



**RATCHETING UP CAPABILITY AND AMBITION: KEY DEVELOPMENTS IN
THE SPACE SEGMENT OF CHINA'S SPACE SYSTEMS, SEPTEMBER
2024-MARCH 2025**

INTRODUCTION

China is making steady progress in growing its capabilities in the space segment, the orbital portion of its space systems. Notable achievements in recent months include making the world's longest spacewalk, successfully testing a reusable satellite, and launching further satellites for two satellite constellations that may eventually threaten the dominance of Starlink. These achievements come amid a time of ambition, as marked by the October 2024 rollout of China's first National Space Science Development Plan, which aims for China to become the world's leader in space sciences by 2050.

The PRC is aiming for a number of key advances in 2025, including the development of lunar remote sensing satellites to support its lunar exploration ambitions, and test flights for two space plane prototypes, which will eventually fly supply missions to China's Tiangong space station. Recent journal articles show that Chinese scientists are also developing technologies related to 6G LEO satellite internet.

However, some in China's space industry have called for tamping enthusiasm: the in-house magazine of China Aerospace Science and Technology Corporation (CASC), one of China's two main space state-owned enterprises (SOEs), downplayed a U.S. ranking that placed China as the world's leader in commercial remote sensing, while scholars from Beijing Normal University (BNU) argued that China's space-based environmental monitoring system is not fit for purpose.

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News Update

Record-Breaking Space Walk Achieved

- Taikonauts aboard a Shenzhou-19 achieved the world's longest spacewalk on December 17, 2024. Cai Xuzhe and Song Lingdong made the 9 hour, 6 minute walk, breaking a record set by U.S. astronauts in 2001 of 8 hours, 56 minutes. The Shenzhou-19 launched into orbit aboard a Long-March 2-F on October 30, 2024, marking China's fourth manned space flight since the Taigong space station entered the application and development phase.

Pair of Shijian Satellites Launched

- A Shijian-19 satellite landed at the Dongfeng landing site, part of the Jiuquan Satellite Launch Center, on October 11, 2024, with its payload intact, completing China's first successful test of a reusable satellite. The development of the Shijian-19 was targeted by the 14th Five Year Plan, providing a platform for experiments in areas such as zero gravity and life in space. PRC state media said that the Shijian-19 hosted several "international cooperation payloads", although China did not provide details regarding the nature of the payloads or the countries involved.
- On January 6, 2025, the Shijian-25 satellite was launched. Developed by the Shanghai Academy of Spaceflight Technology, the Shijian-25 will be used for satellite fuel replenishment and other on-orbit serving tasks. The launch is part of a far-reaching effort by China to strengthen its ability to perform rendezvous and proximity operations; the "Shijian" series is used to implement and verify new technologies, indicating that the technologies involved on the Shijian-19 and Shijian-25 are at a relatively advanced state of development as opposed to technologies aboard the Shiyan series of satellites.

Final Contenders for Space Plane Project Chosen

- The China Manned Space Agency (CMSA) announced on October 29, 2024 that the Qingzhou space plane developed by the Chinese Academy of Sciences (CAS) Innovation Academy for Microsatellites and the Haolong space plane developed by AVIC's Chengdu Aircraft Research and Design Institute had made it to the final round of the procurement competition for a space plane to provide low-cost cargo services for China's space station. From an initial pool of ten proposals, the Qingzhou and Haolong programs will proceed to the flight test stage. The Qingzhou prototype will launch aboard the first flight of the CAS Space Kinetica-2 rocket in late 2025, while the Haolong will launch aboard Landspace's Zhuque-3. Both launches are planned for late 2025.

China Space Cooperation with Pakistan Expanded

- Organizations in China's space sector expanded ties with Pakistani counterparts in early 2025. On January 17, 2025, a Long March 2-D launched the PRSC-E01, the first in a series of three optical remote sensing satellites for Pakistan. China Great Wall Industry Corporation, a subsidiary of CASC, signed a multi-launch service contract with Pakistan's Space and Upper Atmosphere Research Commission in 2022. On February 28, 2025, the CMSA and the Pakistan Space and Upper Atmosphere Research Commission signed a cooperation agreement for China to select and train a group of Pakistani astronauts, one of whom will become the first foreign astronaut to enter China's space station. Space cooperation between the countries dates to at least 1992, when, together with Thailand, they founded the Asia-Pacific Multilateral Space Technology Cooperation Symposium.

Components of Two Satellite Internet Mega-Constellations Launched

- There were several launches for two of China's satellite internet mega-constellation projects in recent months. Eighteen Polar Orbit Group 6 satellites for the Spacesail constellation entered orbit on January 23, 2025, following early Spacesail launches in August, October, and December 2024, bringing the total number of satellites to 72. The satellites in the January launch were manufactured by the Shanghai Engineering Center for Microsatellites. Another manufacturer of Spacesail satellites, Genesat, received approximately 1 billion RMB (US\$137 million) in funding in December 2024. Another set of 18 Spacesail satellites were launched into orbit on March 11, 2025 as part of the first launch from Launch Pad 1 at the Hainan Commercial Launch Site, a newly-constructed facility in Hainan Province.
- Chinese state media reported on February 11, 2025 that a second batch of satellites for a satellite internet constellation had entered orbit aboard the first Long March 8A launch vehicle. Given references to the Spacesail and Honghu mega constellations, the lack of a specific name for the constellation in state media reporting means that it likely refers to the Guowang constellation; Chinese bloggers identified the satellites as part of Guowang. The first batch was launched on December 16, 2024 aboard a Long March 5B.

