

conducting dialogues on Arctic issues. In 2012, China and Iceland signed the Framework Agreement on Arctic Cooperation, which was the first intergovernmental agreement on Arctic issues between China and an Arctic State. China also values cooperation with other non-Arctic States. It has conducted bilateral dialogues on the law of the sea and polar issues with the United Kingdom and France. In 2016, China, Japan and the Republic of Korea launched high-level trilateral dialogues on Arctic issues to promote exchanges on policies, practices, and experience regarding Arctic international cooperation, scientific research, and commercial cooperation.

China supports the participation of all Arctic stakeholders in Arctic governance and international cooperation. China supports platforms such as “The Arctic: Territory of Dialogue”, “The Arctic Circle”, “Arctic Frontiers”, “The China-Nordic Arctic Research Center”, in promoting exchanges and cooperation among the stakeholders. China also supports the participation of research institutions and enterprises in Arctic governance with their own expertise put to good use. China encourages research institutions to communicate with foreign think tanks and academic institutions, and supports enterprises to participate in the commercial development and utilization of the Arctic in a lawful and orderly manner.¹⁴⁵⁶

8.7.14 Space science

8.7.14.1 History

China’s First Artificial Satellite

National Space Science Centre of China (NSSC) was established by **Chinese Academy of Sciences** (CAS) in 1958 with the mandate to develop China’s first artificial satellite, Dongfanghong-1 (DFH-1). The center’s founder, Prof. Jeoujang Jaw, a distinguished space scientist, was one of the fathers of China’s first artificial satellite.

In October 1957, the first artificial Earth satellite, Sputnik 1, was successfully launched by the Soviet Union, ushering in a new era of political, military, technological and scientific development. The following year, leading Chinese scientists Prof. Hsue-shen Tsien and Prof. Jeoujang Jaw made a proposal to establish China’s artificial satellite program. On May 17, 1958, Chairman Mao Zedong officially stated that China should develop its own satellite.

CAS shouldered responsibility for this project. In no time, several institutes were set up to take charge of payload development and system design for the satellite program. The program, called the “581 Mission,” was made the nation’s top scientific priority in 1958. Dr. Hsue-shen Tsien was named program chief, with Dr. Jeoujang Jaw and Mr. WEI Yiqing as deputy chiefs.

¹⁴⁵⁶ Excerpts of The State Council Information Office of the People’s Republic of China white paper titled “China’s Arctic Policy” published on Jan 26, 2018, available online at URL:

http://english.www.gov.cn/archive/white_paper/2018/01/26/content_281476026660336.htm

From 1958 to 1968, NSSC designed, developed and tested DFH-1. The centre built an engineering model of the satellite before handing the project off to industry, paving the way for the satellite's successful launch on April 24, 1970.

Initiated and Pushed Forward the National Sounding Rocket Program

NSSC played an indispensable role in initiating and developing the national sounding rocket program. In collaboration with the Shanghai Institute of Mechanical and Electrical Engineering, NSSC set up China's first exploration system for the T₇ meteorological sounding rocket. With several launches during the period from 1960 to 1965, T₇ was China's first indigenous sounding rocket. Furthermore, NSSC established China's first sounding rocket launch site, known as the "603 Station."

In addition to the T₇ (T-7), NSSC successfully completed quite a few other sounding rocket experiments, such as the Zhinv-1, Zhinv-3 and TY-4. It also built CAS's Hainan Sounding Rocket Launch Site, the only sounding rocket launch site in China.

Major Founder and Contributor to the Chinese Aerospace Industry

Over the past few decades, NSSC has served as the lead institute in China's aerospace development. It has initiated and spearheaded research work related to space science and space exploration technology by developing assorted space exploration payload devices and space avionic devices. Overall, NSSC has played a crucial role in China's applied satellite program, Manned Space Flight Program and Lunar Exploration Program, which together are significant landmarks in China's aerospace development.

Since 2000, NSSC has proposed a series of space science programs, such as the Geospace Double Star Exploration Program (DSP), the International Space Weather Meridian Circle Program (the Meridian Project) and the Martian Space Environment Exploration Orbiter (YH-1), etc.

Organized and Implemented the CAS Strategic Priority Program on Space Science

In January 2011, the Strategic Priority Program (SPP) on Space Science was approved by CAS. On July 7, 2011, NSSC, which was formerly known as the Center for Space Science and Applied Research, was officially inaugurated. It is responsible for the management and implementation of the SPP on Space Science.¹⁴⁵⁷

8.7.14.2 Brief Introduction

The National Space Science Center (NSSC) of the Chinese Academy of Sciences (CAS) is China's gateway to space science. It is the key institute responsible for planning, developing, launching and operating China's space science satellite missions. It also spearheads space science research in the fields of space physics, space environment, microwave remote sensing, space engineering technology, etc.

