CIMUN VI Chair Research Report

Committee: The United Nations Commission on Science and Technology for Development (UNCSTD)
Issue: Addressing the issue of space debris and ensuring responsible space exploration
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1. Committee Introduction

As a subsidiary body of the Economic and Social Council (ECOSOC), the main mission of the United Nations Commission on Science and Technology for Development (UNCSTD) is to provide the United Nations General Assembly (GA) and ECOSOC with high quality advice on current issues that are relevant to science and technology.

Established in 2005, UNCSTD functions as a forum for national Governments, intergovernmental organizations, and the civil society to hold timely discussions on global issues that impact the field of science, technology, and development. Such discussions tackle various challenges of access, governance, and equity to ensure that technological advancement can benefit all people. The committee also maintains strong bonds with other UN entities, including United Nations Trade and Development (UNCTAD), The Commission on Status of Women (CSW), International Telecommunication Union (ITU), the United Nations Educational, Scientific, and Cultural Organization (UNESCO), as well as other regional commissions.

With the rapid development of technology in our current society, UNCSTD is one of the most relevant committees where timely discussions can be conducted. The committee requires critical thinking and cooperative collaboration from member states to methodologically utilize science and technology as a tool for a better future.

2. Agenda Introduction

For a significant amount of time, space has been one of the most compelling and mysterious topics to human civilization. As a result of this interest, space exploration has rapidly developed over the past decades, taking place as one of the most heavily funded industries. Although exploring space required a large amount of monetary supplies, at the same time, it came with various merits, including the rapid development of technology, identification of environmental issues, and obtainment of new information on the unexplored realms of space. However, this progress came with clear drawbacks: pollution of the Earth. The issue of space debris has exponentially worsened with the development of space exploration, resulting in millions of space trash floating around the Earth. With the involvement of private corporations and the limitations of existing treaties surrounding this issue, it has been even more difficult to properly address space debris.

The agenda invites delegates to identify the severity of space debris levels, and to determine solutions that can effectively alleviate or improve current situations. Thus, it is crucial to consider different circumstances surrounding the issue, and to reasonably weigh the importance of space exploration to the severity of space debris when discussing measures to cast impactful changes.

3. Definition of Key Terms

Space debris

Space debris is man-made, non functioning objects in Earth's orbit. These primarily include defunct satellites, used rocket stages, and fragments from collisions or anti-satellite tests.

Kessler syndrome

Kessler syndrome is a catastrophic scenario theorized by NASA scientist Donald Kessler, where dense space debris triggers an unstoppable collision cascade. Each impact will generate more fragments, potentially rendering the Low Earth Orbit unusable for decades or longer and would not only jeopardize military assets, but also civilian services such as weather forecasting and telecommunications.

Low Earth Orbit (LEO)

The Low Earth Orbit is known as the orbital region 160 - 2,000 km above Earth, where most satellites operate. However, due to the privatisation of space and increase in debris, this area has become more and more congested, raising concerns regarding a potential Kessler syndrome.

Satellites

Satellites are primarily divided into three main types 1) civilian, where they are mainly used for weather forecasting, environmental monitoring, navigation (GPS), and earth observation. 2) military, primarily for national defense purposes. It enables real-time navigation, facilitates intelligence gathering, effectively serving as a 'third eye' for nations. Notable examples include the USA's GPS satellites (though they also serve civilian uses) and spy satellites for monitoring military activities. 3) commercial satellites, which are owned by private corporations. Much like SpaceX's Starlink, they generally provide global satellite internet services.

Anti-satellites (ASATs)

Naturally, given the importance of satellites, there has been growing interest in methods of disabling or destroying them. First tested by the US in 1959, these weapons have significant power in space warfare that can not only alter power balances but also amplify or reduce inequalities.

Outer Space Treaty (1967)

The Outer Space Treaty, commonly referred to as the OST, is the foundational international space law that has established principles of peaceful exploration and prevented the militarization of space. However, while the OST regulates national activities in space, it relies heavily on individual states to enact domestic laws that hold companies liable for environmental damage and space debris. This regulatory gap has driven fears that the rapid commercialization of space could outpace governance frameworks, leading to unsustainable and uncontrolled debris proliferation. Therefore, delegates should consider how to modify the OST to fit current advancements in space.

4. Timeline of Key Events

1957 - USSR launches Sputnik 1
The launch of Sputnik 1 by the Soviet Union marked humanity's first successful artificial satellite in orbit. While it, most certainly, represented a monumental achievement in space exploration, it has also raised concerns regarding the future of debris management, primarily due to the rapidly advancing nature of technology.

1965 - First recorded debris collision
The US Pegasus satellite, designed to study micrometeoroids, ironically became the first confirmed victim of space debris. Indeed, this collison proved that even small objects could lead to significant damages.

