UNOOSA

United Nations Office for Outer Space Affairs

Topic 1: Space Security and Militarization

Topic 2: Management of Space Debris

Model United Nations at UC Davis

Letter from the Head Chair

Dear Delegates,

Hello, and welcome to the fifteenth annual session of the Davis Model United Nations Conference! My name is Dhruv Nandakumar and I will be the head chair for the United Nations Office for Outer Space Affairs. I am a first-year student at UC Davis and I'm currently pursuing a double major in Computer Science and Economics. Although it is only my first year participating in collegiate MUN, I have participated in MUN throughout my four years of high school and am incredibly excited to be given the opportunity to lead this committee.

My goal from this session is to give delegates the opportunity to participate in cooperative, diplomatic, and informative debate. That being said, there are several key aspects that deletes should keep in mind if they want to be successful in any committee. In-depth preparation, public speaking skills and leadership skills are crucial. Allow yourself time to completely research about both the topics in this guide, even if we may not have time to discuss bot in detail. Try and come up with innovative, in depth solutions to the problem at hand even if they are few in number. However, perhaps the most important trait that you as delegates should have in committee is the confidence to speak. Once you come to committee fully researched, nothing should stop you from raising your placard to speak about issues you feel deeply about; and the confidence to do so will assure your success in committee. Keep in mind that all the delegates around you are also here to accomplish the same things, and working together cooperatively will not only ensure that you reach a comprehensive solution to the problem, but will also make your DMUNC experience more enjoyable.

I am available to answer any questions you may have up until the conference and can be reached at dmunc.unoosa@davismun.org. I look forward to seeing you all in debate and good luck with your preparation!

Best Regards,

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Topic 1: Space Security and Militarization

Introduction

The desire to look up and to explore what seems to be beyond our reach has long motivated mankind to explore unknowns and test our technological and intellectual limits with outer space travel. Since the dawn of the 1950's, outer space, the final frontier, has been opened up for mankind to explore with the launch of the Russian Federation's (then the Soviet Union) *Sputnik* satellite.

Since then, and as of 2014, there are over one thousand one hundred active satellites orbiting the earth per the report sponsored by the *Satellite Industry Association* (SIA); one hundred seventy-five of which are for military purposes and over eight hundred forty of which are for civilian use. Eleven member states of the United Nations have acquired space launch capability, conducting over seventy-five launches per year across a total of twenty-two launch sites which are currently in operation. Furthermore, over sixty member states and regional organizations currently have satellite systems in orbit. The United States Space Surveillance Network has cataloged over seventeen thousand objects currently in orbit around Earth.

Aside from the above, the economic impact that man's exploration of space is significant. According to a 2014 SIA report, the satellite industry crossed USD one hundred and ninety-five Billion in revenues, with a growth rate of seven percent, with the world economic growth rate being a relatively meager 2.3%.

It has been demonstrated that Outer Space Exploration is not just a fascination but is vital to our progress as a civilization and our economy. Earth's orbit and space beyond that should be made free for exploration to all member states, but as it has been shown that the sheer rate of growth of the industry and its participating member alone with their potentially conflicting agendas could open the industry to potential militarization. It is in the interest of all member states to agree to that outer space should be free for exploration only for peaceful purposes.

Thankfully, the world community has not yet taken steps to militarize outer space. However, reification of militarization still exists and is a grave issue. It is encouraging to note that there exist treaties that prevent the militarization of space to some extent including treaties such as but not limited to, the Outer Space Treaty which reinforces that all states under international law are free to explore and make use of outer space for peaceful purposes. Furthermore, the Outer Space Treaty also explicitly prohibits the placement of Weapons of Mass Destruction in outer space (WMD).

However, there are still areas in which the Outer Space Treaty lacks effectiveness, which will later be explored in this guide. It is, however, worth mentioning that Outer Space Security is of great importance to all Member States of the ICAO because its militarization threatens the security of all states.

Definitions

- Outer Space: There is no specific, firm boundary on where outer space starts but in this conference, the boundary of outer space shall henceforth be defined at the Kármán line and any distance beyond, at an altitude of one hundred Kilometers (sixty-two Miles) above sea level; above the mesosphere and in the thermosphere, as defined by the Outer Space Treaty.
- Militarization of Outer Space: The militarization of outer space shall henceforth be defined as the placement into an orbit of any device that has intentional destructive capabilities. It shall also be broadened to include any ground based weapon that is

intended to cause destruction in outer space. Furthermore, any weapon that travels through outer space to reach its target shall also be included in this definition including Missile Defense Systems.