¹⁴⁵⁷ NSSC National Space Science Centre, CAS, <http://english.nssc.cas.cn/au/histroy/>

Established in 1958 by CAS, NSSC soon dedicated itself to developing China's first artificial satellite, Dongfanghong-1 (DFH-1). From 1958 to 1968, NSSC designed, developed and tested DFH-1, and built an engineering model before it was handed to industry, paving the way for its successful launch on April 24, 1970.

NSSC was in charge of application systems for China's Manned Space Flight Program from 1992 to 2003. It also initiated and acted as lead institute in scientific application system and payload development for the Martian Space Environmental Exploration Orbiter (YH-1). Since 2004, NSSC has played an indispensable role in developing the scientific payload subsystem for China's lunar exploration program.

As early as 1997, NSSC proposed the Geo-space Double Star Exploration Program (DSP), a Sino-European project in which two satellites carried out research on magnetic storms from 2004 to 2007. The successful program, which was undertaken in cooperation with the European Space Agency (ESA)'s Cluster Program, was China's first space science satellite mission and its first large-scale international space science project. DSP was also the first program in human history to realize six-point measurements in geo-space, in this case, dynamic measurements of the Earth's magnetosphere.

NSSC has also advanced space technology to support other science programs. For example, space environment and remote sensing payloads developed by NSSC are now on board Chinese application satellites, such as the FY and HY series.

NSSC has also developed the Meridian Project, which comprises a ground-based space environment monitoring network along the 120-degree East longitude, and 30-degree North latitude, as well as a station in Antarctica. The network of monitoring instruments is now being extended north to Russia, south to Australia, and to the other side of the globe along the 60-degree West longitude, as part of the International Space Weather Meridian Circle Program. NSSC is now in charge of CAS's Strategic Pioneer Program on Space Science, which will launch four scientific satellite missions by 2016, i.e., the Hard X-ray Modulation Telescope; Quantum Experiments at Space Scale; Dark Matter Particle Explorer; and Shijian-10.

Several other missions are also under study, such as Kuafu, which would focus on solar influences on Earth space weather; the X-ray Timing and Polarization mission; the Space Very Long Baseline Interferometry mission; the Solar Polar Orbit Radio Telescope mission; the Magnetosphere-Ionosphere-Thermosphere Coupling Exploration mission; the Search for Terrestrial Exo-Planets mission; the Advanced Space-based Solar Observatory mission; the Einstein Probe; and the Water Cycle Observation Mission. Advanced studies on future space science mission concepts and key technologies are also part of this program.

NSSC has a staff of 680, including 299 professors and associate professors. NSSC is the home of the National Key Laboratory of Space Weather, two CAS key laboratories, one Russia-China Joint Research Center on Space Weather, as well as astounding rocket launch site in Hainan Province.

NSSC has Ph.D. and master's programs in space physics; computer application technology; geo-space exploration technology; and electromagnetic theory and

microwave technology. In addition, it offers a master’s degree in spacecraft design. NSSC also has a postdoctoral program in space physics.¹⁴⁵⁸

8.7.14.3 Organization Table of National Space Science Center of China

NSSC	
Space Science Study Center	<ul style="list-style-type: none"> • Division of General Administration • Office of Strategic Planning • Office for Space Science Specialists • Simulation Centre for Space Science Missions
Administrative Department	<ul style="list-style-type: none"> • General Administrative Office • Division of S&T R&D • Division of Quality Control and Standardization • Division of Human Resources • Division of Assets and Finance
Department of Space Technology [Chinese Academy of Sciences (CAS) Key Laboratory of Integrated Activities and IT for Complex Aerospace System]	<ul style="list-style-type: none"> • Tracking and Integrated Test Technology Laboratory • Space Avionics Laboratory • System Simulation and Current Design Laboratory • Innovative Space Technology Laboratory • Space Science Experimental Technology Laboratory
Department of Space Science	<ul style="list-style-type: none"> • State Key Laboratory of Space Weather • Solar System Exploration Laboratory
Department of Space Environment	<ul style="list-style-type: none"> • Space Environment Exploration Laboratory • Space Environment Prediction Center

¹⁴⁵⁸ NSSC National Space Science Centre, CAS, <http://english.nssc.cas.cn/au/ac/>

