

Committee: Environmental Commission

Topic: Combating the pollution of space

Student Officer: Yiannis Katsikis

Position: Deputy President



PERSONAL INTRODUCTION

Dear Delegates,

My name is Yiannis Katsikis and I am Deputy President of the Campion School MUN Environmental Commission, focusing on the topic of 'Combatting Space Pollution'. I am half British, half Greek and I attend Campion School of Athens myself. I have attended six MUN conferences so far, specifically in the Environmental Commission acquiring knowledge on several different topics concerning our generation and our future in relation to the environment.

Please feel free to contact me regarding any of your problems concerning the specific topic, the procedure of MUN, information about the conference or anything else you require on this email address:

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Best regards and good luck with your resolutions!

TOPIC DEBATING

Through the evolution of technology and extended research throughout space, several aspects of our universe have been discovered including that of space debris and its . A fascinating but worrying topic to concern us all, considering that millions of spatial fragments are encircling us, including those of satellites and remains of astronauts. Maybe our research has gone too far and is not worth it if it comes to destroying our Universe. However, these small particles may also prevent us to utilize what we already have.

Space debris are made up from parts of spaceships, space stations etc. During journeys to outer space, whatever is not utilised, is just ejected into space. Space junk is also produced from the collisions between asteroids and meteorites and during these, parts are destroyed and expelled into space. Throughout space, matter is travelling at very orbital velocities reaching (20,000km per hour) and possibly causing damage to even our own investments such as satellites due to collisions. Any item, including even a chip of paint can affect or destroy either other space junk which could lead to a chain reaction of debris being formed or puncture part of our own investments such as the glass on the spaceships, or electronics in satellites causing severe damage. Therefore, measures have to be taken to reduce space debris in order to secure future space travel and keep current investments safe.

KEY TERMS

Space

The empty, unlimited area outside the Earth's atmosphere.

Pollution

Pollution is the addition of any substance to the environment at a rate faster than it can be dispersed.

Space Pollution

The man - made destruction of space through the creation and usage of objects in space itself.

Debris

Waste remains.

Rocket

The method used in the current day and age of reaching out further into space, either controlled by humans or assisted by computers which exists the earth to explore beyond.

Launch Canisters

The removal of chemicals from a container due to the build up in either the machine or rocket.

Combat

Prevention or tackling on a specific matter.

Space Junk

Man - made remains orbiting the earth and space such as abandoned parts of rockets and satellites.

TIMELINE

Date	Description of Event
1946	WAC Corporal was the first US designed rocket that was able to reach the edge of space
1957	The first artificial satellite was created
1957	Rockets begin launching
1957	First artificial satellite launched
1962	NASA conducted its first solar observatory
1966	Having been launched, the SA 5 was discovered to have collapsed spreading space junk across parts of Brazil
1997	A Russian navy satellite was sent out but failed. The antennas broke down not allowing the radar to work properly and resulting in a crash, leaving a shawl of space debris across Canada
2001	Having been launched into space but failing, the Russian Heavyweight space station came back to earth weighing 130,000kg and about 1,500 getting to the Earth's surface.
2007	Fengyun-1C destroyed in chinese anti-satellite test creating 3,428 pieces of debris in orbit
2008	Microsat-R was the target of a U.S. anti-satellite test named Operation Burnt Frost
2008	US Navy sent of a spy satellite leaving behind debris across NW US and Canada
2009	Russian Kosmos 2251 accidentally collides with an Iridium 33 satellite creating 1,668 pieces of debris in orbit
2012	The first man-made probe went into the interstellar space
2017-2018	Breakthrough start-up company Seer Tracking beings using artificial intelligence to track space debris
2019	India tests anti-satellite weapons on a satellite. This results in several pieces of debris remaining in orbit creating potential risk

CAUSES

Through research on the topic of space pollution, several causes have been found and that can be acted upon in order to solve the problem too. In only a few words, space pollution is caused by the human intervention and research into space. Basically, what happens is, that using the timeline above, we can see that many new inventions have been launched into space. When these machines become non-operational, the parts disintegrate and break out into space. These developed, due to their already high expenses and for full functionality have to be built using specific materials, which can't be broken down or attracted back and are therefore free to damage and collide with others. The old initial satellites put out in the beginning were not as developed and over time have been broken apart into debris which just float around in space.

