states on existing and potential threats and security risks to space systems.

Paragraph 19 of that report reflects the views expressed by many States, which characterize the testing and use of such weapons as an example of irresponsible behavior. Furthermore, paragraph 14 of the report notes that “*many states regard the possible development of various anti-satellite weapons, either deployed on orbit or launched from systems deployed on the ground, in the air or at sea, as a serious cause for concern. Some*

⁴ *Legality of the Threat or Use of Nuclear Weapons*, Advisory Opinion, 8 July 1996, ICJ Reports 1996 (‘Nuclear Weapons’) para 86

regard the development and use of such capabilities as a challenge to the security and sustainability of outer space and as a possible threat to international peace and security”.

From this perspective, the OEWG should clarify that the obligations established by Article IX of OST, especially the obligation of conducting space activities “with due regard to the corresponding interests of all other States Parties to the Treaty”, are incompatible with the conduct of further destructive ASAT tests.

Furthermore, considering their potential to reinforce mistrust among military powers, these tests may accelerate the pace at which we are moving towards an arms race in outer space, which runs counter the terms of the Article III of OST.

The OEWG should also recognize and endorse the moratorium on direct-ascent anti-satellite missile testing called for by resolution A/RES/77/41. Despite its limited scope, it constitutes a relevant step toward a broader recognition of the importance of the matter and could bring positive effects for the negotiations of norms, rules and principles that may, in the future, be the base for a legally binding instrument on PAROS.

However important, the multilateral moratorium on DA-ASAT called for by A/RES/77/41 cannot be understood as a measure sufficient to ensure stability and to prevent conflict in outer space.

There are evident omissions in the DA-ASAT moratorium that need to be addressed by the OEWG. Among them, the question of other types of destructive ASAT weapons (mainly co-orbital) stands out. The development and/or the testing are likely to generate similar negative systemic results.

Beyond that, the moratorium on DA-ASAT weapons should be supplemented by a prohibition of the actual use of destructive ASATs in conflict. An exclusive focus on testing risks merely freezing the current divide between States that possess such capabilities and those that do not. In addition to creating an unsustainable and dangerous imbalance, it might also lead to the perception that a “window of opportunity” is closing, thus leading additional States to rush to develop latent capabilities and to test them in order to demonstrate its effectiveness.

A broader prohibition of the use of destructive ASATs would also contribute to assuage concerns with the possible repurposing of weapons designed for other ends, such as high-altitude air defense systems and anti-ballistic missile (ABM) interceptors, in order to target satellites.

Conclusions

In light of the considerations above, and with a view to contributing to the establishment of norms, rules and principles of responsible behavior that effectively address the potential and existing threats against space systems, Brazil believes the OEWG should include in its report a recommendation for a moratorium on all destructive ASAT tests.

The OEWG report should also include in its recommendations a clear norm against the testing and/or use of any type of destructive anti-satellite weapons, either specifically or as part of a general norm against the use of force against space objects.

Both recommendations should act as a stepping stone for future broader and legally binding obligations on the prevention of an arms race in outer space.