	<ul style="list-style-type: none"> • Near Space-Environment Laboratory
Department of Microwave and Remote Sensing	<ul style="list-style-type: none"> • CAS Key Laboratory of Microwave and Remote Sensing Technology
Space Science Mission Operation Center	<ul style="list-style-type: none"> • Satellite Mission Operations Laboratory • Space Science Data and Network Laboratory
Support and Experimental Validation Center	<ul style="list-style-type: none"> • Space Environment Special Effects Laboratory • Quality and Reliability Assurance Laboratory • Space Environment Testing Simulation Laboratory • Office of Procurement
Space Science Program Center	<ul style="list-style-type: none"> • Division Of General Planning • Office for Program System Management

Source: NSSC Report 2013

URL: <http://english.nssc.cas.cn/au/an/201304/P020141014513218422143.pdf>

8.7.14.4 National Space Science Center, CAS: Past Missions

- **Double Star Exploration Program (DSP) (2013-06-06)**¹⁴⁵⁹
- **YH-1, Martian Space Environmental Exploration Orbiter (2013-06-05)**¹⁴⁶⁰
- **Space Science Active Experiment (2013-06-01)**¹⁴⁶¹

¹⁴⁵⁹ National Space Science Center, CAS Mission titled “Double Star Exploration Program (DSP)” dated June 6, 2013, available online at URL:

http://english.nssc.cas.cn/missions/PM/201306/t20130605_102885.html

¹⁴⁶⁰ National Space Science Center, CAS Mission titled “YH-1, Martian Space Environmental Exploration Orbiter” dated June 5, 2013, available online at URL:

http://english.nssc.cas.cn/missions/PM/201306/t20130605_102886.html

¹⁴⁶¹ National Space Science Center, CAS Mission titled “Space Science Active Experiment “ dated June 1, 2013, available online at URL: http://english.nssc.cas.cn/missions/PM/201306/t20130621_104918.html

8.7.14.5 China's Space Activities

The **Information Office of the State Council published two White Papers** on Space titled **“China's space activities in 2011”** (December 2011)¹⁴⁶² and **“China's space activities in 2016” (December 2016)**¹⁴⁶³. The main points discussed in these White Papers have been highlighted in the following Chart:

China's Space Activities in 2011	China's space activities in 2016
I. Purposes and Principles of Development	I. Purposes, Vision and Principles of Development
II. Progress Made Since 2006 <ul style="list-style-type: none"> • Space Transportation System • Man-made Earth Satellites • Human Spaceflight • Deep-space Exploration • Space Launch Sites • Space Telemetry, Tracking and Command (TT&C) • Space Applications • Space science • Space debris 	II. Major Developments Since 2011 <ul style="list-style-type: none"> • Space transportation system • Man-made satellites • Manned spaceflight • Deep space exploration • Space launch sites • Space Telemetry, Tracking and Command (TT&C) • Space applications • Space science • Space debris
III. Major Tasks for the Next Five Years <ul style="list-style-type: none"> • Space transport system • Man-made Earth Satellites • Human Spaceflight • Deep-space Exploration • Space Launch Sites • Space TT&C (Telemetry, Tracking and Command systems) • Space applications • Space science • Space debris 	III. Major Tasks for the Next Five Years <ul style="list-style-type: none"> • Space transport system • Space infrastructure • Manned spaceflight • Deep-space exploration • Experiments on new space technologies • Space launch sites • Space TT&C (Telemetry, Tracking and Command systems) • Space applications • Space science • Space environment
IV. Development Policies and Measures	IV. Policies and Measures for Development
V. International Exchanges and Cooperation	V. International Exchanges and Cooperation

¹⁴⁶² The Information Office of the State Council white paper titled “China's space activities in 2011” published in December 2011, available online at URL:

http://www.china.org.cn/government/whitepaper/node_7145648.htm

¹⁴⁶³ The Information Office of the State Council white paper titled “China's space activities in 2011” published in December 28, 2016, available online at URL:

http://english.www.gov.cn/archive/white_paper/2016/12/28/content_281475527159496.htm

The Chapter 23 “Develop Strategic Emerging Industries” in PART V “An Optimized Modern Industrial System” of the **13th Five-Year Plan For Economic And Social Development of The People’s Republic Of China (2016–2020)** gave the following details:

By targeting cutting-edge technologies, adhering to industrial development trends, focusing on key areas, and optimizing the integration of policies, we will create space for the growth of emerging industries and see that they gain a competitive advantage in the future. We will work to ensure that the value-added of strategic emerging industries reaches 15% of China’s GDP.

