



Situation Update: Chinese Space Ambitions

**Intelligence & Analysis Division
White Paper Series**

November 2022

www.RMCGlobal.com

This white paper is designed to provide analysis of relevant, publicly available information on threat and hazard events/trends and their potential impacts to the interests of the United States, both at home and abroad. This product is not intended to be an all-encompassing assessment of the subject.

Introduction

China is currently developing its space program as the nation seeks to become a key competitor in the international space domain, with recent history suggesting that China seeks to surpass the U.S. in space development and capabilities. Since 2016, China's space industry has seen rapid and innovative progress and is looking to become a world resound program with further advancements. China has expanded its space operations in continents such as South America and Africa in order to surpass the U.S. and Europe in the space race. As a result, China has accelerated space research, technology, and doubled its efforts to have the ability to engage in space exploration, utilization, and governance in the international space domain. Key developments and success in space launch missions, space infrastructure (satellite communications, remote sensing systems, navigation), manned spaceflight, and deep space exploration among others indicate China's willingness to compete with the U.S. in the space industry and enhance their capabilities in space.¹

Background

In early 2022, China's State Council Information Office released a white paper entitled "China's Space Program: A 2021 Perspective", which detailed the country's plans and priorities for the next five years of spaceflight and exploration. The plan detailed China's focus on integrating space science, technology, and technological application in order to become "a space power", with specified goals including a human lunar landing, launching new telescopes, completing construction of its new space station, and upgrading space transport systems.²

China's space ambitions are not a new development, as China has been developing significant military and space capabilities since 1955, though at present time Chinese space progress is described as "generations behind" U.S. space technology. However, from a military perspective, there are areas in which China and the U.S. have paced one another for over a decade. In 2008, both countries demonstrated the ability to destroy low Earth orbit (LEO) satellites, thus marking the beginning of an era where space is another potential domain of conflict exists between the U.S. and China.³

Though China's recent statements regarding its space program have highlighted the benefits of continued space exploration and technological development for human progress and "peaceful purposes", senior U.S. defense officials have raised concerns that China is seeking to weaponize space, specifically noting that near-peer competitors are building capabilities to destroy or degrade the satellite systems that support U.S. intelligence, military communication systems, and early warning networks. As of 2008, China's focus on developing the offensive counterspace operations doctrine has been public knowledge, though it was unknown whether these capabilities were intended for deterrence or as usable weapons of war. Today, as China continues a rapid and aggressive development of space assets to match or surpass the U.S.'s dominance in space, some experts raise concerns of an "arms race in space".¹

As the space race of the 20th century demonstrated, dominance in space exploration and technological prowess are important indicators of power projection, and China's push for space power is reflective of a "renewed great-power competition" in both the military and economic spheres.⁴

Case Study: Tiangong Space Station

China is planning to complete construction of the low Earth orbit space station "Tiangong" by the end of 2022. The Chinese Manned Space Agency (CMSA) intends to keep Tiangong continuously inhabited by three (3) astronauts for at least a decade, while the station hosts numerous experiments from China and partner countries. When complete, the station will consist of three (3) modules: "Tianhe", the main habitat for astronauts, which was launched in May 2021; and "Mengtian" and "Wentian", which will be dedicated to hosting experiments.⁵

In 2018, then-ambassador of China to the UN Shi Zhongjun stated, "the China Space Station (Tiangong) belongs not only to China, but also to the world", in a gesture of "space diplomacy". However, despite publicly posturing the station as an asset of the world to be used for the benefit of mankind, Beijing officials have not stated whether the space station will be used to assist or support the People's Liberation Army (PLA)—an important distinction, given that space programs possess military and security benefits. Experts have stated that "dual use" applications of the space station could enable the PLA to dock military equipment systems in space or use accessory satellites to survey the ground for military purposes; actions that could be enhanced with the expertise of space partner astronauts conducting working aboard Tiangong.⁶

