

**Topic: A report and study of Satellite Junk in Space as of 2023**

**Group: Anabella Villanueva, Anushikha Chaudhuri, Julia Krönert, Laura Dea Vamper, Polina Yordanova**

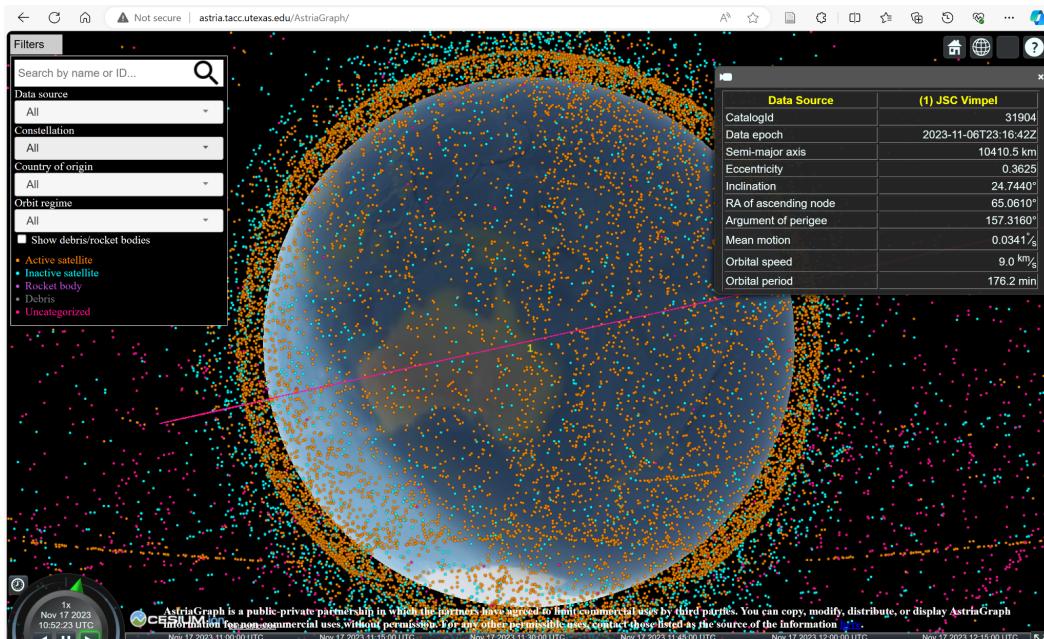
**Group name: Space Junkies**

Email      IDs:      [anavictoriavq@gmail.com](mailto:anavictoriavq@gmail.com),      [anushikha.chaudhuri@student.uva.nl](mailto:anushikha.chaudhuri@student.uva.nl),  
[polinayordanova98@gmail.com](mailto:polinayordanova98@gmail.com), [vamperlaura@gmail.com](mailto:vamperlaura@gmail.com), [julia.kroenert@student.uva.nl](mailto:julia.kroenert@student.uva.nl)

**This document briefly summarizes our project and the results.**

### ***Collection of Data and Video Making***

We, together with the help of Bellingcat, retrieved the main meta data from <http://astria.tacc.utexas.edu/AstriaGraph/>. We used this large amount of data and categorized it for our analysis. We merged and simplified some of the results generated by AstriaGraph ([image 1](#)). We used the software Tableau for our data analysis, where we created our graphs, few examples are in ([images 2-3-4](#)). Furthermore, we correlated our quantitative data with qualitative data such as articles (image 5-6) related to space debris and satellites. Thereafter, we created a video presentation to report our findings.



