SISCMUN

Research Report | [GA4]

Forum: Special Political & Decolonization (GA4)

Issue: Discussion on Space Pollution as a Threat to Future Human Space Operations

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Welcome Letter

Greetings in the name of peace and diplomacy!

In a world where exploration and independence are both valued, there exists a need for the world to find the balance between achieving the two. Unfortunately, in this current age, these fundamental ideals are still unreachable for some people, especially due to two issues: Space Pollution and Colonialism. Space pollution increases safety and economical risks towards successful space operations, while colonialisms stop people from fully enjoying their right to self-determinism. This brings into light the need to foster more tight collaborations as member states continue to work towards these issues.

To assist in this endeavor, we, the Board of Dais, have meticulously crafted this document such that delegates will be provided with a brief overview of each agenda. Like the explorers during the Age of Discovery, they are highly encouraged to approach each idea with an open mind and the determination to understand more. After all, the satisfaction of curiosity leads to a more hollistic set of

knowledge in the formulation process of sustainable solutions. Above all else, we hope that delegates will be able to embrace the mandate of the GA4 committee as they embody the ideals of diplomacy, innovation, and collaboration in tackling both agendas.

With that, although there is no perfect solution, we hope that by the end of this conference, our delegates will not only have a more diverse perspective on the issues that society is currently facing but also find the drive to translate their concern and ideas into action that will mitigate their impacts. In this era where each member state dreams of achieving the 2030 Sustainable Development Goals, every viable solution is worth exploring.

In animo pacis et servitii,

Your Board of Dais,

Eliza and Alex

Background

The Special Political and Decolonization Committee, also known as the Fourth Committee or GA4, is one of the six main committees of the United Nations General Assembly (UNGA). The main committees of the UNGA often receive work and items from the UNGA's agenda that are relevant to the committee's specific mandate due to the typical heavy agendas that the UNGA deals with (UN, n.d.). In the case of GA4, it primarily deals with issues relating to that of decolonization and other matters directly or indirectly related to it, such as the effects of Atomic Radiation, the reviewing of special political and peacekeeping operations, as well as

facilitating efforts towards international adherence to the peaceful use of outer space. Specific agenda items from the UNGA that the Fourth Committee has was allocated to and has addressed/continues to address include the tackling of economic and other activities within Non-Self-Governing territories that affect its inhabitants, as well as facilitating the implementation and declaration of independence for countries, regions, and people that used to be colonized, among others relating to decolonization. Thus, GA4's mandate mostly covers the agenda items given to them by the General Assembly as well as the preparation and eventual submission of recommendations and draft resolutions addressing the various issues surrounding the committee's assigned agendas (United Nations, n.d.).

The issue of space pollution is a problem that has lasted ever since the beginning of the "Space Age" in the 1950s when the biggest and wealthiest nations, such as the United States and the Soviet Union (now the Russian Federation) decided to explore space, essentially uncharted territory back then. The official beginning of the Space Age in 1957, with the Soviet Union's launch of the world's first natural satellite, was an enormous step towards the development of technology relevant to space travel and exploration (Uri, 2017). However, this also marked the beginning of the issue of Space Pollution. Space Pollution is often attributed to the large amount of Space Debris that exists around our planet, with Space Debris being any type of artificial, man-made material that continues to orbit our Earth but no longer works (Gregersen, 2024). The size of the debris, as well as its exact position within Earth's orbit, differs; however, it is estimated that there are millions of debris orbiting our planet, with sizes ranging from being smaller than 1 centimeter to being larger than 10 cm across. Additionally, the time it takes for space debris to fall back to Earth is dependent on its altitude. Still, space debris will generally orbit around the Earth for years, even centuries, the higher its altitude. This, paired with the high speeds of orbit that these debris have around Earth, means that these debris, even

the smallest ones, continually threatens spacecraft and satellites that orbit around the planet. In fact, there have already been multiple
cases of Space Debris causing damage of varying degrees to both manned and unmanned spacecraft, with the most impactful event occurring in 2007 when the Chinese Military destroyed the Fengyun-1C weather satellite, which broke into 3000 different fragments due to the military's testing of their anti-satellite system. Said debris from the weather satellite would eventually form into a cloud of debris encircling Earth, with none of the pieces of debris reentering the planet's atmosphere for decades (Gregersen, 2024).

