The United Nations Office for Outer Space Affairs (UNOOSA)

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TOPIC B. Efforts to reduce space debris

I. Introduction

Ever since 1957, the rise of the Space Agency brought on the expansion of several and new horizons, and with it, proof of the human potential to surpass boundaries. Contrary to popular belief, the sky is not the limit, and thus, humans have overcome the natural borders by launching innumerable objects into space, not only for governmental purposes, but for communications, scientific research, and exploration.

As technology progresses, more and more objects are being sent into space yearly. For instance, rockets are launched more constantly as the need to update the satellites is getting bigger. Furthermore, the satellite's lifespan is shorter each time, becoming obsolete anachronisms that are now hindrances to the rest of the active orbital satellites. As the number of objects in Low Earth Orbit (LEO) increases, so does the risk of collision. These parts that are disposed of in space, as well as other human objects are called space debris.

Collisions between satellites and other human junk create space debris (also known as space junk). It has been amassing since the first human-made satellite, *Sputnik 1*, escaped Earth's gravitational pull-on October 4th, 1957. The momentous event heralded the start of the Space Age as humans began to explore even further away from the home world, a feat that has been repeated in more than 4,700 launches around the globe. Nevertheless, that also means

humans have left their mark on space in the form of trash, as the debris includes the stages from rockets and satellites, and the satellites themselves once they stop functioning. However, it also includes smaller bits and pieces lost to space, such as several tools, gadgets, among other objects (Wei-Hass, 2020).

Donald Kessler, a scientist from NASA, came up with an idea called the *Kessler Syndrome*. It sustains that an exaggerated amount of debris in space could cause a chain reaction in which small collisions would lead to a massive collision, creating more and more space debris until LEO became unusable. This could be seen as a worst-case scenario, but even though there have only been 25 maneuvers to avoid collision, and the calculated chance of a collision is one in ten thousand (the last one being in 2009), scientific calculations have determined that, with the right variables, this could be a possibility. Therefore, it is essential that solutions to space debris are carried out (O'Callaghan, n.d.).

The United Nations require that every company retrieves their satellites after 25 years of their mission, or after they have failed. The major problem is that most satellites often fail, or their functions become obsolete, so they complete (or rather, fail) their mission in short spans of time and are then replaced by other satellites whose life span might be noticeably short as well. Many scientists have also pointed out the various risks the debris may cause in the interference of the functional capacities of each satellite, and how these could be prevented in the future (O'Callaghan, n.d.).

Taking into consideration the risk of danger that these types of collision may inflict in telecommunication and scientific satellites, like the *International Space Station* (ISS, where astronauts live), it is paramount that the member Nations of UNOOSA unite to propose various measures to clean the LEO and prevent the further contamination of surrounding objects. Even though it may not affect the global population directly, it can become a crisis that could have been prevented.

II. Current situation

Nowadays, LEO is contaminated with millions of "space junk", with most of them being human-generated objects; such as spacecraft, rocket, and satellite parts. This so-called space debris moves fast, and can reach speeds of 18,000 miles per hour; therefore, many of the future space operations like explorations and scientific research missions are in great risk (NASA, 2019). Due to the rate of speed and volume of these fragments in LEO, there exists a risk of collision-induced catastrophic fragmentations or mission-terminating impacts, damaging current and future services, as well as making explorations and operations a risk to people and property both in space and Earth (Bonnal and McKnight, 2016).

It could be said that there are no actual complete international space treaties or laws to clean up this "junk", an issue that concerns a future generation, since it is estimated that there are approximately 6,000 tons of materials in LEO. As stated previously, there have been serious incidents which increased space debris, enlarging its population by 70% (NASA, 2019).

Specifically, there are around 34,000 pieces of space debris bigger than 10 centimeters and millions of smaller fragments that could be disastrous if they hit another object (O'Callaghan, n.d.). Also, 170 million pieces of debris larger than one millimeter move around the Earth. The main countries that contribute to this situation are the United States of America, Russia, and China, which understand that when they create space debris, their own systems can face a risk of malfunctioning (Mosher and Kiersz, 2017).