**Image 1: “Astria Graph”**

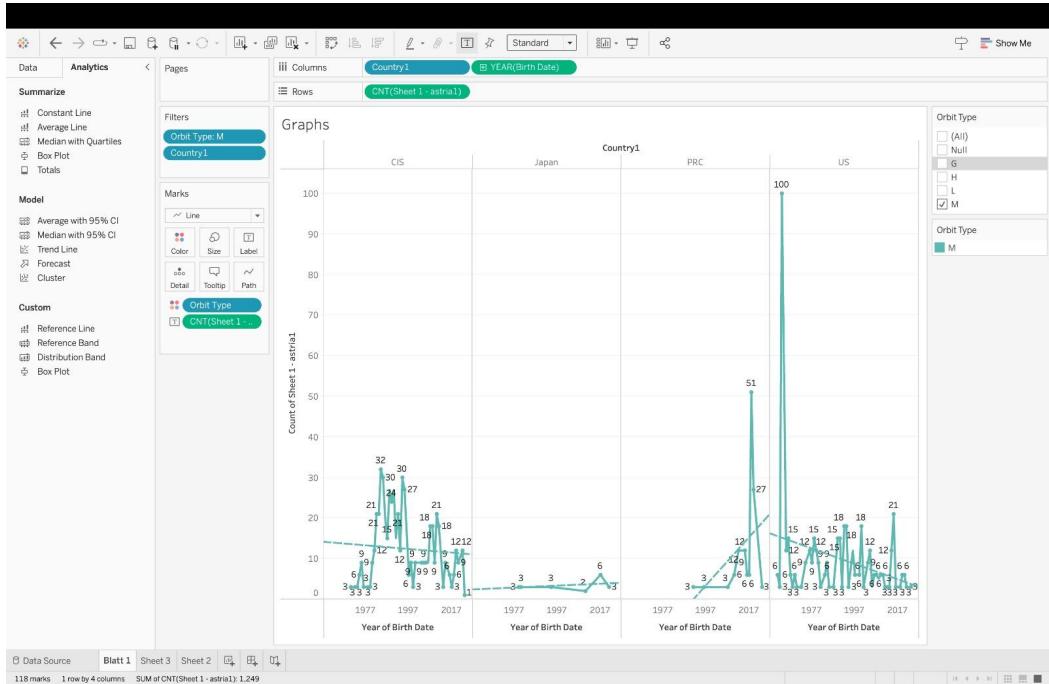


Image 2: “Medium Earth orbit (MEO)”

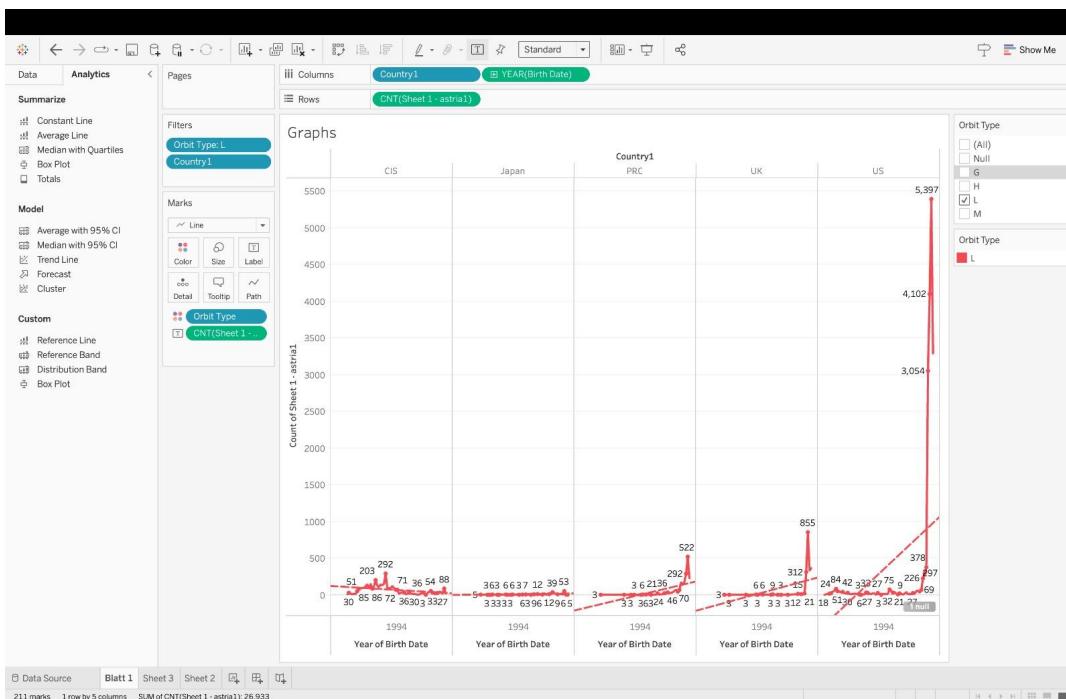


Image 3: “Lower Earth orbit (LEO)”

