**SPACE SUSTAINABILITY**

**PRESEVING THE USABILITY OF OUTER SPACE**

**HOW WE USE SPACE SATELLITES AND THEIR ORBITS**

Thousands of satellites orbit the Earth at different altitudes, enabling many of the technologies we use on a daily basis.

**THE NEED FOR SPACE SUSTAINABILITY**

**1. What is Space Sustainability?**
Ensuring that humanity can continue to use space for peaceful purposes and socioeconomic benefits in the long term.

Space activity has increased with technological advancements—more than 30 countries now have satellite launches.

**2. SPACE JUNK**
Space junk or orbital debris refers to defunct satellites, rocket bodies, and fragmented objects in space that no longer serve a useful purpose. There are millions of debris objects in space, traveling at high impact speeds.

**Number of Debris Objects by Size**: 24K, 920K, >1,000m, >100m, >10m, >1m.

5,900 metric tons — The mass of debris objects in space, 28,000 km/s — Speed at which space junk can travel.

Increasing space debris poses a threat to active satellites and human spaceflight, especially as orbits get more crowded.

Source: European Space Agency (ESA)

**3. ORBITAL CROWDING**
The space in Earth's orbits is limited. Satellite constellations—large networks of satellites that surround the Earth—are becoming more common.

**Examples of Planned Satellite Constellations**

- Starlink
- OneWeb
- Kuiper
- Amazon
- SpaceX
- SpaceX

**4. SPACE SECURITY**
Military capabilities to disrupt, degrade, or destroy satellites for national security reasons. Such actions could have consequences for other users in space.

Debris Generated by Anti-satellite (ASAT) Tests

Since 1999, China, India, Russia, and the U.S. have conducted over 70 tests collectively.

**SOLVING THE SPACE SUSTAINABILITY PROBLEM**
As global reliance on satellite services and applications grows, the importance of policies, practices, and technologies to use space sustainably becomes more critical.

**Space Holds vast benefits to humanity that we leverage through satellites.**

However, the orbits in which satellites travel constitute a limited natural resource because there is a finite amount of space becoming increasingly crowded with satellites and space junk.

Managing this resource for the future requires the world to look towards sustainable management of space through policy and technical capabilities.

As of May 2023, there were 4,084 operational satellites in space, with several applications:

- Science and exploration
- Environmental monitoring
- Military surveillance
- Navigation
- Research and development
- Disaster management
- In-orbit satellite servicing
- Missile warning systems
- Satellite broadband

Who is active in space?
Space is a global resource where activities by one actor can affect all others who use space.

The rapid increase in the number of satellites, driven by the commercial sector, poses challenges for the future of space activities.

**SHARE OF SATELLITES BY SECTOR AND DECADE**

- Commercial
- Defense
- Amateur/Academic

**2010s**

- Commercial: 2,547
- Defense: 478

**2020s**

- Commercial: 4,781
- Defense: 129

**sources**

- 36,000 km to 40,000 km: 57
- 2,000 km to 56 km: 560
- <200 km: 3,328

**Number of Satellites at or Below 56 km**

**5,900 metric tons**

As of May 5, 2003, there were 5,900 metric tons of debris objects in space, as reported by the ESA.

**Number of active satellites (ESA) 1960-2020**

**2010s**

- Commercial: 2,547
- Defense: 478

**2020s**

- Commercial: 4,781
- Defense: 129

**Space**

Space is critical for modern life and the technologies we use daily. Space sustainability is of key importance to maintaining these benefits for the future.

**Presented by**
SECURE SPACE FOUNDATION
Promoting Cooperation Solutions for Space Sustainability