When fossil fuels are burnt gases like sulphur dioxide and carbon dioxide are produced, along with other pollutant gases. Since they are all less dense and lighter than oxygen and hydrogen, they rise high enough to surpass the earth's atmosphere and therefore are freed into space. Due to the absence of gravity, intermolecular and electrostatic forces are the only ones present. Therefore, they bond, forming nebulae. As a result of microgravity (lack of gravitational pull) , they are not attracted to the planets so therefore the nebulae produced is free in space. The biggest impact that this has is on astronomy from earth as the clouds interfere with the telescopes on the surface of the planet. This problem is very minor compared to the issue of space debris, as the impact of debris collisions is far greater.

Remains of machines play the biggest role in space pollution build up. For example, even small details such as paint flakes contribute to it. Whatever is taken into space can't be removed due to the lack of forces. Therefore, even paint flakes, let alone whole parts of rockets and satellites, remain there unattended to, colliding, and creating even more trouble. If the build up continues, more incidents will take place concerning the impact of our future in space and even our current generations which may even have more detrimental effects. This is called the Kessler Syndrome, and other than the aforementioned points of building up the biggest problem that is forthcoming is the chain reaction that may

make it impossible to launch from the earth without the risk of collisions which is a very big problem due to the fact that we are considering on moving planet at some point, let alone continuing our research.

POSSIBLE SOLUTIONS

Having looked through the several causes and having understood the detrimental impacts that may be caused as a result of space debris, several measures have to be put into place in order to prevent it initially starting but also reducing what is already present. As of 2018, an approximate 4900 out of over 8000 total satellites are predicted to still be orbiting the Earth. There are two main ways that have been found in order to reduce the problem those being contactless and contact methods. Contactless methods, seem to be more effective as using them the debris can be reached from further away and with no real human intervention. These include the usage of lasers and ion beams. Tohoku University in Japan are in the process of creating a contactless method called the ion beam shepherd but problems have arisen over time. Such as a lot of power being needed to direct it back to Earth where it could be dealt with. However, due to evolving technology and different forms of energy, this problem has been nearly counteracted. Contact methods involve launching satellites with nets or harpoons to effectively “catch” space debris and then deorbit them in order to burn it up in the atmosphere. Companies such as Astroscale and Saber Astronautics are developing such methods

Additionally, having followed the International Space Station example of creating the NanoRacks- Remove Debris satellite, using a 3D camera in order to detect the location and spread of the space junk, is a very successful way of depleting the current junk and reducing the likelihood of continuous collisions. This can be done through the laser beam that the 3D camera will create in turn and therefore result in the detection of the space junk.

Obviously, the thing that is really in our hands is the formation of what we send into space. In other words, we need to be careful of our satellites and new upcoming missions. Currently, the work is voluntary and needs to be encouraged more so as to encourage more people to take part. Additionally, as the Global Future Council on Space Technologies is working on encouraging private actors to also contribute to this critical project.

Finally, the reduction of fossil fuel usage will also prevent the nebulae being created in the first place. So, through the reduction of cars and encouragement of public transport, recycling, planting more trees etc can be followed.

MAJOR COUNTRIES INVOLVED

RUSSIA

Russia, being the country that has the highest number of rocket bodies and a huge number of active satellites is a big contributor to the total debris created reaching 4,035 pieces orbiting.

US

The US has the biggest amount of debris in space with a total of 4037 items of debris. There are 1,520 active US satellites in space and 688 rocket bodies circling. The US, having the largest total impact overall, has to take the most action in order to ensure that the junk is reduced to an extent, especially as it is the most economically advanced and stable and has the biggest sphere of influence concerning exploration in space.

