The Current Space Landscape

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In recent years, the space environment has become increasingly complex. More actors, including governments and industry operators, are fielding space systems and developing new terrestrial applications and benefits that rely upon those space systems. This trend has accelerated in recent years as the space domain shifts from a government-driven domain to a multiuser domain (government, industry, academia). Space activities are a key element of diplomatic and national security strategies, and a supporting element of policies to advance scientific knowledge and societal benefit. Increasingly, space capabilities are also becoming a core part of commercial and economic strategy and policy. As the world's leading space power, the United States remains at the forefront of most space sector developments, although both allied and competitor nations are rapidly increasing their capabilities.

Over 11,200 functional satellites orbit the Earth, providing tangible social, scientific, strategic, and economic benefits to billions of individuals throughout the globe. More than half of these satellites are operated by American agencies, companies, or organizations. In the U.S., a small number of commercial companies currently operate over 90 percent of the country's operational satellites on orbit.[1] Globally, at least 100 countries operate satellites.[2] Many of these commercial and governmental actors in space are new to the domain and may be unaware of existing operational best practices for safe and sustainable space operations.

In addition to the active satellites in space, there is a large and growing number of objects in space that serve no useful purpose. Orbital debris—dead satellites, spent rocket stages, and other fragments associated with humanity's activities in space—represents a growing threat to active satellites. The United States is currently tracking more than 36,700 debris objects in Earth orbit, most of which are pieces of human-generated orbital debris larger than 4 inches in size, each of which could destroy an active satellite in a collision.[3] Statistical modeling indicates there are an estimated 1.1 million pieces of orbital debris between 0.4 and 4 inches in size that

1 Union of Concerned Scientists, *Satellite Database* (Washington, DC: Union of Concerned Scientists, accessed February 12, 2025), https://www.ucsusa.org/resources/satellite-database. Data as of May 1, 2023.

2 T.S. Kelso, *SATCAT Boxscore* (CelesTrak, accessed February 12, 2025), https://celestrak.org/satcat/boxscore.php.

3 European Space Agency, *Space Debris by the Numbers* (accessed February 12, 2025), https://www.esa.int/Space_Safety/Space_Debris/Space_debris_by_the_numbers.

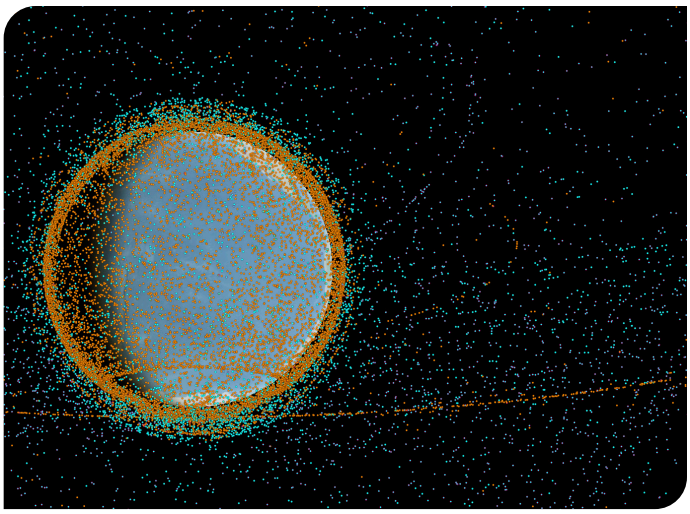

Figure 01 | Active satellites, in orange, and all other debris objects, in blue. Not to scale. *Credit: Astriagraph*

are largely untracked, each of which could severely damage an active satellite in a collision. Continued growth of the orbital debris population and failure to implement improved spacecraft operations practices could lead to a sharp decrease in our ability to sustain the benefits that space systems provide to the entire world.

The United States is currently the world leader in tracking and providing knowledge about the space environment and human activities in space—a capability set known as space situational awareness (SSA). As the space environment becomes more complex, with more actors and increasing potential interactions among satellite operators, SSA capabilities are becoming increasingly critical to the safety of operations. The United States provides SSA information to the global community as a matter of spaceflight safety and has over 185 SSA sharing agreements signed with countries, companies, and intergovernmental organizations that allow for the sharing of more specific SSA data.