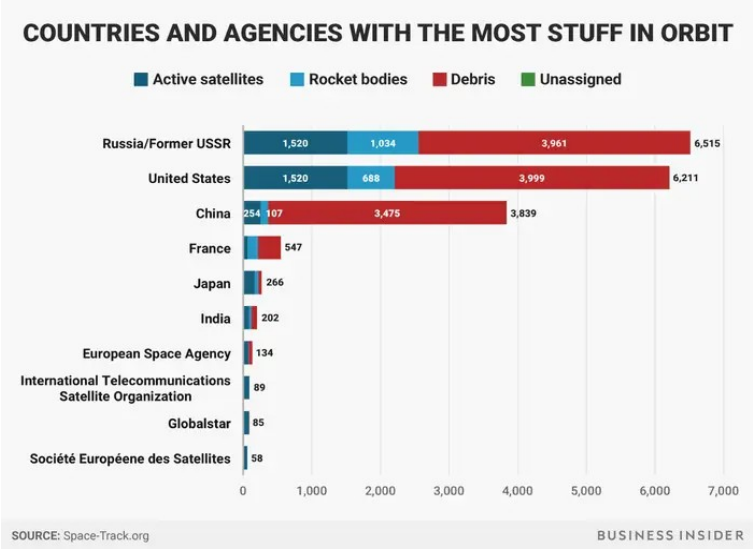

Figure 1. Top ten entities with the most traceable objects around Earth in 2017 (Business Insider, n.d.)

Apart from this, it is known that there is space debris in the Moon as well. This includes moon buggies from *Apollo 15*, *16* and *17*, 54 unscrewed probes and 190,000 kilograms of material left by humans on the Moon surface. Moreover, the main countries that have left spacecraft on the moon are the Russian Federation (formerly the USSR), Japan, India, China, among others (O'Callaghan, n.d.).

As technology keeps advancing, more companies are developing new business models to make profits from connectivity. For example, several companies, including *SpaceX* and *Amazon*, are planning to launch a net of vast new satellite constellations that will provide band internet to the whole world. If successful, there could be an additional 50,000 satellites in orbit, which means that collision avoidance maneuvers will need to be done more frequently (the first satellite maneuver to avoid colliding with a mega constellation was performed by the European Agency in 2019) (O'Callaghan, n.d.).

III. Previous treaties, agreements and resolutions

The United Nations Committee on the Peaceful Uses of Outer Space, along with The United Nations Office for Outer Space Affairs have particular interest in preventing and minimizing the creation of space debris. Yearly, States and organizations carry out an information exchange by creating a research of their space debris at the Committee's Scientific and Technical Subcommittee. As a result, the ST/SPACE/49 – Space Debris Mitigations Guidelines of the Committee on the Peaceful Uses of Outer Space (2010) was endorsed in 2007 by the General Assembly (UNOOSA, 2020).

These guidelines state that the implementation of space debris mitigation measures is essential, since some space debris have the potential of damaging spacecraft, causing mission failures or life loss in manned spacecraft. For manned flight orbits, these measures are highly relevant because of crew safety implications. Due to this scientific research, the national and international legal aspects of debris space mitigation measures were taken and discussed by the Legal Subcommittee (UNOOSA, 2020).

In addition, the recovery and collection of space debris is a central part of the 1968 Rescue Agreement, which states that any country must return "foreign" space objects discovered in their territory to their owners and avoid collisions. UNOOSA has a list of the recovered objects in its database (UNOOSA, 2020). The most relevant documents regarding space debris are the following:

- Research on space debris, safety of space objects with nuclear power sources on board and problems relating to their collision with space debris. This document establishes the regulations regarding spacecrafts sent to orbit containing dangerous materials and those powered from a nuclear source. It is of great importance since a collision incident with these spacecrafts could lead to major catastrophes (UNOOSA, 2020).
- Active Debris Removal – An Essential Mechanism for Ensuring the Safety and Sustainability of Outer Space A Report of the International Interdisciplinary Congress on Space Debris Remediation and On-Orbit

Satellite Servicing. This is a document that mentions the importance of a sustainable and "healthy" space, referring to space debris (UNOOSA, 2020).

- Compendium of space debris mitigation standards adopted by States and international organizations. It refers to the consequences and mitigation of a coalition act in space, as well as other incidents that could occur and have occurred in the past (UNOOSA, 2020).

IV. Key questions

1. What is your delegation's position regarding this topic?
2. Are there any proposals given by your country? Which ones?
3. What is the actual situation of your delegation?
4. Does your delegation have any type of space program or agency? If so, when was it founded? Is it part of any international organization?
5. How can your delegation reduce space debris?
6. Does your delegation have any proposals towards a new space debris handling treaty?
7. Is your delegation directly affected by space junk and space debris? How and why?

V. Sources

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