China

Despite China being considered one of the largest countries in the world, they haven't yet dominated the space industry. However, through the continuous evolving of technology over time, they will definitely contribute even more towards space pollution. Currently, they have 3,475 items in space. The reason China has managed to create so much junk is that in 2007, it destroyed its own satellites whilst carrying out the anti - satellite weapons test.

France

France, again being one of the most economically active and stable doesn't seem to be as active in space. Yet, France still has 547 pieces in orbit, contributing to the pollution of space.

India

India, has 202 pieces of debris circulating space overall. India over the past 7 years has increased its overall space investigation and is steadily increasing its impact in space pollution. India has been using cheaper products and materials in order to carry out their investigations which makes it harder to solve and have a bigger impact. Finally, India launched missiles to blow up satellites in orbit which created more debris despite their attempt to prevent this by conducting this activity further down in the atmosphere.

Japan

Japan has 266 pieces around space due to the fact that they have recently begun investigating space. Japan has evolving technology as is starting to have a bigger overall influence when it comes to both space and production of equipment.

UK

A surprisingly small amount of only 1 piece of debris overall has been detected to be part of the UK's exploration. Overall, the UK has not really embarked on the journey to explore outer space and probably won't for a few years now.

Brazil

Brazil, being quite a big country overall, but not having enough financial stability to explore, has a surprisingly large amount of space debris circulating outer space of 52 items, which considering that Brazil hasn't explored or sent anything out to space very much, is very high.

Canada

Canada again doesn't seem to be very active when it comes to space exploration however they have begun exporting and contributing to the US's projects and productions of rockets, satellites and space stations.

UN INVOLVEMENT

The UN through its several committees has been making a conscious effort in order to combat this problem of space pollution. The United Nations Committee on the Peaceful Uses of Outer Space has been aiming on preventing the creation of Space Debris in the first place. Discussions throughout the UN have been conducted in order to set the Space Debris Mitigation Guidelines through the UNOOSA organisation in order to limit the amount of space debris created and destroy the current junk present.

In 2016, “National research on space debris, safety of space objects with nuclear power sources on board and problems relating to their collision with space debris” was conducted during the 53rd session and was soon followed by the “Compendium of space debris mitigation standards adopted by States and international organizations”.

“VIENNA, 23 February (UN Information Service) -- Prospects for using small satellites to bring the benefits of space technology to developing countries and discoveries in how to measure and assess the dangers posed by "space debris" were among the main questions discussed at the thirty-third session of the Outer Space Committee's Scientific and Technical Subcommittee, which ended here this morning.”¹

¹ <https://www.un.org/press/en/1996/19960226.os1719.html>

RESEARCH QUESTIONS

To further develop your knowledge on the topic of space pollution and how it can be solved, taking into account the history, the causes and the above proposed possible solutions the delegates can follow up on the following.

You may research, the impact of space pollution on people (specifically health and environmental) in order to further understand why it is so important to deal with this problem quickly.

You may use this link to aid you with this :

<http://www.pollutionissues.com/Re-Sy/Space-Pollution.html>

According to your country at hand, you must research individually the impact on your specific country, how your country is contributing to space pollution overall, what has your country done to aid with this problem, why must your country act quickly.

You may also want to look up the way in which this problem may be conveyed to an audience. For example, through social media or mass media in general.

Please do not hesitate to contact me on this email:

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If you have any problem regarding your research, my above study guide provided, extended research, websites to guide you or even the overall procedures of MUN and specifically what will take place at CS MUN

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- [The countries with the most space junk REVEALED! Infographic shows the worst offenders | Daily Mail Online](#)
- [How much space junk exists and which nations created most of the trash - Business Insider](#)
- [The countries that have the most junk in Space](#)
- [Small Satellite Demonstrates Possible Solution for 'Space Junk' | NASA](#)
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- [A History of Garbage in Space](#)
- [Space Exploration Timeline](#)
- [Space pollution.](#)
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- [A/AC.105/C.1/2016/CRP.8 - National research on space debris, safety of space objects with nuclear power sources on board and problems relating to their collision with space debris](#)