- Weapon of Mass Destruction: Any explosive, incendiary, or poison gas, including the following: a bomb; grenade; rocket having an explosive or incendiary charge of more than four ounces; missile having an explosive or incendiary charge of more than one-quarter ounce; mine; or device similar to any of the previously described devices.

Goals of Committee and Expectations of Delegates

In committee, delegates will address major issues such as coming up with a formal definition as to what constitutes the militarization of space. Whether this definition will encompass not just weapons present in space, but also anti-satellite ground based weapons and intercontinental ballistic missiles. Delegates will also be tasked with establishing a stringent framework for assessing whether equipment being sent to space have potential military capabilities. Maintaining international security and world peace is of paramount importance, and delegates in committee will play a crucial role in ensuring the above.

Furthermore, the goals of this committee also include addressing issues of national sovereignty regarding the use of Outer Space and the aforementioned framework. While the Outer Space Treaty was a significant step forward in assuring the peaceful usage of outer space, delegates will be tasked with improving the UNOOSA's current effectiveness by developing new and innovative solutions to the problem at hand. International cooperation, productive debate and dialogue, and diplomacy will be paramount if committee is to be successful.

Current situation

It has been established that while the Outer Space Treaty has taken many steps towards ensuring the peaceful usage of outer space, it has shortcomings; ones that are potentially disastrous in the contemporary world if not addressed immediately. The issues are stated below.

The Outer Space Treaty, as mentioned previously, explicitly prohibits the placement of Weapons of Mass Destruction in outer space. However, the treaty merely stops at this and fails to ban the installation of any other sort of weapon in outer space. Furthermore, weapons that function on different principles than WMDs such as spatial mines are not prohibited either.

The second contemporary issue is that while the Outer Space Treaty prohibits the testing of weapons and any military maneuvers on celestial bodies such as our Moon and other Planets, it does not explicitly prohibit the testing of any weapons in outer space per se. The only time this issue is addressed is in a draft of the International Code of Conduct for Outer Space Activities, which prohibits the placement or testing of weapons in outer space. However, this is merely a draft and does not take effect for the foreseeable future.

The third issue, an extension of the first, is the fact that the Outer Space Treaty does not consider the destructive capability of ground-based anti-satellite weapons. Space security not just constitutes of the removal and prohibition of weapons in space, but also takes into account the safety of all peaceful equipment in space. One of the main causes of concern on these lines in the safety of geosynchronous satellites, such as the Galileo or the Glonass satellites, which are used for civilian purposes and by the army. Furthermore, contemporary society depends on satellites for a variety of needs including telecommunications, research, and even the internet. Therefore, their security must also be a priority; measures for which do not exist today.

It then follows the primary cause for concern which must be addressed: the ambiguity in the definition of certain terms used in the UNOOSA today such as the "harmful contamination" of celestial objects (Outer Space Treaty) and the definition of a space weapon.

The fourth issue that arises is the lack of a stringent framework to check if an object being sent into space has destructive capabilities and if it classifies as a weapon. Today, more and more governments are being reliant on civilian satellites for their purposes; which could then be targeted. It is, therefore, important for member nations to reach a consensus on establishing a stringent framework to check for the same.

Historical Background

Case Study: The Origin of the Arms Race in Space

The launch of the USSR's Sputnik Satellite in 1957, amidst the cold war, earmarked the era of mankind's exploration of outer space and also opened the debate for the militarization of space. The development of Germany's V-2 missile after the Second World War enabled both the United States of America and USSR to develop their space programs, following which both countries realized that space was a key strategic milestone in the theater of war.

Although there was discussion among nations such as the United States, Canada, France, and the United Kingdom about creating a system to inspect the purpose of satellites even before the launch of the Sputnik, there was the passing of UN Resolution 1348 to ensure the pacific use of outer space. However, neither action had much effect. Both the United States and USSR took advantage of the ambiguity of the phrase "Pacific uses" in the resolution to use their satellites for reconnaissance purposes in order to take stock of each other's military capabilities. These satellites were then used to monitor the dismantling of arms that took place in accordance with arms control treaties that were signed.