1969 - Apollo 11 Moon Landing (USA)
While the success of the Apollo 11 mission demonstrated the epitome of human technological achievement, it discarded lunar modules and third-stage rockets into LEO. Therefore, a key consideration for delegates would be to balance between scientific advancement and environmental concerns.

1978 - Donald Kessler publishes "Collision Frequency of Artificial Satellites"

Kessler, an American astrophysicist, theorized a catastrophic chain reaction, where collisions create more debris that trigger more debris. This became the foundation for modern debris mitigation strategies, though its warning went overlooked for decades.

1993 - NASA establishes Orbital Debris Program Office
Responding to rising risks of space debris, NASA created the first dedicated team to track debris and develop mitigation guidelines. Their work led to practices like the post-mission disposal and shielding for satellites, though enforcement remained voluntary.

2007 - China's ASAT test destroys Fengyun-1C
China's ASAT test destroyed a defunct weather satellite, producing around 3000+ trackable debris fragments. This event was considered the worst debris-creating event at the time, and its debris has and still remains in orbit.

2009 - Iridium 33 collides with Cosmos 2251
The collision marked the first accidental collision between operational satellites. The event generated approximately 2000 fragments of debris, validating Kessler's predictions.

2010-present - Rise of private corporations (e.g. SpaceX, Blue Origin) in space launches
With the growing privatization of space, it is very important for delegates to take into consideration the activities of private companies within nations. For instance, SpaceX and Blue Origin have exponentially increased satellites over the past decade, intensifying concerns regarding congestion and collision risks in the LEO.

2021 - UN adopts "Long-Term Sustainability Guidelines"
The non-binding framework urged nations to minimize debris management through post-mission disposal, though its enforcement methods remain ambiguous.

2022 - US announces self-ban on destructive ASAT tests
The US moratorium, joined by its allies, was aimed to reduce debris-generating weapon tests. While it certainly raised awareness and decreased environmental concerns, it is also to note the diplomatic tensions (as it pressured China and Russia to follow suit) resulted.

5. Positions of Key Member Nations and Bodies

United States

As the most dominant spacefaring nation in the world, the US maintains the most advanced space surveillance network to track debris. Alongside NASA and the US Space Force, it has developed the Space Surveillance Network, which monitors over 27,000 orbital objects.

Russia

Russia presents a paradoxical position on space debris mitigation. While officially endorsing international guidelines, its military actions have significantly worsened the debris problem, most notably through the 2021 destructive ASAT test that endangered the International Space Station due to its debris.

China

China pursues a very ambiguous path regarding space sustainability. On one hand, it operates the world's most extensive debris monitoring system and has conducted numerous debris removal technology demonstrations, including a 2022 robotic arm experiment. But on the other hand, China's 2007 ASAT test remains the single worst debris creating event in history, creating more than 3,000 pieces of space debris that is still in orbit as of now. A main consideration for China would be its conflicting approach of environmental diplomacy and space ambitions.

India

India has signed all major debris mitigation agreements and is developing indigenous tracking capabilities through ISRO's Network for Space Objects Tracking and Analysis (NETRA). India space policy is increasingly emphasizing sustainability, with major plans for active debris removal missions by 2023. However, its growing satellite constellations can potentially cause future debris management challenges that may challenge their ability/stance.

Japan

Japan strongly advocates for international debris mitigation standards whilst has continuously enhanced its space situational awareness capabilities via partnerships with the US. Japan mainly combines technological innovation with diplomatic engagement, though its position may be complicated by regional security concerns and threats, particularly due to North Korea and China. It has also been the world's first nation to conduct a commercial debris removal mission (completed with a company called Astroscale).

Brazil

Brazil is one of the emerging space powers that emphasize equitable access to orbital resources whilst raising concerns regarding debris management, particularly from major spacefaring nations (e.g. US, Russia, China, potentially India). Due to its space agency, AEB, lacking advanced tracking or removal capabilities, it advocates strongly for technological assistance that would enable developing nations to participate meaningfully in debris mitigation efforts and in space exploration. Since Brazil's position will reflect the broader Global South, which generally lacks space capabilities, Brazil will serve as a liaison to bridge gaps and voice perspectives regarding this issue on its behalf.

6. Questions a Resolution Must Answer

Why is it important to address the issue of space debris, and what are some details that should be considered when discussing this problem?

What are the benefits and drawbacks of space exploration, and which side is more valuable for human civilization?

What are other problems that can branch off from the issue of space debris?

What are some ways to bring long-term and effective changes to the current situation with space debris in a feasible manner?

Is there a way to continue space exploration while alleviating space debris, and if so, what ways are the most practical?

Why might some nations have different stances on space debris, and what are some ways to incentivize such nations to act on a unified approach?

Is it possible to address this issue right away, or should solutions be planned thoroughly in advance?

Why did space debris form in the first place, and how can this information be used to create solutions that can decrease space debris?

7. Bibliography

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