China is expected to be the only country with its own space station once Tiangong becomes fully operational, as the International Space Station, which has excluded China due to U.S. national security policy, will be decommissioned by 2030. This gives the Chinese space venture an advantage in the international space domain.⁷

In addition to research and information concerns surrounding Tiangong, the station's robotic arm capabilities have ignited concerns. According to China Manned Space Program, Tiangong's robotic arm is capable of lifting objects weighing up to 20 tons, and smaller versions of the technology have been installed on Chinese scavenger satellites, ostensibly for use in space debris clean-up. However, U.S. Space Command officials have stated that the technology "could be used in a future system for grappling other satellites", posing a potential threat of Chinese equipment interfering with American satellites to sabotage communication systems.⁷

The 2022 Annual Threat Assessment of the U.S. Intelligence Community reaffirmed the unease surrounding Tiangong and China's greater space ambitions, stating, "Beijing is working to match or exceed U.S. capabilities in space to gain the military, economic, and prestige benefits that Washington has accrued from space leadership. Counterspace operations will be integral to potential military campaigns by the People's Liberation Army, and China has counterspace-weapons capabilities intended to target U.S. and allied satellites."⁸

Case Study: Chinese Space Collaboration with African Countries

China's interest in Africa's space programs are part of their Belt and Road Initiative, which entails building infrastructure in developing nations. The Belt and Road initiative may take years, if not decades, to demonstrate their full potential. Since the 1960s, it has provided scholarships to students from Africa for undergraduate and graduate programs in science and engineering, with an additional 50,000 scholarships and 50,000 training opportunities announced in 2018. These programs allow students to relocate to China during their studies. Of the 400,000-500,000 international students that study there every year, more than 80,000 are African. This has fostered the long-term development of human capital and diplomatic engagement.^{9,10}

As part of its investment in the continent, China has begun integrating Africa's nations in the development of its own space program. In 2021, the African space economy was valued at \$19.49 billion. It is expected to grow by approximately 16% over the next four (4) years. As of 2022, 13 African countries have 48 satellites. Six (6) of which were built by China, and one (1) was built by the U.S. Among them, China launched Nigeria's first two (2) communications satellites in 2007 and 2011, Algeria's was launched in 2017, followed by Ethiopia's and Sudan's launch in 2019. In 2018, Tunisia became the site of the first ground receiving station outside of China for its Beidou Satellite Navigation System.¹⁰

Satellites are integral to the China-Africa relationship and their collective research on mineral surveying, infrastructure, agricultural production, deforestation monitoring, climate cooperation, and trade. China has seen a vacuum in the lack of satellite cooperation with African countries and the U.S., for whom space cooperation with African governments has not been a priority. However, 14 African countries have space programs, and many others are able to process satellite data. As of January 2020, they have launched 42 satellites and 90% of space projects in Africa have been funded by their own national governments and investors. There are no launch facilities in Africa, however. Satellites are launched by partner nations, including Russia, France, and China, among others.⁹

Twenty-three African countries have 125 new satellites in development that will be ready by 2025. While the European Union has also seen potential in the emerging African space industry, China is decades ahead in the industry. China has continued its developmental and diplomatic mission there, including youth outreach for the launch of its space station Tiangong in July 2022. In September 2022, three (3) taikonauts (China's astronauts) spoke to students from eight (8) African countries via video conference. Such public relations efforts suggest that China is seeking early buy-in from the next generation of African science and engineering students.¹¹

Case Study: Chinese Space Development in South America

The PLA exerts considerable influence over China's space program. The PLA Strategic Support Force (PLASSF) is responsible for space, cyber, and electronic warfare. China's main civilian space agency, the China National Space Administration, is reportedly "overshadowed" by the military. The PLA's role within China's space program suggests that its sphere of influence includes overseas ground stations, which fulfill the telemetry, tracking, and command (TT&C) functions integral to the operation of satellites and spacecraft.¹²

