



BSAMUN 2023

# Addressing Space Security and the Military Use of Outer Space

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# Introduction

The militarisation of outer space is an ongoing issue that poses an increasing threat to global security. The German invention of the V-2 rocket during the Second World War is said to have led to both space travel and new avenues for militarism and defence. The new technology intrigued governments around the world, due to the potential for large-scale unmanned aerial military strikes, and, in the post-war period, continued development of these weapons ensued, resulting in the creation of satellites and other spacecraft. In recent years, several nations deploy military satellites, which they rely on for command and control, communication, navigation, and early warning systems. As the space sector continues to grow, there is significant concern regarding the use of space for military purposes.

As international political tensions arise, it is essential for nations to work together to prevent military conflict in outer space, and to ensure the safety of citizens in every nation, whilst protecting the right to conduct research and space exploration programmes. Different from the weaponization of space, which is often denounced in the international community, the militarisation of space has expanded to include the services provided to civilians, such as the Global Positioning System (GPS), weather monitoring, and 5G cellular services, through the use of military satellites. Hence, the peaceful uses of outer space must also be maintained, and technological development allowed to continue, such that space remains a safe and accessible domain for all nations, and that the benefits of space exploration and utilisation are shared in a peaceful and equitable manner.

## Definition of key terms

**Outer Space:** The physical universe beyond the earth's atmosphere.

**Space militarisation:** The development and deployment of military technologies for use in space, and the use of space-based systems for purposes of a peaceful nature, including intelligence, surveillance, reconnaissance, and communication.

**Space weaponization:** The placement of equipment or technology in outer space that has the potential for destructive use, including kinetic weapons such as missiles and

space-based lasers, as well as non-kinetic weapons such as electronic jamming devices and cyber weapons that can disrupt or disable satellites and other space-based systems.

**Space security:** The measures taken to ensure the safety, stability, and sustainability of space activities. It involves protecting space infrastructure, space assets, and the environment in space from physical and non-physical threats such as natural hazards, human error, technical malfunctions, intentional attacks, and space debris. Space security also encompasses international cooperation and coordination to prevent conflicts, mitigate risks, and promote responsible behaviour in space.

**Space Race:** The competition between nations in the field of space exploration. Commonly refers to the race between the United States and the Soviet Union (1955-1975) during the Cold War.


**Anti-satellite weapons (ASAT):** Space weapons intended to disable or destroy satellites for tactical and strategic goals. They serve as a defence against space-based and nuclear weapons, force multipliers for a nuclear first strike, and counters against anti-ballistic missile defence.

**Hard-kill space weapons:** Weapons designed to destroy or disable satellites, spacecraft, or other space-based objects that pose a threat to national security or military operations. They can be used for offensive or defensive purposes and can target both manned and unmanned systems.

**Soft-kill space weapons:** Space-based systems designed to disable, disrupt, or degrade other space-based objects without physically destroying them. Unlike hard-kill space weapons, which use physical force to destroy their targets, soft-kill space weapons use non-kinetic means to interfere with or disable their targets.

**Space situational awareness (SSA):** An understanding of the space environment and remaining aware of any threats to space activities. In order to deliver data, information, and services about space objects orbiting the Earth, SSA makes use of a network of ground-based sensors that can survey and monitor artificial space objects. SSA also helps to ensure space activities proceed safely, in accordance with domestic and international laws and standards.

## General Overview



The history of the militarisation of outer space dates back to the Cold War when the US and the USSR began developing satellite technology for military purposes. In November 1957, Sputnik 1, the first artificial satellite was launched into orbit by the USSR, while the US launched its first satellite the next year. These events mark the start of the Space Race, the competition between the US and USSR, in which both nations were vying for military supremacy in outer space. In the years following, the development of space technology was largely centred around advancing military capabilities, with many space exploration technologies soon being adapted for defence purposes. The conclusion of the Space Race is marked by the Apollo-Soyuz mission in 1975, a joint mission between the USA and the USSR, the first instance of cooperation between the opposing superpowers in the field of space exploration.

The United Nations has played a critical role in the prevention of conflict in Space. In 1959, the Committee on the Peaceful Uses of Outer Space (COPUOS) was established by the UN General Assembly. The committee is aimed at promoting research and development in space exploration, including UN-sponsored space programmes, as well as resolving outer space-related legal issues. Each year, the committee, in cooperation with other UN bodies and the Fourth Committee of the General Assembly, works to draft an annual resolution on international cooperation in the peaceful uses of outer space.