However, the substantial increase in space exploration with satellites then lead to the development of anti-satellite defense systems such as missiles as well as Inter-Continental Ballistic Missiles (ICBM) by the USA and USSR. The USA then went on to develop other space weapons programs such as the Nike-Zeus program, the Sentinel Program, and Project

Defender, two of which make use of Anti-Ballistic Missiles (ABM) and orbiting satellite weapons systems. This then went on to become the "Strategic Defense Initiative" which was tasked with the role of developing space-based defense systems under the Reagan administration in 1983, which recently (2008) launched an anti-satellite missile on one of its satellites to demonstrate its capability.

The USSR also took many steps to gain the advantage in the arms race for space including developing programs such as the Fractional Orbital Bombardment System (FOBS) and the Polyus Orbital Weapons system in 1987. This was followed by the implementation of the Russian Space Forces in 1992 and the Strategic Rocket Forces in 1997, which creates the Russian Space Forces in 2001.

Other member states such as China responded to these developments by testing weapons systems of their own, such as the FY-AC polar orbit rocket in 2007. Thus, starting the arms race in outer space.

UN Involvement

It has been demonstrated that if left unchecked and unguided, the arms race in outer space will undoubtedly lead to its militarization and finally a lack of security internationally. Thankfully, while not comprehensive, the United Nations has taken several steps to try and ensure the peaceful usage of outer space since 1958, with the creation of the Committee on

Peaceful Use in Outer Space (COPUOS) which reinforced the idea that "outer space should be used for peaceful purposes only" and further warned about the danger of nuclear weapons in outer space.

This was then followed by a treaty that banned testing of nuclear weapons in outer space, in the atmosphere, and under water in 1963 to prevent the proliferation of WMDs. However, this treaty was met with opposition from North Korea, China, and France, all of whom refused to sign the treaty.

The first real treaty, the Outer Space Treaty, constructed by COPUOS was adopted by the UN General Assembly in 1967 and was the first of its kind to ensure international relations between member states (except for Iran which did not ratify the resolution) with regards to the use of outer space. The basic principles of the outer space treaty are as follows:

- the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries and shall be the province of all mankind;
- outer space shall be free for exploration and use by all member states;
- outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means;
- States shall not place nuclear weapons or other weapons of mass destruction in orbit or on celestial bodies or station them in outer space by any means;
- the Moon and other celestial bodies shall be used exclusively for peaceful purposes;
- astronauts shall be regarded as the envoys of mankind;
- States shall be responsible for national space activities whether carried out by governmental or non-governmental entities;

- States shall be liable for damage caused by their space objects; and
- States shall avoid harmful contamination of space and celestial bodies.

Subsequently, this was followed by the implementation of the 1968 Rescue Agreement, which put forth the rights of astronauts in space as well as procedures for recovering astronauts from space as well as the recovery of space satellites. In 1972, the Liability Convention also took effect, detailing how member states would be liable for any damage their machines caused in outer space as well as procedure for settling the same. Both of the above was adopted by the General Assembly.

The Registration Convention of 1975 took a significant step towards ensuring confidence-building measures and transparency of space missions being undertaken by member states to improve trust. The convention required member states to publish the name of the launching States, the registration number of the satellite, the time and location of launch, as well as the type and function of the space vehicle. The United Nations was tasked with being a centralized database for the information.

Finally, the Moon Agreement of 1979, which prevented the testing of weapons on or militarization of the Moon was adopted by the General Assembly. However, this did not prohibit the use of military personnel for peaceful purposes such as scientific research.

Major blocs

The United States of America

The United States of America has undoubtedly one of the world's most advanced space programs with NASA's budget for space exploration crossing USD 17.7 Billion, one of the highest investments in the world. The United States can be understood as a key player in global space exploration, and due to its significant investment, other member states are forced to open dialogue with the United States in terms of International Space Exploration. The United States currently operates 273 military satellites including missile detection satellites. It is worth noting that the United States has large competition from India and China in terms of the effectiveness of its space program and their recent developments in military reconnaissance satellite technology.

The United States has not shown much previous interest in developing documents that prohibit the weaponization of space. One major reason for this inference is its continued interest in carrying out its civil-military dual role space program which can be destabilizing. There is, however, evidence to prove that the United States has plans to develop weapons in outer space including space-to-space attack weapons and space-to-ground weapons. The United States has shown growing evidence of increasing its space military capabilities for itself and its allies such as Japan.

