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Reaching for the Stars: China's Space Ambitions

In recent years, China has emerged as a major player in space exploration. With milestones such as the successful landing of a Chinese rover on the far side of the moon and the completion of its own space station, China's space program has captured global attention. However, Beijing's space ambitions have also raised concerns about the use of its space capabilities for military purposes and its lack of transparency in space operations.

By Sophie-Charlotte Fischer

In recent decades, space has reemerged as an increasingly important strategic domain for states. With the heavy reliance on space-based assets for communication, navigation, and intelligence, it is a crucial area for both civilian and military activities. The rapid advancement of space technologies has also led to the emergence of a thriving commercial space industry, providing new economic opportunities. In addition, space offers great potential for research, with insights from experiments helping to address medical, environmental, and technological challenges on Earth. As the importance of and dependence on space continues to grow, more and more countries are seeking to secure their access to space and to develop more advanced capabilities (see [CSS Analysis 256](#)).

Historically, a small group of powerful nations, including the United States and Russia, have dominated space. While the origins of China's space program date back to the early stages of the Cold War, it has only emerged as a major space actor in the last two decades. In recent years, China has captured global attention with achievements such as the first successful landing of its Chang'e-4 rover on the far side of the Moon in 2019, the launch of its first Mars mission, Tianwen-1, in 2021, and the completion of its own permanently crewed space station, Tiangong, in 2022.



A model of the Long March 5Y rocket at an exhibition inside the National Museum in Beijing in March 2021. *Tingshu Wang / Reuters*

China's space ambitions, however, have also raised growing concerns. For example, uncontrolled re-entries of remains of its rockets into the Earth's atmosphere have prompted questions about China's reliability as a space actor. There is also concern, particularly in Washington, about Beijing's intentions and possible use of its burgeoning space capabilities for military purposes and its potential territorial claims to parts

of the Moon. As Beijing advances its space ambitions amid rising geopolitical tensions, space has become an increasingly important arena in the intensifying great power competition between the United States and China.

China's Space Program

China's space program has a rich history that spans from the early stages of the Cold

War to the present day, characterized by significant advances, painful setbacks, and periods of stagnation. In the early stages of the Cold War, China closely monitored the progression of the US and Soviet Union's ability to use space for military purposes. This spurred China to develop its own rocket and missile technology, with support from the Soviet Union, beginning in the 1950s. China's space ambitions were further fueled by the successful launch of the Soviet Union's *Sputnik-1* satellite in 1957, with Chinese communist leader Mao Zedong famously proclaiming in 1958, "we want satellites too."

However, after the Sino-Soviet split in the 1960s, China's space program was left without Soviet support. This led to a period of setbacks in China's space program as it struggled to overcome technical and resource limitations. Yet, the experience also sharpened its focus on developing indigenous technologies. Hence, during the 1960s and 1970s, China made some progress in developing rocket and satellite technology. Notably, in September 1960, China successfully launched its first full-scale rocket, the T-7. In the 1970s, China began developing its Long March family of rockets. The launch of its first satellite into orbit, *Dong Fang Hong-1*, carried by the Long March 1 rocket in April 1970, is often regarded by experts as China's first significant achievement in space.

In the 1990s, China's space program began to develop more systematically. The Long March rocket family expanded, and China launched several satellites for varying purposes, including meteorology, communications, and navigation. However, the 1990s also saw several launch failures as well as China's worst launch accident. In 1996, a Long March 3B rocket carrying a US-built satellite tilted sideways during launch and crashed into a nearby village, killing and injuring several people. Yet, with the launch of Project 921 of 1992, China also set new goals for its manned space program and about ten years later, in 2003, Yang Liwei made history as the first taikonaut (a Chinese astronaut) to travel into space. This was an important milestone, with China becoming the third country after the US and Russia to send a man into space on its own rocket.

The 2000s and 2010s were characterized by a broader expansion of space activities, enabled by China's rapid economic growth

and new technological developments. China reached a new milestone in its manned space program in 2008 with the first space walk by a taikonaut, Zhai Zhigang. In addition, lunar exploration became a higher strategic priority for Beijing in these de-

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cares, leading to the launch of the ongoing *Chang'e* robotic Moon mission series as well as the further development of space infrastructure including the building of China's own permanently crewed space station, another goal enshrined in Project 921. However, during this period, China's evolving anti-satellite (ASAT) missile capabilities also came under increasing scrutiny, causing growing concern in other countries.

Drivers of China's Space Ambitions

The Chinese government has long been committed to restoring China's status as a great power at the international level. As Chinese leader Xi Jinping has repeatedly emphasized since becoming president in 2013, the country's development as a major space power – China's "space dream" is seen as an important part of this effort. This larger ambition is associated with a variety of subgoals that motivate China's space ambitions, including the pursuit of international prestige and soft power, the promotion of economic development and innovation, and the development of competitive military capabilities.