Several of the ground stations used by China are located in South America, including within Venezuela, Brazil, Bolivia, Chile, and Argentina. They provide coverage over the Southern Hemisphere. These stations are part of a global network of that maintains communications with satellites as they pass over different geographic regions while in orbit. Their proximity to the U.S. has raised concerns that they can be used to spy on U.S. assets and intercept sensitive information. The Espacio Lejano ground station in Neuquén, Argentina, has caused controversy since 2012, when Argentina leased approximately 500 acres of land to China for the construction of space facilities. Espacio Lejano has been administered with minimal oversight from the Argentine government.¹²

Since coming online in March 2018, the \$50 million control station has been run by China Satellite Launch and Tracking Control General (CLTC), which falls under the PLASSF. CLTC manages the ground infrastructure for China's space operations and is staffed by PLA personnel, further demonstrating the integration of the military in space-related activities. Open source reports have raised concerns that the PLA uses the station for its own purposes. However, China has countered these allegations by asserting that the station is only used for peaceful missions.^{12,13}

There are commercial interests in South America from Chinese firms, as well. Emposat, a company with ties to the state-run Chinese Academy of Sciences, plans to build a ground station in Río Gallegos as part of a joint venture with Argentine company Ascentio. As with Africa, China has moved to fill what it sees as a gap in South America. U.S. influence in the region has waned, and there are a lack of partnerships with countries' space programs there.¹³

Conclusion

Chinese space ambitions, developments, and enhanced capabilities have raised security concerns to the U.S. Department of Defense as China appears to be on track to surpass the U.S. as the dominant space power by 2045. China has designated space as a military domain by revealing in official documents that the goal of space warfare and operations is to achieve superiority using offensive and defensive means which has led to security concerns for the U.S. DoD and others currently involved in space operations. Furthermore, Chinese military strategy documents have emphasized the growing importance of space and cyberspace operations as the country expects its future wars to be fought primarily outside of Chinese borders. China has also improved its counterspace weapons capabilities and has put in

Situation Update: Chinese Space Ambitions



place military reforms to better integrate cyberspace, space, and electronic warfare into joint military operations. The recent space operations conducted in Africa, South America, and the Tiangong space station are being heavily monitored as these recent developments, advancements, and collaborations with major continents are a large sample of plans to surpass the U.S. in the space race.¹⁴

With enhanced capabilities in space technology, satellite systems, human spaceflight and space exploration, and space launch, China has built a robust network of space surveillance sensors capable of searching, tracking, and characterizing satellites throughout all the planet's orbits. This key development allows for China to support missions in the collection of intelligence, space targeting, and ballistic missile tracking rivaling the U.S. security infrastructure in space. Per the U.S. Office of the Director of National Intelligence, the PLA will continue to integrate space services such as satellite reconnaissance and positioning, navigation, timing, and satellite communication into its weapons command-and-control systems to degrade the U.S. military's information advantage.^{8,14}

As China continues to trend towards a key competitor with the U.S. in space, a variety of threats become a security concern to the U.S. through cyberthreats, missile threats, orbital threats, and electronic warfare capabilities. With the ability to disrupt satellite signals in space through the electronic jamming of space-based communications, radar systems, and GPS navigation support, in addition to conducting cyberespionage against foreign space entities and launch missiles at satellites with missiles that have the ability to reach peak orbital status, U.S. space infrastructure and technology has the potential to be targeted by an increasingly capable Chinese state.¹⁴

¹ Chinese Aerospace Studies Institute. (2022, January.). *China's Space Program: A 2021 Perspective*. The State Council Information Office of the People's Republic of China. Retrieved October 31, 2022, from <https://www.airuniversity.af.edu/Portals/10/CASI/documents/Translations/2022-02-16%20ITOW%20China's%20Space%20Program-%20A%202021%20Perspective.pdf>.

² Wall, M. (2022, January 29). *China Lays Out Ambitious Space Plans for Next 5 Years*. Space.com. Retrieved October 31, 2022, from <https://www.space.com/china-five-year-plan-space-exploration-2022>.