Russian Federation

The Russian Federation was one of the world leaders in space weaponization in the early twentieth century. However, since the dislocation of the USSR and the end of the cold war, the Russian Federation stopped investing as much capital into its space exploration programs which lead to their equipment being old and outdated, thus falling behind the USA in the arms race for outer space. The State tried to combine its military agenda with its commercial space program, but its missiles were not conditioned to withstand it, which can be worrisome for the international community. However, since the beginning of the twenty-first century, Russia has improved its investment in the Space Program and has begun creating the technical skills as well as the technology required for militarization and is now at stage where it has a long-term plan to reach the level of the USA.

It is worth noting, however, that in official documents written by Russian officials, the Russian Federation has expressed its interest in promoting the peaceful usage of outer space as well as promoting international cooperation to achieve the same; including methods such as a Chinese-Russian sponsored treaty to prevent the placement of weapons in outer space, which, notably, has been previously blocked by the USA. The Russian Federation is pursuing more peaceful uses for its space program such as cooperation with the People's Republic of China for a potential Mars mission.

The People's Republic of China

The People's Republic of China is far less advanced in its Space Weapons programs when compared to the Russian Federation or the USA. However, PRC does have ambitious plans when it comes to the same. Since 1980, the People's Republic of China has attempted to curb the USA's influence on the arm's race by pushing for non-armament treaties in outer space. However, it is worth noting that the PRC has been very secretive about its space programs and it is yet unclear whether such treaties are being endorsed with the aim of disarming or to merely have an advantage over the rest of the international community when it comes to the arms race in space.

The European Union

Members of the European Union are far less involved in the arms race for outer space and are more focused on commercials and civilian uses for outer space. France plays diverse roles in space explorations with involvement in projects such as the Galileo project. Nevertheless, member states of the European Union will likely form a coalition with allies such as the United States of America if need be in order to gain military capabilities. It cannot lead an arms race in itself and must seek the help of more advanced nations such as the USA if the region is involved.

Examples of Current and Potential Space Weapons

- Intercontinental Ballistic Missiles (ICBM): Intercontinental Ballistic Missiles provide States the capability to launch missiles from the ground on Earth or from a satellite in Space. The missiles are capable of delivering an explosive capable of targeting close to any location on earth or a satellite in orbit in a time frame measuring in minutes. Present ICBM technology provides States with anti-satellite capabilities, which has previously been defined as weaponization of Space and measure must be out forth to prevent it. It is worth noting that the United States of America is the only member state to have nuclear-capable ICBMs.
- Nanosatellites: There are currently no laws in place regarding the usage of nanosatellites in space. Nanosatellites are defined as space satellites that weigh less than 10 kilograms (22 pounds) and have the potential to carry small explosive material that have major destructive capabilities to other satellites. The technology is primitive, and most Member States have the capability to develop them.
- Directed-energy weapons: Directed energy weapons consist of terrestrial or space-based machinery that blast high-intensity electromagnetic radiation at electronic targets such as satellites in space in order to disable their electronics and cripple their functionality. Such weapons are under development in nations such as the USA which is currently developing the Tactical High Energy Laser (THEL).

- Spatial Maneuverable Devices (SMD): Any SMD can be considered a potential weapon due to its ability to strike, damage, and debilitate most space-based targets. However, it is worth noting that satellites that are not cooperative are not easy to approach and destroy. Nevertheless, laws must be put in place in order to regulate the purpose and usage of SMDs in the future.
- Spatial Mines: Spatial Mines are extremely small undetectable explosive objects that have the capability to inflict serious damage on orbiting satellites. It is worth noting that while no usage of such technology has been documented, the technology exists and Member States have the capacity to develop them.

Potential Solutions to the Problem

Perhaps the most valuable solution that must be taken into effect in order to curb the weaponization of outer space is to expand the effectiveness of the Outer Space Treaty. Delegates can do so by establishing a comprehensive definition for what a weapon in space consists of. Once this has been done, delegates then expand the effectiveness of the Outer Space Treaty by prohibiting the placement of all weapons in outer space, not limited to WMDs. Furthermore, delegates can also prohibit the testing of any weapons in outer space, rather than the current prohibition on celestial bodies alone. Another possible solution would be to further elucidate on the previously aforementioned ambiguous terms in the Outer Space Treaty, so it to prevent minimal recoil while member nations ratify the same. Finally, delegates can also come up with a framework based on international cooperation that provides member states with the preventive capability of ensuring no potentially destructive weapons may be launched into outer space. For example, such a framework could include provisions for member states to provide a pre-planned orbital path for all satellites to be launched, in order to preemptively curb the usage of spatial mines and nanosatellites.