Space applications also provide a critical service in supporting human and environmental security needs on Earth. Space systems, including position, navigation and timing (PNT), Earth observation, and telecommunications satellites, provide significant benefits in addressing a wide variety of human and environmental concerns. American capabilities and systems are a key part of a global system of space applications. However, the full utility of these important systems can be blunted by a variety of institutional, policy, educational, and social barriers. As a result, benefits from these systems do not always adequately reach decision-makers or citizens when they need it most.

Space technologies also play an important role in both national and international security. The military use of space includes spacecraft designed to support terrestrial military and intelligence operations, such as global PNT systems, as well as communications and intelligence, surveillance, and reconnaissance (ISR) satellites. As more countries integrate space into their national military capabilities and rely on space-based information and services for their national security, there is an increased chance that any interference—either actual or perceived—with satellites could spark or escalate tensions and conflict in space or on Earth. This is made more difficult by the challenge of determining the exact cause of a satellite malfunction. Some states are developing or have developed a range of counterspace capabilities, including ground- and space-based objects, that could be used to deceive, disrupt, deny, degrade, or destroy space systems.

As space activities have grown, a multilateral governance and coordination system has evolved. The principal international fora for discussing questions related to space affairs are the United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS), the International Telecommunication Union (ITU), the Conference on Disarmament (CD), and the UN General Assembly. Of these fora, COPUOS is the leading multilateral body for discussing questions of international cooperation in space activities. It was responsible for crafting the 1967 Outer Space Treaty, which set out the foundations of international space law that were then elaborated upon in later agreements. From its initial 24 founding members in 1959, the membership

of COPUOS has increased to 104 members, with more countries applying for membership each year, underscoring the growing importance of discussions held there. The United States has historically been an active and leading participant in multilateral discussions of space governance and has helped to shape a principles-based governance regime reflective of American values that has been largely supportive of space activities. U.S. leadership in these discussions remains critical moving forward as a growing number of countries plan and conduct lunar missions, as well as the commercial sector.

Domestically, many agencies have a role in space policy and regulation in the United States. These include the Departments of Defense, Commerce, Transportation, Energy, and State, as well as specialized agencies such as the National Aeronautics and Space Administration (NASA), the Federal Aviation Administration, and the Federal Communications Commission. Agencies may act in a regulatory role, a promotional role, a user role, or a development role, or some combination of these. Congress also has a fundamental role in both the promotion and governance of space activities, with space-focused subcommittees in both the House of Representatives and the Senate. Historically, space has been seen as a nonpartisan issue in Congress, with differences between chambers or geographical constituencies often playing more of a role than party affiliation.

The first Trump administration reestablished the National Space Council (NSpC) as the main hub for interagency coordination on space policy and expanded its membership to include additional agencies. Under the first Trump administration, the

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NSpC issued seven Space Policy Directives (SPDs), which did everything from announcing goals for NASA's human spaceflight program to establishing the Space Force. The SPDs issued during the Trump administration also included initiating an important transition of civil SSA and space safety services from the Department of Defense to the Department of Commerce. The reinstatement of an NSpC served a useful purpose in improving whole-of-government consideration of space activities within the Executive Branch. The Biden administration maintained the NSpC, kept up momentum for the Artemis program, and added many more signatories to the Artemis Accords. Under Biden, the Office of Science and Technology Policy issued a Cislunar Science and Technology Strategy, announcing goals for technical capabilities such as PNT and SSA for the cislunar environment.[4] On the international level, the Biden administration led discussions on norms of responsible behavior at the United Nations, which achieved a General Assembly resolution that broadly condemned programs that would place a nuclear weapon in orbit.

Looking ahead, the United States must remain a global leader in promoting space activities in a sustainable fashion, including supporting the development of national and international space governance. ●

4 White House Fact Sheet, *First National Cislunar Science & Technology Strategy*, https://www.whitehouse.gov/ostp/news-updates/2022/11/17/fact-sheet-first-national-cislunar-science-technology-strategy/