Currently, the number of countries with space capabilities is increasing, and many of them are developing their own space-based military capabilities. According to a report by the Secure World Foundation, there are over 2,000 active satellites in orbit, with more than 50 countries having space programs. As the number of satellites in orbit increases, so does the potential for conflict and the need for space security. The use of space for military purposes is not inherently problematic, as many military activities, such as communication and navigation, rely on space-based technologies. However, when space militarisation leads to an arms race or risk of conflict in space, which could have significant consequences for global security and stability. There are also concerns about the creation of space debris from military activities, which could pose a threat to other space-based assets and the environment in space.

The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, commonly referred to as the Outer Space Treaty, was opened for signature by the Russian Federation, the United Kingdom and the United States in January 1967, in the midst of international concern over the weaponization of outer space. In October of the same year, the treaty entered into force, signed by over 100 nations. The Outer Space Treaty provided the initial foundation

of international space law, outlining the responsibilities of all states to ensure outer space activities remain peaceful and sustainable, with equal access to space exploration for all states. The treaty prohibits the placement of weapons of mass destruction in space, although there is currently no specific legal framework governing the use of conventional weapons in space. Subsequent to the Outer Space Treaty, the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, also called the Moon Treaty, forbade the establishment of military bases on the Moon, as well as the deployment of weapons and conduct of military operations. However, the Moon Treaty is considered a failed treaty as it has not been ratified by any nation that has in past or presently taken part in manned space exploration.

The Anti-Ballistic Missile Treaty (ABM Treaty), a bilateral arms control agreement between the United States and the Soviet Union, was signed in 1972. The treaty limited the deployment of missile defence systems and space-based weapons systems designed to intercept incoming intercontinental ballistic missiles (ICBMs) and their associated warheads. By prohibiting the deployment of space-based weapons systems, the ABM Treaty has helped to prevent the militarization of space and preserve the use of space for peaceful purposes, such as scientific research and exploration. However, with the U.S. withdrawal from the treaty in 2002, the restrictions on space-based weapons systems were lifted, and the possibility of a future space arms race could emerge.

Notable NATO involvement in outer space operations has only begun recently. The NATO Space Centre was established in 2020, based at the Allied Air Command in Ramstein, Germany. The Space Centre provides a format for the collaboration of NATO member states' space agencies and to communicate space data and services in the interest of the alliance's security. Prior to the creation of the Space Centre, allies adopted NATO's Space Policy in 2019, accepting outer space as a new operational domain, in addition to the existing air, land, sea and cyberspace.

Currently, space security remains a pressing issue, as nations recognise the threats posed to space-based assets, by other nations and non-state actors. This has led to increased investment in space-based capabilities for surveillance, early warning, and protection.

Several countries, including China, Russia, and the United States, have conducted tests of anti-satellite weapons in recent years, raising concerns about the potential for conflict in space and the need for improved space security measures. Furthermore, the United States and Russia, among others, have established dedicated space defence units to protect their space-based assets from potential threats. Such units are responsible for

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monitoring and defending against attacks on satellites and other space-based assets. For these reasons, there is a growing recognition of the need for international cooperation to address space security challenges.

## Major Parties Involved

**United States:** The United States is a dominant space power and has been investing heavily in a wide range of space-based military capabilities, including the development of new satellites, space-based sensors, and missile defence systems, as well as developing the Space Force as a dedicated military branch responsible for space operations. The US Space Force was established in December 2019 as a response to growing threats to US space assets and to provide a greater focus on space as a warfighting domain. Through the Space Force, the US military operates a large network of ground-based radars and space-based sensors to monitor objects in space and track potential threats, such as incoming missiles or other spacecraft. The US believes that the use of space for military purposes is necessary to protect its national security interests, yet also advocates international cooperation in space. The US has signed a number of bilateral agreements with other countries, including Japan and Australia, to share data on space debris and other objects in space. The US has also been working with other countries, including Russia and China, to develop standard practices for responsible conduct in space.

**Russian Federation:** The Russian Federation is also a major player in the space sector and has been developing its own space-based military capabilities. Russian officials have expressed concerns over the US's military use of outer space and have called for a treaty to ban the weaponization of space. However, the Russian Federation has also been developing its own anti-satellite weapons, raising concerns about the potential for conflict in space. In discussions to reduce the possibility of conflict, the Russian Federation has proposed the creation of a space-based arms control regime to prevent the militarisation of space.

**China:** China is considered the third most powerful nation in the space sector, though it is considerably far behind the United States and Russian Federation in its space activity. As of April 30, 2022, Chinese satellites account for a mere 541 of the 5,465 operational artificial satellites orbiting the Earth, while 3,433 belong to the United States. Along with the Russian Federation, China has voiced concerns about the activities of the US Space Force and aims to adopt a treaty to hinder US military use of space.