Tender for Lunar Remote Sensing Satellites Issued

- On February 14, 2025, CMSA issued a tender for lunar remote sensing satellites to obtain high-precision topographic and geomorphic data of the moon's low-latitude regions, map key mineral resource distributions, and identify characteristic minerals. The satellite will support China's first crewed lunar landing and subsequent missions.

Policy Update: China Issues National Space Development Plan

CAS, China National Space Agency, and CMSA issued China's first National Medium-to-Long Term Space Science Development Plan on October 15, 2024. The plan calls for China to make influential breakthroughs in lunar and planetary exploration by 2027, establish a lunar research

station and make progress in high-precision space observation by 2035, and acquire global leadership with revolutionary scientific breakthroughs and deep space missions.

Industry Magazine Update: Aerospace China

The December 2024 issue of *Aerospace China*, CASC's in-house magazine, reviewed the U.S. Center for Strategic and International Studies' (CSIS) 2024 "medal table" of the world's foremost countries in commercial remote sensing. Chinese companies received 14 medals, compared to 12 for the U.S. Finland and Uruguay were the only countries with more than one medal, each having two. The only areas Chinese firms did not receive any medals were X-band SAR and SAR revisit; in both areas, Umbra, Capella Space, and ICEYE occupied the medal positions. The table below summarizes the medals awarded to Chinese companies.

Aerospace China argued that the rankings should be interpreted with the understanding that U.S. intelligence community and national security think tanks are propagating the "China threat" narrative, and noted that across the board, China's rankings had declined slightly since the previous CSIS medal table was released in 2021. It also observed that the rise of companies in Finland and Uruguay suggests that China may face a "joint attack" in commercial space by U.S. allies and partners. *Aerospace China* recommended that China should strengthen integrated planning and convert its technological advantage into market competitiveness. It also recommended improving the use of policy tools to protect and foster the development of the commercial remote sensing sector, dig deep into application scenarios and provide high value-added analysis products and services, integrate into the "smart" era, and promote a transformative leap in critical competitiveness.

Sector	Company	Satellite	Medal
Opto-electronic imaging	China Siwei	Gaojing-01	Gold
Opto-electronic revisit	CGST	Jilin-1	Gold
Opto-electronic video	Zhuhai Orbita	OVS-2/3	Silver
Opto-electronic video	CGST	Jilin-1 video satellites	Bronze
C-band SAR	Shanghai Space Research Institute	Gaofen-1, Gaofen-2	Gold
C-band SAR	Spacety	Chaohu-1	Silver
Shortwave IR	Shanghai Space Research Institute	Gaofen-5	Bronze
Medium-wave IR	Shanghai Space Research Institute	Gaofen-5	Silver
Medium-wave IR	CGST	Jilin-1 Spectral 01/02	Bronze
Longwave IR	CAST	Ziyuan-1	Gold
Longwave IR	Shanghai Space Research Institute	Gaofen-5	Silver
Longwave IR	CGST	Jilin-1 Spectral 01/02	Bronze
Multispectral	China Siwei	Gaojing-03	Gold
Hyperspectral	Zhuhai Orbita	OHS	Bronze

1.1 What's Trending on China National Knowledge Infrastructure (CNKI)?

CNKI is China's primary public-facing database for academic research. Quantitative metadata provided by CNKI provides a window into trending areas of research in Chinese academia. Among satellite-related articles published since September 2024, there is a clear focus on 6G technology and LEO satellite internet, with three of the ten most downloaded articles covering this topic.

6G Network Development

The most downloaded article (1,721 downloads) addressed the development of LEO satellite internet. Authored by scholars from the Beijing University of Post and Telecommunications, it provides a network architecture for space-ground integration, discusses core technologies for mobile phones to connect directly to satellites using 6G networks, and lastly sets out a network architecture, critical technologies, and applications for LEO communications, navigation, and remote sensing fusion.

Another widely downloaded article on CNKI in late 2024 discussed the key role of integrated sensing and communication (ISAC) in developing 6G technology, and examined space-air-ground ISAC network architecture. To promote the development of 6G satellite ISAC, it proposed future research on large-scale MIMO ISAC, space-ground ISAC network security, and new antenna architecture. The article was downloaded 1,255 times.

An article by researchers from the Harbin University of Technology, downloaded 1,187 times, observed that increases in demand and network scale required integration of communications, sensing, and computing in 6G networks, improvement of overall system performance, and the usage of digital twins to enhance the system's real-time maintenance and modeling capabilities. It proposes a digital twin network implementation plan based on integrated communications, sensing, and computing, mapping space-ground integrated networks onto a digital world, achieving reactivity to the physical world. It envisions the demand for and advantage of 6G in deep integration of communications, sensing, and computing and all-domain coverage, aiming to achieve the vision of "one thought and the world is at your will" (一念天地，万物随心). The focus follows the launch of the world's first 6G test satellite in early 2024.

Deep Space Exploration The second most downloaded article since September 2024 (1,319 downloads) reviewed the latest progress in the design of international deep space exploration missions, including lunar exploration as well as large planet and small celestial body exploration. Authored by researchers from the Tsinghua University School of Aeronautics and Aviation, the article proposes mission suggestions and ideas based on this review.

Space-Based Environmental Monitoring

Another popular article centered on a claim by scholars from BNU's National Key Laboratory on Earth Surface Processes and Resource Ecology argued that China's environmental monitoring network is not yet able to meet national needs in pollution reduction, ecological protection and restoration, and climate change response. The article, which has been downloaded 1,095 times, calls for the development of a "space-land-sea" (天空地海) integrated ecological and environmental monitoring network. This network concept dates back to at least 2023, when the Guangxi Marine Environment Monitoring Center built a "space-land-sea" monitoring network to track the environmental impact of the Pinglu Canal on the coast of Guangxi Province.