Conclusion

It has been seen that exploration of outer space is not just a want for mankind, but a need if we are to progress. At the same time, however, the possibilities for its weaponization are endless. While there have been certain measures taken by the international community and the United Nations as a whole to help prevent an arms race in outer space, there is yet much work to be done. You, the delegates, are being tasked with developing novel and innovative solutions to one of the largest problems contemporary society will face in a few short years.

While it may seem like an unlikely dystopian future now, we are at the precipice of change. Space, now, can either become a future theater for war or a symbol of hope for our future. If the International community comes together, cooperates, and decides on a peaceful future in space exploration, the possibilities are indeed endless. The International community must set up more stringent methods and frameworks to assure the same. The time to make change is now.

Questions to Consider

1. The following are some questions to consider that may aid in guiding your research.
2. What defines a weapon in outer space?
3. Will, if I decide to create an International Framework to check satellites that go to outer space, it infringe on national sovereignty? If so, how can I work around it?

4. What further confidence building measures can I implement in order to improve international cooperation?
5. In what ways can the solution tackle existing problems while still remaining flexible enough for problems that may arise?
6. Can already existing resolutions be used or strengthened to tackle the issue at hand?

Topic 2: Management of Space Debris

Introduction

The term "Space Debris" encompasses both natural objects such as meteors and asteroids as well as man-made objects such as satellites, derelict launch vehicles, etc. Commonly, natural space debris orbit the sun whereas man-made debris orbit the earth, making them more commonly known as orbital debris. Withstanding the fact that this topic's primary focus shall be on mitigating artificial debris, space debris shall be referred to as orbital debris; the two terms can be considered analogous.

Since the dawn of man's exploration of space, one of the largest challenges that humanity faced was getting our technology beyond earth's atmosphere. In the early years of space exploration, up until the early twenty-first century, the primary goal of these launch vehicles was to get the spacecraft to space, with little to no regard for what happened to the launch vehicles after; which were usually left in space without concern of the debris they would create. While it is comforting to know that in the recent years, engineers are focusing their designs with the idea of reducing the amount of space debris they would cause, there is still a lot of debris that exists in orbit around Earth.

These derelict launch vehicles, combined with outdated space technology (old satellites, for example) and debris left over from explosions and accidents related to other space debris together become the largest contributor to orbital debris. Orbital debris can range in size from being as small as a paint fleck to being as large as a derelict satellite.

Today, the United States of America's National Aeronautics and Space Administration (NASA) has cataloged over 15,000 pieces of orbital debris which are larger than a softball and over 100,000 pieces which are larger than a penny in orbit, which travel at speeds close to 17,500 miles per hour. These velocities are large enough for even the smallest debris to damage large satellites. The aforementioned space debris is present in two orbits, the Low Earth Orbit and the Geosynchronous Equatorial Orbit. Orbital Debris smaller than 15 centimeters in length currently cannot be cataloged but still pose a threat to spacecraft and must be addressed.

Therefore, it can be seen that orbital debris, if not mitigated at the earliest is of grave concern to all Member States not just due to the risks they pose to States' technology currently operational in Space but also to civilians on the ground due to the risk of re-entry of large space debris such as launch vehicles. These risks, sources, history and possible solutions will be discussed in this guide.

Definitions

- Space debris: Space Debris shall henceforth be defined as any object present in earth's orbit which does not serve any current useful purpose to any State, but whose presence pose a threat to current operational space technology in orbit. Such debris can include but is not limited to derelict launch vehicles, unusable satellites, debris from explosions in space, and from collisions in space.
- Low Earth Orbit and Geosynchronous Equatorial Orbit: The Low Earth Orbit (LEO) is an orbit around Earth with a minimum altitude of 160 Kilometers (99 Miles) and an orbital time of 88 minutes and is bound at an upper altitude limit of 2,000 Kilometers (1,200 Miles) and an orbital time of 127 minutes. To put into perspective the speed of orbital debris in this region, the minimum velocity required for an object to stay in this orbits is close to 5 miles per second.

- The Geosynchronous Equatorial Orbit (GEO): The Geosynchronous Equatorial Orbit (GEO) are designed for satellites which need an orbital period that is the same time the earth takes for one revolution (24 Hours), thus making the satellite seem motionless to the ground. The GEO is defined to be at an altitude of 35, 786 Kilometers (22, 236 Miles) above the earth's equator.