**India:** India has been rapidly expanding its space capabilities in recent years, with a particular focus on developing its own satellite launch capabilities. In 2019, India successfully launched its Chandrayaan-2 mission to the moon, marking a major milestone in its space program. India has also been working to expand its satellite communication and remote sensing capabilities, with plans to launch a series of Earth observation satellites in the coming years. However, India's space program has become controversial. In 2019, India conducted an anti-satellite missile test, destroying one of its own satellites in low Earth orbit, generating concerns about the creation of space debris and the potential for a chain reaction of collisions in space. The test was also criticized by some countries, including the US, for increasing the risk of conflict in space. Despite these concerns, India has continued to invest in its space capabilities, with plans to launch its first manned space mission in 2022.

**Japan:** Japan has also been actively enhancing their space situational awareness. In 2019, the Japanese government launched its first dedicated military communications satellite to improve its ability to monitor objects in space and protect its space-based assets. Japan has also been cooperating with the United States on the development of the Space Situational Awareness (SSA) data-sharing framework, which aims to enhance the ability of both countries to monitor and track objects in space. The SSA framework will allow Japan and the US to share data on space debris, satellites, and other objects in space, which will improve the accuracy of space situational awareness and help prevent collisions and other incidents in space.

**France:** France has been working to enhance its space situational awareness capabilities, in addition to the development of military satellites. The French military operates a network of ground-based radars and optical telescopes to monitor objects in space and has been working with other countries, including the US and Germany, to improve its space surveillance capabilities. France has also been a major contributor to the European Space Agency (ESA), which is responsible for developing and coordinating space activities in Europe. Through its membership in the ESA, France has been involved in a wide range of space-based activities, including the development of the Galileo satellite navigation system and the Copernicus Earth observation programme. France has also been a key player in international efforts to promote space security and prevent the weaponization of space. In 2008, France, along with the US and Russia, co-sponsored a United Nations resolution calling for the prevention of an arms race in outer space. France has also been a vocal advocate for the development of international norms in space, including the development of a code of conduct for responsible behaviour in space.

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**NATO:** In 2019, NATO recognized space as a new operational domain alongside land, sea, and air, and is now developing new technologies to protect its space assets. NATO has also been working closely with its member states, including the United States, to develop a comprehensive approach to space security that includes deterrence, defence, and diplomacy. NATO has also been involved in international efforts to promote space security and prevent the weaponization of space. In 2019, NATO signed a joint declaration with the European Union on space cooperation, which outlined areas of cooperation and collaboration between the two organisations in the areas of space situational awareness, scientific research, and satellite navigation. NATO has also been working with other international organisations, such as the United Nations and the European Space Agency, to promote responsible conduct in space.

## Possible Solutions

1. One possible solution to address the issue of space security and the military use of outer space is the development of an international treaty that bans the use of space-based weapons and establishes rules for the peaceful use of space. Such a treaty would require the agreement and cooperation of all major space-capable countries. With this, encouraging international cooperation in space can help to promote peace in space and enhance the safety and security of space assets. Increasing transparency and communication among space-capable countries can help to avoid misunderstandings and conflicts in space. This could be facilitated by calling upon relevant UN and NGO organisations, to mitigate international tensions as they arise and act as an impartial third party, advocating for the interests of global security.
2. International norms and standard practices in space can help to prevent the weaponization of space and promote responsible behaviour in space. Promoting responsible behaviour and common expectations among space-capable countries can help to prevent the escalation of conflicts in space and maintain a stable space environment in which all countries can benefit from the ability to carry out independent and collaborative research and exploration. These practices can be used to promote the peaceful use of space and respect for the rights of other countries' space assets.



3. The further development of technology is a critical aspect of space security. Improved space situational awareness capabilities are essential to monitor and track objects in space, including satellites, debris, and other space assets. By accurately identifying the location and movement of space objects, countries can better understand the space environment and identify potential threats to their own assets. This information is critical for effective decision-making and risk management in space. Developing defensive technologies, such as anti-satellite defence systems, is also an important aspect of space security. These systems can help to protect space assets from potential threats, including attacks from other countries or accidental collisions with space debris. Additionally, the development of offensive capabilities, such as satellite-based weapons or cyberattacks, can help to deter potential adversaries from targeting space assets in the first place. However, while defensive technologies can help to protect space assets, offensive capabilities could potentially lead to an arms race in space and threaten the stability and security of the space environment.

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