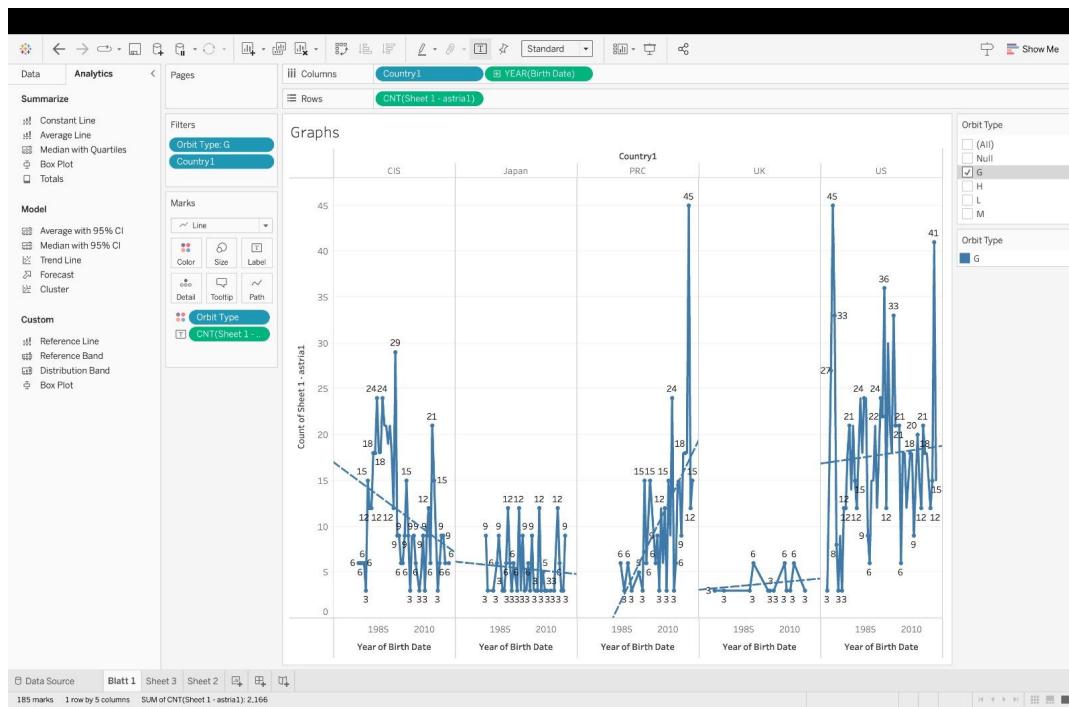


Image 4: “Geo-Synchronous/Stationary orbit (GEO)”

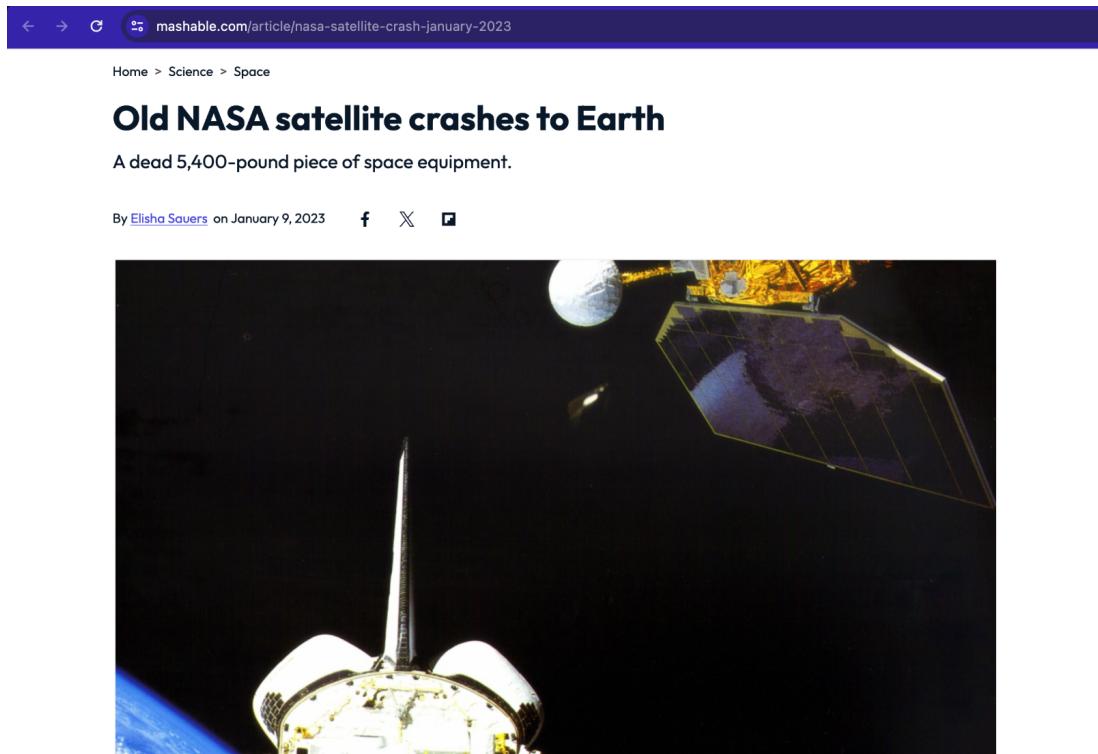


Image 5: “Article on Satellite crash”

