



Dynamics of Disruption

Commercial space development amid adversarial interests: A perspective



Abstract

The article, “Commercial space development amid adversarial interests: A perspective” delves into the rise of space as a commercial and geopolitical arena and the emerging patterns of cooperation and conflict therein. It discusses the impact of earthbound geopolitical realities on commercial space operations, accentuated by significant events including Russia’s anti-satellite weapon test. The power dynamics among space-faring nations—US, China, Europe, Russia, India, and Japan—are extensively deliberated, with each examined based on their characteristics of launch, in-space presence, commercial space sector, and space situational awareness. Finally, the article posits an urgent call for harmonious space policies to manage the threats in this expanding realm and ensure space exploration is harnessed for the collective good.

As the space economy grows, strategies are needed to limit threats from nations seeking to disrupt or weaponize space.

It is said that history often repeats itself; it is also said that history moves faster in the modern age. Whether either is true, it certainly applies in the context of how the geopolitical world on Earth impacts commercial operations in space.

On November 15, 2021, Russia launched an anti-satellite (ASAT) weapon that struck Russian satellite COSMOS 1408. The test marked the fourth time a country had deployed an ASAT, joining the US,¹ China,² and India.³ COSMOS 1408 was operating in lower Earth orbit (LEO) just as the previous ASAT targets had been.

However, Russia’s test differed from previous ones in significant ways. The US and Chinese tests had taken place when commercial operations in LEO were relatively sparse.⁴ There were even significant differences in the commercial deployment between India’s 2019 ASAT test and Russia’s 2021 test. Most notably, in the time between India’s ASAT test and Russia’s, Starlink had deployed approximately 1,800 satellites in orbit.⁵

India’s ASAT test was intentionally conducted on a satellite far lower in orbit to ensure that the debris would burn up in the atmosphere more quickly. The victim satellite in the Indian ASAT test also released far less debris.⁶ Russia, alternatively, destroyed COSMOS 1408 at 490 km, close to many commercial orbits, which released approximately 1,800 pieces of trackable debris.⁷

The debris field immediately threatened the International Space Station (ISS), forcing the astronauts and cosmonauts onboard to prepare to evacuate.⁸ More symbolically, the test also immediately damaged the previously collaborative relationship between Russia’s Roscosmos and NASA.⁹





The commercial space industry has grown to develop an unprecedented presence in space, particularly lower Earth orbit. Unfortunately, this growth has coincided with a new era of geopolitical aggression and the weaponization of space has gone from a distant hypothetical to a pressing reality. This paper examines this new environment and its potential impact on the future of commercial space endeavors.”

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Orbital debris fields from the Russian ASAT test, spanning an orbital range of 300–1,100 km, remain an operational hazard for LEO operators.¹⁰ This is where the bulk of large commercial LEO operators have deployed their systems, including Starlink, OneWeb, Planet, and Spire, as well as a vast array of smaller constellations and stand-alone satellites. For the foreseeable future, long-term debris fields from the COSMOS 1408 test will be traveling through viable and important commercial orbits. This demonstrates just one aspect of how nations could disrupt space.

Now, history is repeating itself only three years later. US Intelligence is reporting that Russia is developing new space weapons to specifically disrupt commercial space services.¹¹ Collectively, Russia’s previous ASAT test and the recent news that Russia continues to develop weapons capable of widespread damage in space are a clear demonstration that the global geopolitical environment has, does, and will pose risks and threats to commercial space actors.

The rise of space as a geopolitical arena

Major space powers and their capabilities

While the arena of space has grown, both geopolitically and commercially, there are only a few geopolitical entities capable of shaping space policy or influencing events in space. Considered here are the United States, China, Europe,¹² Russia, India, and Japan. These five nations and a geopolitical union are uniquely positioned to drive, shape, and threaten the present and future of commercial space operations, making them the current “Space Powers” on Earth. Here, we evaluate each Space Power based on the following characteristics of its space industry, with a focus on a broad set of essential capabilities that are critical to Space Sovereignty:¹³ Launch, in-space presence, commercial space sector, space situational awareness (SSA), lunar presence, and deep-space and science missions.

The United States

The US is a clear Space Power in every sense of the word, and has often been the first mover and standard setter in all aspects of space. It has a robust launch industry that has facilitated an unparalleled presence in space in LEO, on the moon, and beyond.¹⁴

The US also has a unique advantage in SSA technologies and information, with a significant amount of public and private infrastructure deployed to track space debris and alert operators, both domestic and foreign, of potential conjunction events between spacecraft or between spacecraft and debris. The US has further leveraged its SSA capabilities diplomatically, securing collaborative agreements with countries across the globe based on the principle of SSA sharing.¹⁵



One could split the US space industry into government and commercial space and there would be two space powers. The US commercial space industry would, on its own, compete for a place on a list of Space Powers. This was punctuated recently by the successful landing on the moon of a private US space company, an accomplishment that has not been achieved by two of the Space Powers on this list.