Goals of Committee and Expectations of Delegates

In committee, delegates will work together to establish a framework and guidelines for future space travel with the aim of minimizing the generation of space debris. Delegates will also cooperate on an international level to create the infrastructure to monitor, analyze, predict, and prevent future anomalous events that are caused due to existing space debris. They will also be tasked with creating novel solutions with the aim of mitigating existing space debris.

Furthermore, delegates will also be tasked with assessing the feasibility of the measures they implement to strike a harmonic balance of efficiency regarding monetary investment involved and effectiveness of their solution in order to make them accessible to all member states.

Delegates must keep in mind the need for diplomacy and international cooperation. It is only through a joined effort and productive debate that a consensus and practical solution can be reached.

Current Situation

To quote one of NASA's chief scientists, "The greatest risk to space missions comes from non-trackable debris," shedding light on the gravity of the problem the international community face today due to orbital debris.

In the past, orbital debris in the LEO and the GEO have caused significant damage to spacecraft. For example:

- In 1996, A French satellite was hit, damaged, and debilitated by debris from a French rocket that had exploded a decade before the event.
- On February 10, 2009, a defunct Russian satellite collided with and destroyed a functioning U.S. Iridium Commercial Satellite. This collision created more than 5000 new pieces of space debris.
- Chinese satellite and missile tests in 2007 further added thousands of new pieces of debris into orbit.

While it is true that the number of catastrophic events due to space debris has not been very high in the past, its effect still cannot be ignored and is ever increasing. This can be seen with the most recent example of the International Space Station (ISS). The ISS is crucial to making scientific progress in many disciplines, and its continuity of survival is vital. In 2014, the ISS had to maneuver outside of its planned orbit three times in order to avoid lethal chunks of space debris. Experts speculate that impact from any sizable piece of debris in orbit, due to its high velocity, would cause catastrophic damage to the life support systems aboard the ISS.

The collisions and disasters that are instigated by space debris can potentially cause the following events:

- Non-operational Spacecraft, derelict launch vehicles, mission-related debris

- Fragmentation debris created at the end of a mission in earth's orbit
- Fragmentation debris caused by interaction with anomalous events such as interaction with Cosmic Background Explorer (COBE) debris cloud
- Fragmentation Debris caused by explosion of spacecraft at mission failure
- Fragmentation debris caused by intentional or unintentional collision of spacecraft, such as the aforementioned Chinese missile tests on their satellites which created an unprecedented amount of debris

Clearly, the problem of space debris is not one of the distant future but is one that exists today and will only increase with time unless mitigated; a task that requires international cooperation.

Potential Issues Caused by Space Debris

It has been established that the amount of orbital debris present in the LEO and any Orbit above the same will only increase with our increase in manned or unmanned spaceflight. This would then imply that the number of collisions that will occur between this debris and operational spacecraft would increase at a proportional rate.

One major concern the international community has with the aforementioned problem is the concern with "Kessler's Law" which implies that the sheer number of space debris that will accumulate in the LEO and GEO in the near future would be enough to create a self-sustaining cycle of debris creation, caused by collision of debris within themselves. While some say that we have reached the tipping point and we have already crossed the point of no return with regards to the same, all evidence points to the fact that there are still actions that can be taken to mitigate such effects.

Furthermore, the recent trend of the international community increasing both its focus and investment in outer space exploration with missions such as India's Mars Orbiter Mission coupled with the increasing space debris is cause for concern. The success of such vital missions depends on the underlying assumption that the spacecraft will not interact with debris, an assumption that is getting hard to rely on. This coupled with our extensive dependence on satellites already in orbit in the GEO warrants attention to the issue of space debris at the earliest.

UN Involvement

The Issue of Orbital Debris has been considered a serious issue by the United Nations since 1984. However, since then, the UNOOSA and United Nations has taken very few steps to mitigate the same.

One of the provisions by the UN to attempt to reduce space debris is present as a clause in the Rescue Agreement of 1968 which requires States to return a "foreign" objects in space to their owners on earth and that the UN be notified of the same. The Rescue Agreement was adopted by the General Assembly.

Another initiative to combat space debris taken by the UNOOSA is the publishing of the set of Space Debris Mitigation Guidelines, which outlines the various steps in which member states can go about improving their space programs to mitigate debris.