The Chinese government sees its space program as a symbol of its growing global power and influence as it can help Beijing to enhance its standing in the international community. For example, achievements such as being the third country to send a man into space and being the first to succeed at a soft landing on the far-side of the moon has given China a sense of global recognition.

While successful space expeditions bring prestige and renown to a state, China also views its space program as a diplomatic tool. Beijing has already collaborated with other countries on several space projects and has helped developing countries build their own space capabilities. China has also invited foreign scientists to participate in its space missions and cooperated with in-

ternational organizations such as the United Nations on space-related issues.

China's space ambitions are also driven by its broader goal of using advanced technologies to further its economic development and its capacity for research and innovation. This is underscored, for example, by the current 14th Five-Year Plan, which identifies deep space as one of seven key areas for strategic national science and technology projects. Apart from activities promoted by the government, China's commercial space industry has also been steadily developing since the issuance of State Council "Document 60" in 2014, which allowed more private investment in the space industry.

Finally, China's space ambitions also have a military dimension. Modernizing its forces and eventually having a "world-class military" has been a key goal of the Chinese leadership. The importance of advanced space capabilities – including the use of space-based assets for communications, surveillance, and intelligence, as well as anti-satellite missile capabilities – in achieving this goal has become increasingly apparent.

China's Space Capabilities

China has made significant progress in developing its space capabilities. The country's commitment to expanding its space assets is demonstrated by its ranking as the world's second-largest space spender in 2022, with only the US spending more. China has invested in various capabilities that will continue to evolve, including its missile and satellite programs, human spaceflight missions, lunar and deep space exploration, and its own space station.

Since the 1970s, China has been progressively developing its Long March rocket family, thereby enhancing its independent launch capabilities. The Long March rockets allow for various configurations that cater to specific mission requirements. They have played a crucial role in the attainment of various milestones in China's space program, facilitating the launch of diverse payloads into space including satellites as well as manned missions. In recent years, however, Chinese commercial companies, most notably Galactic Energy with its *Ceres-1* rocket, have begun to enter the space launch market.

China has also made significant advancements in establishing a comprehensive satellite program that includes Earth

observation, communication, navigation, and scientific research satellites. One notable example is the BeiDou navigation satellite system. Today, the third generation of the system provides global coverage and allows China to operate independently of other countries' navigation systems, such as the American GPS and the Russian GLONASS. However, China has also been expanding its ASAT capabilities that could be used to destroy or disable other countries' satellites. These capabilities got public attention in 2007, when China conducted an anti-satellite missile test by destroying its own aging FY-1C weather satellite.

Since the launch of Plan 921 in 1992, China has successfully conducted several manned space missions with the *Shenzhou* spacecraft series. Following the first launch in 2003 with taikonaut Yang Liwei, the *Shenzhou* series has completed ten manned missions. During these missions, taikonauts have conducted a range of activities and experiments in space, involving, for example, the *Tiangong-1* and *Tiangong-2* space laboratories that were launched in 2011 and 2016.

China has also made notable strides in exploring the Moon. China's lunar exploration program, the *Chang'e*, began with the *Chang'e-1* in 2007. The program has since achieved several milestones, including the first soft landing on the far side of the

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Moon by *Chang'e-4* in 2019 and the successful return of lunar samples by *Chang'e-5* in 2020. In early 2023, China also unveiled the concept for its lunar lander, which is expected to put two taikonauts on the Moon by 2030. It also plans to have a permanently manned lunar base by the mid-2030s.

However, China's space exploration ambitions extend beyond the Moon, as the country has set its sights on exploring the wider solar system as well. China made its first successful foray into Mars exploration in 2020 with the *Tianwen-1* mission, which carried an orbiter, lander, and rover. In May 2021, the mission deployed the *Zhurong* rover to the surface of Mars, where it has been conducting exploration and research activities. China is also planning a

mission to the Jupiter system – *Tianwen 4* – but the details have yet to be worked out.

The “crown jewel” of China's space program is its own permanently manned space station. China completed the construction of its space station, *Tiangong*, in November 2022 – a triumph especially after being excluded from the International Space Station (ISS) by the US in 2011. The modular space station consists of three main modules and is capable of hosting crews and scientific experiments. During its time in orbit over the next fifteen years, the *Tiangong* is expected to become a critical hub for China's space activities – and those of its partners.

International Space Collaboration

China has repeatedly emphasized the importance of achieving technological self-reliance, including in the space domain. At the same time, space has also served as an important vector for Beijing to strengthen its international collaboration with other countries. However, while some countries have shown a keen interest in cooperating with China in space, others have expressed concerns about the country's space program and Beijing's opaque intentions.

The United States has largely restricted space collaboration with China. In 2011, the US banned NASA from any collaboration with China on space, citing national security concerns with the so-called Wolf Amendment. The Wolf Amendment prohibits NASA from using any funds to collaborate with Chinese entities, including individuals, companies, or government agencies, unless the agency obtains explicit approval from Congress. The restrictions apply to a wide range of activities, including joint scientific research and technology development, and they have also barred China from participating in the ISS.