Space pollution, if left unchecked, can prove to be extremely dangerous down the line in the context of space travel and the usage of space; such is the case as proposed by NASA scientist Donald Kessler, outlining a certain phenomena that would eventually dubbed the Kessler Syndrome. The Kessler Syndrome is an occurrence wherein a possible "*cascade of orbital debris*" caused by a number of satellite collisions produces orbiting fragments that could eventually collide with even more satellites, therefore leading to the creation of a sort of "*debris belt*" orbiting the planet whose number in quantity could be greater than that of the natural satellite flux. The probability of satellite collisions in the first place increases as more and more spacecraft, be they unmanned or broken-off parts of manned spacecraft, are sent into space. Thus, the Kessler Syndrome proposes that each Sattelite collision or explosion that occurs in the Planet's orbit will lead to a further increase in the number of future collisions, which could, in the long run, and in the most extreme case, lead to the Earth's orbit eventually being unusable due to the massive number of space debris orbiting the planet (Wall, 2022).

However, the present situation of space debris orbiting the planet only poses a real danger to the satellites currently orbiting it, considering that even small

space debris can cause damage due to the speed at which the debris and the satellites orbit around the Earth. Although the frequency at which satellite collisions occur has historically been relatively low, the probability of collisions occurring will increase. It will continue to increase as more privately owned companies, space agencies, and state space programs send more satellites into orbit, making the collision avoidance manoeuvers that satellites and other spacecraft will have to make even more complicated, further increasing the possibility of a collision occurring, be it with another orbiting satellite, or with space debris which is, as established earlier, in the millions, of varying sizes, and poses a degree of danger no matter what the size of the debris is. (O'Callaghan, 2019).

As space pollution around our planet's orbit continues to increase, it will eventually pose a danger to manned and unmanned missions, as well as to space exploration in general, as the increasing number of space debris will make maneuvers of escaping Earth's orbit much more complicated as well, with space pollution adding a level of uncertainty to the overall safety of space missions as current capabilities prevent us from knowing the exact number of space debris orbiting our planet. Thus, worsening space pollution can further hamper the efforts of major stakeholders in space exploration and the utilization of our planet's orbit for the benefit of life here on Earth. Satellites orbiting our Earth are vital for our lives here on Earth as they serve a multitude of purposes, benefitting those not concerned with space exploration, such as enabling real-time communication, access to the internet, bank and stock market transactions, monitoring and predicting weather conditions, as well as allowing us to understand the true effects of climate change better. Even a nation's government utilizes satellites for private communications and military and strategic purposes, contributing to a better level of national security and the safety of its citizens. Our desire to explore and

understand space, the solar system, and our collective galaxy is what essentially enabled and empowered our forefathers to put in a large number of resources, allowing us to reap the benefits that space exploration and, in turn, the utilization of space that we enjoy today (West et al., 2023; Logsdon, 2024).

Definition of Key Terms

Term	Definition
Space Pollution	The contamination of space (in the context of the agenda, this includes the area where satellites orbit around Earth) caused by decommissioned satellites, stages of a rocket that has remained in space, or space debris in general (PCMag, n.d.).
Space Debris	Refers to any piece of machinery or debris that has been left in space by humans. It can be large objects, such as satellites that are no longer operational, or smaller objects, such as smaller pieces of debris or paint flecks that have fallen off a rocket (O'Callaghan, 2019).
Space Program	Programs or initiatives that are either privately-funded or state-funded that involve bringing manned or unmanned spacecraft into space.
Satellites	Can either be natural, or artificial, man-made objects that orbit around a large celestial or astronomical body, such as planets and or large enough asteroids. Examples of natural satellites include moons. Man-made satellites can either be the manned type (such as the International Space Station, and other Space Stations/Shuttles) and the unmanned type (robotic satellites) that serve multiple purposes (Britannica, 2023).
Satellite Constellation	A network of identical or similar-type artificial units with the same purpose and shared control that communicate with worldwide-located ground stations (EOS Data Analytics, n.d.).
Collision Avoidance Maneuvers	Maneuvers (adaptation and mitigation techniques) that seek to minimize collision with space debris (Waste, 2019).

Major Parties Involved

Space Agencies/State's Space Programs

Seeing the benefits that the utilization of space, particularly the area where objects start to orbit Earth, has in terms of increasing the security of a country as well as improving its military capabilities, space agencies or the state's space programs are typically heavily involved with the development of technology that either improve or worsen space pollution. They also play a major role in monitoring the amount of and risk associated with the space debris to a certain spacecraft.