China

China is second only to the US in launch and in-space presence, most notably continuing to operate its own space station while contemplating greater satellite deployments in the region.¹⁶

China undoubtedly has some significant SSA programs,¹⁷ although there is limited information about their capabilities. However, China has had to maneuver its space station at times to avoid commercial satellites from other administrations.¹⁸ This suggests robust SSA capabilities, although it is possible that the US may have alerted China to the possible conjunctions.

China's commercial space industry is growing quickly but raises questions as to whether any aspect is truly "commercial."¹⁹ However, China boasts a host of lunar and deep space²⁰ successes that minimize the impact of a relatively muddled public-private divide within its domestic space industry.

Europe

Europe, the only Space Power that is a coalition of nations rather than a single state, is more fairly grouped with the other three Space Powers than with the US. While it does have its own launch vehicle, the transition to a new model has been difficult,²¹ and increasing the cadence of launch has not yet proved feasible. There are also questions as to how sustainable European launch will be without access to and reliance on Russian launch technology.²²

As a result, Europe's in-space presence is significantly lower than that of China and the US. Europe's SSA capabilities are still under development²³ and, likewise, similarly limited as compared to China and the US but consistent with the other Space Powers on this list.

However, Europe still boasts a long-standing commercial space industry and a number of critical science and civilian²⁴ space deployments. It has successfully conducted several deep-space missions but has not yet landed on the moon.

Russia

Not so long ago, Russia would have been considered a peer of China and a near-peer to the US. Currently, though, the Russian space program, which should be considered distinct from the Soviet program that once competed on equal footing with the US, has seen its launch capabilities and in-orbit presence diminish while its peers have continued to grow and diversify their respective space industries.

One place where Russia may retain superlative capabilities is in SSA. The Russian SSA network, the SKKP, has existed for decades²⁵ and has continued to evolve with more modern capabilities like the US SSA network.²⁶ There may also be some indication that Russia has on-orbit SSA capabilities that may be unrivaled,²⁷ at least outside of the US

Russia's capabilities in space have dwindled,²⁸ and its in-space presence is now relatively dated and small. Its presence is also primarily government, as the Russian commercial sector, such as it exists, has achieved little.²⁹ Russia gets points for its continued role in the operation of the ISS but otherwise has recently tried and failed to land on the moon,³⁰ leaving another Soviet milestone out of reach for Russia's modern space industry.³¹

India

India would not have been on the Space Powers list five years ago. It has made remarkable progress in a short period of time, with its sovereign launch capabilities growing to support more frequent and ambitious government missions as well as commercial opportunities for launching domestic and foreign³² spacecraft.

India's late start in space means its in-space presence is relatively limited among the Space Powers. Its commercial space industry³³ and SSA capabilities³⁴ are likewise nascent but growing rapidly, including a plan to dramatically increase India's launch cadence over the next 15 months.³⁵

India recently completed a successful lunar landing,³⁶ solidifying its position as a global space power with this remarkable accomplishment. India's footprint beyond the moon is more limited in scope, showing that it still has, quite literally, a long way to go before it can measure up to the US and China's space industries.

Japan

Japan has certainly earned a role on the Space Powers list, offering an impressive list of achievements, mostly on a small scale, which have built up over several years. Japan has sovereign launch capabilities and is transitioning to a new rocket³⁷ that achieved its first successful launch in 2024.³⁸

Japan's long-term focus on space gives it a steady, if not an especially explosive or diverse, presence in space, including commercial operators³⁹ and a number of science missions.⁴⁰ Japan also features legacy SSA capabilities with new systems coming online to enhance its ability to track space debris and detect potential conjunctions.⁴¹

Japan successfully landed on the moon in 2023⁴² and has launched significant science missions beyond the moon.⁴³ Japan doesn't offer the scale of the largest Space Powers nor the promise of Space Powers with larger populations and resources. However, Japan has successfully built one of the most independent national space programs on the planet, securing a spot as a key stakeholder in space.

Conclusion

Is the final frontier of space becoming the next stage for conflict, global supremacy versus collaboration? The advent of space technology and exploration has undeniably transformed both geopolitics and commercial domains. The US, China, Europe, Russia, India, and Japan have emerged as significant space powers, navigating this arena of competition and



Outer space is becoming increasingly competitive, both from a commercial and military perspective. As well, the potential for conflict has grown between allies and adversaries. There is every indication this geopolitical congestion will continue to increase at an accelerated pace. As such, there is a growing need to protect the space domain to ensure there is access for all and not just the powerful states."

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collaboration. Recent events, like Russia's ASAT weapon test and additional provocations, emphasize the urgent need for harmonious space policies to mitigate threats in this expanding realm. While the US leads the charge in terms of space sovereignty, other nations including China, India, and Japan are showing accelerated growth and potential. As we extend our boundaries beyond Earth's atmosphere, managing these evolving dynamics responsibly becomes indispensable. The challenge, therefore, is not just about exploring the universe, but also about how we ensure that this exploration is harnessed for the greater good. This is our odyssey, today and tomorrow—to transform space from a potential field of conflict into a beacon of inspiration, where the ambitions of our shared humanity reverberate louder than the drums of discord.

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