Furthermore, the UNOOSA along with contributions from Canada, the Czech Republic and Germany on the Committee on the Peaceful Uses of Outer Space, created the Compendium of space debris mitigation standards which were adopted by member states and International Organizations. This document outlines the importance of international cooperation in information sharing between States and organizations; information being along the line of progress and technology made in the field of combating space debris.

Past Initiative by Other Major Organizations

Notwithstanding the fact that the United Nations has taken steps in the past to try to mitigate space debris, several other organizations have taken the steps to try and achieve the same.

The European Space Agency (ESA), for example, is an intergovernmental space organization with over 20 member States, which is headquartered in Paris, France. The organization has taken several steps to try and mitigate space debris such as implementing measures scan and observe existing space debris to avoid collisions with existing satellites. Furthermore, the ESA also has taken measures to prevent the future generation of space debris such as advanced end-of-life disposal.

Inter-Agency Space Debris Coordination Committee (IADC), is also an intergovernmental organization created in 1993 and has 13 State Space Agencies participating including India's ISRO and USA's NASA. The IADC published their set of Space Debris Mitigation Guidelines, which defines key earth orbits, outlines the causes for space debris, provides measures to avoid and minimize the generation space debris, and guidelines to prevent on-orbit collisions.

Historical Background

Case Study: NASA's Orbital Debris Management and Risk Mitigation Program

The United States of America's National Aeronautics and Space Administration is considered to be a world leader regarding its proficiency in environment development and modeling as well as its mitigation policy development program about orbital debris. The Orbital Debris Program was conceived, as NASA was established in 1979, to respond to concerns regard orbital debris and lead reproach regarding the same. So far, NASA has been successful in implementing U.S. Government Orbital Debris Mitigation Standard Practices in its National Space Policy.

Aside from this, the Orbital Debris Management Program has seen several advancements in its field. The program is based on three key areas: Measurement, Modeling, and Risk Assessment.

The first aspect of Measurement involved cataloging and tracking various kinds of space debris in coordination with the US Department of Defense (DOD). This aspect further creates a framework for assessing whether evasive maneuvers should be performed (red threshold, yellow threshold, green threshold) to avoid collision with debris based on mathematical modeling.

Furthermore, the program also creates methods for debris removal from space such as space tethers, space tugs, and lasers. Thereby providing a comprehensive solution for managing existing space debris and reducing risk to existing spacecraft.

Finally, the program also incorporates measures for improved engineering of spacecraft to reduce the amount of debris they produce to prevent future contamination of the LEO and GEO with debris. Such measures include, but are not limited to, enhanced Whipple shields and Robotic Spacecraft Collision Avoidance.

Potential Solutions to the Problem

It has been seen that the international community and the United Nations have already recognized orbital debris to be a serious problem and have begun taking measures to mitigate it. However, there is still much that can be done.

First, the expansion of the UNOOSA's Space Debris Mitigation Guidelines must be less ambiguous and more detailed regarding specific measures. Clarity and more transparency in this department can go a long way.

Promoting international confidence building measures and sharing of information is vital if an effective solution to the problem is to be reached. It is clear that the technology to mitigate outer space debris already exists, as seen in the NASA case study. Now the international community must find a way to cooperate with each other, share resources and information for all member states' space programs to reach their peak in terms of debris management capability.

There must also exist a strict framework for classifying, tracking and risk assessment of space debris which has been adopted worldwide. Furthermore, consensus on the guidelines which ensure new spacecraft produce minimal debris, as well as its implementation, will be crucial.

Conclusion

It has been established that orbital debris has been and will continue to be a serious concern for the International Community and must be addressed at the earliest. Orbital debris not only poses a threat to spacecraft currently in operation but also to future space missions and even life here on earth in the case of reentry. Such is a concern that affects all Member States of the United Nations.

There have already been various steps taken by the United Nations and other major groups such as the European Space Agency and the Inter-Agency Space Debris Coordination Committee to take control of the situation. However, these measures will not suffice.

There are solutions to the same, including information sharing, confidence building, technology sharing, and the establishing of a comprehensive universal framework. International cooperation is a must if the UNOOSA is to see a comprehensive solution to the problem at hand. It is not too late to make a change if the work towards it starts now.

Questions to consider

1. How can I set up information sharing and resource sharing methods between States?
2. What would incentivize them to do so?
3. How can I set up a universal framework while still respecting national sovereignty?
4. How can I create a solution that both takes into account reducing current debris as well as reducing future production of the same?

Bibliography

Topic 1: Space Security and Militarization

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