The screenshot shows a news article from thesun.co.uk. The header features the Sun logo and navigation links for News, Sport, Fabulous, TV, Showbiz, Money, Travel, Health, Tech, Motors, and More. The main headline reads: "DANGER ZONE Nasa warns dead 2.5ton 'space junk' satellite will crash to earth today – and they don't know where it will land". Below the headline is a photo of a satellite in space. The author is Imogen Braddick, and the article was published on 0:02, 8 Jan 2023, updated at 0:02, 8 Jan 2023. There are social sharing icons for X and Facebook. A sidebar titled "MORE FROM THE SUN" includes links to stories about Sean Combs, welfare shake-ups, Netflix's end of an era, and Stuart Hooper splitting from his wife.

Image 6: “ Warning on the consequences of space junk”

## ***Data Analysis***

To summarize, we categorized the data to check the trend of satellites being released in orbits starting from the late 1950s till 2023. We found that Russia, USA, Japan, China, and the UK are responsible for a lot of lower earth orbit wastes and according to reports by ESA, the trend is only increasing. USA's major spike around 2019 can be attributed to Starlink satellites being released in the LEO. Moreover, with MEO and GEO, we observed that few countries like China and USA are planning to utilize the MEO space for GPS constellations. SpaceX has started to release satellites to the MEO as well. It was difficult to fit the data of MEO to predict any particular trend since it varies from country to country. With GEO we observed that the countries fluctuate with their missions and are not outspoken with their missions, likely due to military connotations.

## ***Methods***

Space junk is a distinct type of pollution that exists exclusively in space and is also known as space debris. For this project's research, we focus on satellite junk. Human activities discard many dead

satellites and fragments of machinery in the Earth's orbit. The problem of space debris is being underestimated; a study in 2021 demonstrated that the amount could increase 50 times by 2100 (O'Callaghan, 2021).

We collected data on space satellite junk by analyzing the graphs and data we collected from University of Texas's AstriaGraph which allowed us to access information about Space Debris in Earth's orbit. AstriaGraph allowed us to visualize up-to-date space satellites, however, some data did not have categories or country-related information, thus we had to exclude those during our analysis due to time restrictions. The data collected included information and visuals of the Low Earth orbit (LEO), Medium Earth Orbit (MEO), High Earth orbit (HEO), and Geo-Synchronous/Stationary orbit (GSO/GEO). However, after the initial data analysis, we excluded the data from High Earth orbit (HEO) since it did not show any relevant trends, but could be analyzed regardless.

Our research focussed on the top five countries (Russia, the USA, China, the UK, and Japan) contributing to this space junk problem in Lower Earth Orbits. We were also able to connect data spikes in our analysis of MEO and GEO to major events in those countries throughout the years.

Controlling the growth of space junk is a high priority for NASA, the US, and other major countries of the world. We need to preserve near-Earth space for future generations (NASA, 2023).

### ***The Aim(s) of the Project***

While our initial (and very ambitious) idea was to give some near-future estimations on satellite junk at the GEO, we eventually realized that, within the time limitations of this project, it was not feasible to achieve that. Thereafter, we opted for a more feasible goal: to spark more discussions on space junk and, particularly, satellite junk. Moreover, we hoped to give a brief overview of the countries that appear to be the biggest contributors to this issue. Nevertheless, since satellite space junk is an issue of worldwide "contributions," it is wise to keep in mind that such conclusions should never be overgeneralized.

### ***Reflection***

We took a rather creative approach by opting for a video instead of a presentation for this project. This allowed us to showcase our complex set of skills by highlighting our individual strengths. As a group of five, we were able to split the tasks in an efficient manner. Some did the preliminary research; others focused on the technical aspects of it; and the third worked on the final version of the video. By dividing the tasks based on our soft and hard skills, we managed to contribute meaningfully to the assignment. We

intend to generate more discussion about space junk while also addressing the limitations of data collection and policies. Some future discussions on projects related to Open source investigation can be how geosynchronous satellites are used in tracking systems during war zones and continuous conflicts. If we are able to track the synchronous movement of GEOs of certain countries during periods of war or conflict, it may give us an idea about potential future moves or intentions of the country operating the satellites.

### ***Bibliography***

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