China does, however, have a long history of cooperation with the European Space Agency (ESA), of which Switzerland is also a member, across different fields. For example, during China's *Chang'e 1* mission in 2007, ESA provided spacecraft and ground operations support services to the Chinese National Space Administration (CNSA). European astronauts have also participated in trainings in China. ESA even considered sending astronauts to the *Tiangong* space station but in early 2023, the agency announced that it no longer had this intention.

Further Reading

Kari A. Bingen / Kaitlyn Johnson / Makena Young / John Raymond, *Space Threat Assessment 2023* (Washington, D.C.: Center for Strategic and International Studies, April 2023).

Yangyang Cheng, “From Yangtze to Mars: The Fiery History of China's Space Program,” *Vice*, 26.07.2021.

Marc Julienne, “China's Ambitions in Space: The Sky's the Limit”, in: *Études de l'Ifri*, January 2021.

Russia is one of China's oldest space collaborators, having provided early support for China's space program through technology transfers in the 1950s before an extended hiatus due to the Sino-Soviet split. In recent years, following Russia's annexation of Crimea in 2014 and the subsequent deterioration of Moscow's space cooperation with other nations, the relationship has intensified. For example, Russian president Vladimir Putin announced in 2019 that Moscow is helping to build a space-based missile early-warning system. In 2021, Beijing and Moscow's announcement that they would jointly build a manned lunar base, the International Lunar Research Station, attracted global attention.

China has also been collaborating with several other countries on space, including, for example, Brazil, Venezuela, Pakistan, Bolivia, and Laos, and is seeking to further expand its international ties. The 2022 White Paper on China's space program stated that China had signed 46 space cooperation agreements and memoranda of understanding with other countries and organizations since 2016 alone. China has also opened the *Tiangong* space station to all members of the United Nations, which will likely become an important new vehicle to further develop its international space collaboration.

Challenges

While Beijing's growing ambitions in space and the expansion of its capabilities offer new opportunities for collaborators, they have also elicited various concerns. For one, China's expanding space activities have contributed to the growing problem of space debris, which poses an increasing threat to the safety and sustainability of the space environment. China has contributed to this problem through the disintegration

of remains of its rockets, but particularly through its anti-satellite missile tests. China's ASAT test in 2007 created the largest field of space debris ever recorded. Still, in 2022, China voted against a United Nations resolution calling on countries not to conduct direct anti-satellite tests. These developments have raised concerns among other countries operating their own satellites and relying on them for a range of critical services.

Second, and relatedly, there are considerable concerns regarding the lack of transparency surrounding China's space activities. For example, China has been reluctant to disclose vital information concerning the trajectory of its rocket debris, which is critical for predicting landing zones and minimizing the risk to populated areas. Over the past years, the remnants of several Chinese Long March 5B rockets have made uncontrolled re-entries into the Earth's atmosphere. For example, in August 2022, the core stage of a Long March 5B rocket plummeted to Earth in an uncontrolled manner, with pieces of spent metal falling on Borneo. Such incidents demonstrate the potential danger posed by uncontrolled re-entries and underscore the importance of transparency in space activities.

Finally, the US and other Western nations have watched the development of China's military space capabilities with growing un-

ease. China has repeatedly stated that its space program is for peaceful purposes only. However, the lack of transparency surrounding some of China's activities in space has fueled suspicions about its intentions. Moreover, it has been becoming increasingly clear that China has already mastered a range of capabilities, including in electronic warfare, that could seriously compromise the US' ability to use the GPS system and to deploy precision-guided munitions. Moreover, as it demonstrated, China also possesses ASAT missile capabilities to destroy US satellites; these are but a few examples of developments some countries

Space has served as an important vector for Beijing to strengthen its international collaboration.

may find troubling. In 2022, the US Space Force even warned that China was on track to surpass American space capabilities by 2045. Thus, there are fears that China's military empowerment in space could further erode US military capabilities and lead to a destabilizing effect on international relations, especially given the growing potential for accidents and misunderstandings in an increasingly crowded space environment.

Outlook

China's space program has a complex history, driven by its pursuit of international prestige, soft power, economic develop-

ment, and military objectives. Despite hurdles in obtaining foreign technology and a focus on its domestic capabilities, China has made significant progress in developing its space program since its early beginnings during the Cold War. The impressive development reflects the substantial investment China has made in its space capabilities and the country's long-term strategic goals associated with it. The nation's strong motivations and ambitious plans for future space exploration activities indicate that it will become an increasingly important space actor in the coming years. However, as China continues to invest in and expand its space capabilities, it is important to closely monitor its activities to ensure that they are consistent with the principles of peaceful exploration and cooperation in space, while mitigating the risks of potential militarization and accidents.

For more on perspectives on Euro-Atlantic Security, see [CSS core theme page](#).

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