³ MacDonald, B. (2008, September.). *China, Space Weapons, and U.S. Security*. Council on Foreign Relations. Retrieved October 31, 2022, from https://cdn.cfr.org/sites/default/files/pdf/2008/07/China_Space_CSR38.pdf?_gl=1*e6hmdk*_ga*M Tg3NzExMDgxNS4xNjYzMzQxODIz*_ga_24W5E70YKH*MTY2NTc2ODEyNS4yLjAuMTY2NTc2ODEz Ni4wLjAuMA.

⁴ Knickmeyer, E. (2022, September 15). *A New Space Race? China Adds Urgency to U.S. Return to Moon*. AP News. Retrieved October 31, 2022, from <https://apnews.com/article/astronomy-russia-ukraine-space-exploration-science-technology-f98448825e588e8902bb74519b55ba9f>.

⁵ Jones, A. (2021, August 24). *China's Tiangong Space Station*. Space.com. Retrieved October 31, 2022, from <https://www.space.com/tiangong-space-station>.

⁶ Jennings, Ralph. (2022, July 16). *China's Hopes High as Space Station Nears Completion*. VOA News. Retrieved October 31, 2022, from <https://www.voanews.com/a/china-s-hopes-high-as-space-station-nears-completion/6661481.html>.

⁷ Tiwari, S. (2022, January 9). *Chinese Space Station: Why U.S. Remains 'Highly Apprehensive' of Tiangong & Fears Ceding Military Edge to Beijing*. *The EurAsian Times*. Retrieved October 31, 2022, from <https://eurasianimes.com/chinese-space-station-why-us-tiangong-fears-ceding-military-edge/>.

⁸ (2022, February.). *Office of the Director of National Intelligence. Annual Threat Assessment of the U.S. Intelligence Community*. Retrieved October 31, 2022, from <https://www.dni.gov/files/ODNI/documents/assessments/ATA-2022-Unclassified-Report.pdf>.

⁹ Klinger, J.M. (2020, May). *China, Africa, and the rest: Recent trends in space, science, technology, and satellite development*. *China Africa Research Initiative, School of Advanced International Studies, Johns Hopkins University, Washington, DC*. Retrieved October 28, 2022, from <https://static1.squarespace.com/static/5652847de4b033f56d2bdc29/t/5ecdb4ab6dad0e25fa0feb06/1590539437793/WP+38+-+Klinger+-+China+Africa+Space+Satellites.pdf>.

¹⁰ Barlett, K. (2022, September 13). *Why China, African nations are cooperating in space*. VOA News. Retrieved October 28, 2022, from <https://www.voanews.com/a/why-china-african-nations-are-cooperating-in-space/6745595.html>.

¹¹ Onyango, C. (2022, October 3). *Africa's space industry attracting EU and Chinese investors*. *Mail & Guardian*. Retrieved October 28, 2022, from <https://mg.co.za/africa/2022-10-03-africas-space-industry-attracting-eu-and-chinese-investors/>.

¹² Bermudez, J.S., Jr., Hart, B., Funaiole, M.P., & Kim, D. (2022, October 4). *Eyes on the skies: China's growing space footprint in South America*. *The Center for Strategic & International Studies*. Retrieved October 28, 2022, from <https://features.csis.org/hiddenreach/china-ground-stations-space/>.

¹³ Londoño, E. (2018, July 28). *From a space station in Argentina, China expands its reach in Latin America*. *The New York Times*. Retrieved October 28, 2022, from <https://www.nytimes.com/2018/07/28/world/americas/china-latin-america.html>.

¹⁴ Defense Intelligence Agency. (2022). *Challenges to Security in Space – Space Reliance in an Era of Competition and Expansion*. Retrieved October 31, 2022, from https://www.dia.mil/Portals/110/Documents/News/Military_Power_Publications/Challenges_Security_Space_2022.pdf.