Thus, it is only natural that capable (in the context of aspects such as the availability of resources, manpower, and technological capabilities) member states utilize a sizeable portion of their national budget towards space exploration and or the technology relevant to it. Such is the case in the United States, wherein the national government allocated over $20 billion of the government budget to the National Aeronautics and Space Administration (NASA), the primary agency of the US government responsible for the development and initiatives of the US space program (Shibu, 2023). Thus, member states who either have extremely developed space programs or member states who have the capability to advance their space programs likely means that as global technology continues to advance, so will a nation's interest to utilize space for the benefit of their people, leading to even further "traffic" in space, possibly worsening the space pollution problem as more spacecraft are launched either to orbit around Earth or for other purposes.

Large Corporations/Companies

Large private institutions such as those that provide TV and internet service typically do so through the form of their own privately-owned satellites that orbit around Earth. An example one may look into is SpaceX, one of the biggest, privately-owned companies created for the purpose of space exploration, particularly attempting to revolutionize "*the aerospace industry and making affordable spaceflight a reality*" (Eldridge, 2024)

International Agencies/Organizations

International Agencies and Organizations, including the International Space Station, GA4, and the United Nations Office for Outer Space Affairs, provide a platform for member states to collaborate on space projects, including formulating regulations to minimize space debris and their impacts.

Timeline

Date	Description of Events
1957	Sputnik I was launched that not only marked the beginning of the Space Race but also led to the first human made orbital debris in space.
1957	The United States Air Force created Project Space Track to identify the origin of artificial space objects.
1959	The United States launched its first orbital anti-satellite ASAT called the Bold Orion, which led to an increase in space debris.
1978	NASA scientists Don Kessler and Byron Cour-Palais introduced the Kessler Syndrome, talking about the point where orbital debris will start to grow due to collisions of space debris and not necessarily just on new launch activities.
1993	The Inter-Agency Space Debris Coordination Committee (IADC) was founded as an international forum that develops guidelines and implements coordination efforts to reduce space debris and its impacts.
2007	China sent a ballistic missile and destroyed an old weather satellite, entering the space race.
2009	The collision between Iridium and Cosmos communication satellites occurred, which led to an initiative by the Joint Space Operations of the U.S. Strategic Command to alert spacecrafts of close approach substances within 1 km.

2022	The United States announced banning the use of missiles against satellites.

Possible Solutions

- **Improvement of Space Debris Cleanup Initiatives:**
  - One of the primary reasons why space pollution is in the state that it currently is in is due to the fact that cleaning up space debris in the first place is difficult to do. Solutions and Cleanup initiatives related to Space Debris are currently considered to be both expensive and extremely difficult to implement, meaning that current limitations mean that cleaning up space debris will likely take years. However, the large resource cost is not the only reason why it is difficult to solve Space Pollution, as the debris itself also makes it difficult to clean it up. For example, the larger-sized debris, such as those of the leftover rocket stages that orbit around our planet are large in size is difficult to move, and attempting to "clean" it up from our orbit may, in turn lead to the creation of even more space debris. Another issue lies with the smaller-sized space debris, which are extremely difficult to track (Aerospace, n.d.). As mentioned earlier, even small bits of debris can cause relevant damage to satellites and spacecraft orbiting our Earth or attempting to escape Eart'h's orbit, and their small size makes it difficult to track them in the first place, with there only being estimates of the number of smaller-sized space debris. Thus, member states need to take this into account when it comes to the improvement of Space

Pollution cleanup initiatives.

- **Improvement of International Standards in Space Usage and Technologies Relevant to the Utilization of Space**
    - Most international standards and treaties may be considered outdated in nature, and may not take into account the current state of the severity of space pollution, especially around the Earth's orbit. Thus, member states may look into existing treaties, legally binding ones or not, that are relevant to the utilization of space, space pollution, and space debris and see what possible improvements (if any) can be made to fit today's current context better, as not only has the relevant technology become more advanced, but there are stakeholders now, such as private organizations and state governments, are more in number compared to when most of the treaties were made.
    - Additionally, member states can look into improving standards regarding technology related to spacecraft and satellites to prevent the further worsening of the space pollution issue. Such initiatives could include possibly making it easier for satellites and spacecraft to de-orbit, or re-enter the planet safely.

Useful Resources: (from most useful to useful)

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