Section 1, Emerging Industries’ Bigger Role in Bolstering the Economy: We will support the development of next generation information technology, new-energy vehicles, biotechnology, green and low-carbon technology, high-end equipment and materials, and digital creative industries. In fostering new areas of economic growth, we will spur innovation and industrial application in emerging, cutting-edge fields such as advanced semi-conductivity, robotics, additive manufacturing, intelligent systems, next generation aviation equipment, **comprehensive service systems for space technologies**, smart transportation, precision medicine, systems for high-efficiency energy storage and distributed energy, smart materials, efficient energy conservation, environmental protection, virtual reality, and interactive movies and television.¹⁴⁶⁴

Further, **Chapter 25 “Build Ubiquitous, Efficient Information Networks” in Part VI “The Cyber Economy” of the 13th Five-Year Plan for Economic and Social Development of The People’s Republic of China (2016–2020)** gave the following details:

We will ensure a thorough understanding of developmental trends in information technology, implement the national cyber development strategy, accelerate the development of digital technology, deepen the integration of information technology into economic and social development, and accelerate the expansion of the information economy.

We will accelerate the construction of high-speed, mobile, secure and ubiquitous next generation information infrastructure and spread the use of information network technology in order to bring about a cyberspace where all things are interconnected, humans and machines engage in interaction, and **terrestrial and space-based facilities** are integrated.

Section 2, An Advanced and Ubiquitous Wireless Broadband Network: We will intensify efforts to spread the availability of high-speed wireless broadband. We will accelerate the development of 4G networks, see that such networks achieve full and robust coverage of towns, townships, and densely populated administrative villages, and expand the availability of free high-speed wireless local area network connectivity in popular public spaces in urban areas. We will accelerate the extension of internet networks to remote mountainous areas, pastoral areas, and island reefs. We will improve the allocation of the

¹⁴⁶⁴ Excerpts from Chapter 23 titled “Develop Strategic Emerging Industries” in PART V “An Optimized Modern Industrial System” of the 13th Five-Year Plan For Economic And Social Development of The People’s Republic Of China (2016–2020), Pg 65, available online at URL: https://en.ndrc.gov.cn/policyrelease_8233/201612/P020191101482242850325.pdf

country's spectrum resources, strengthen management over the radio-frequency spectrum, and safeguard security and order with respect to radio waves. We will make appropriate plans for utilizing satellite frequencies and orbital resources. We will **accelerate the development of the internet in space and work to achieve interconnectivity between terrestrial and space-based facilities.**¹⁴⁶⁵

On the occasion of this 70th anniversary of the founding of the PRC, the Chinese government published a white paper "**China and the World in the New Era**" in September 2019.

China has made remarkable progress in technology. Significant achievements such as nuclear bombs, ballistic missiles, **manmade satellites, manned spaceflight**, super hybrid rice, supercomputers, synthetic bovine insulin, artemisinin, and high-speed rail, have provided strong support for social and economic development.¹⁴⁶⁶

We have strengthened international exchanges and cooperation in energy, food and network security, and in the polar regions, **outer space** and the oceans.¹⁴⁶⁷

8.7.15 Textiles

General Administration of Customs of the People's Republic of China (GACC) issued a Paper dated January 14, 2020 titled "Review of China's Foreign Trade in 2019", which stated that over the period, exports across seven categories of labor-intensive products including textile and apparel grew by 6.1% to RMB3.31 trillion, making up 19.2% of the total.¹⁴⁶⁸

Part XI All-Around Opening Up, Chapter 49 Improve the Strategy for Opening Up, Section 2 International Cooperation on Production Capacity and Equipment Manufacturing of The 13th Five-Year Plan For Economic And Social Development Of The People's Republic Of China (2016–2020), it has been mentioned that:

We will encourage more of China's equipment, technology, standards, and services to go global by engaging in international cooperation on production capacity and equipment manufacturing through overseas investment, project contracting, technology cooperation, equipment exporting, and other means, with a focus on industries such as steel, nonferrous metals, building materials, railways, electric power, chemical engineering, **textiles**, automobiles, communications, engineering machinery, aviation and aerospace, shipbuilding, and ocean

¹⁴⁶⁵ Excerpts from Chapter 25 titled "Build Ubiquitous, Efficient Information Networks" in PART VI "The Cyber Economy" of the 13th Five-Year Plan For Economic And Social Development of The People's Republic of China (2016–2020), Pg 72, available online at URL:

https://en.ndrc.gov.cn/policyrelease_8233/201612/P020191101482242850325.pdf

¹⁴⁶⁶ Excerpts from China's State Council Information Office White paper, titled "China and the World in the New Era" published on September 27, 2019, Pg 04, available online at URL:

http://english.www.gov.cn/archive/whitepaper/201909/27/content_WS5d8d80f9c6d0bcf8c4c142ef.html

¹⁴⁶⁷ Excerpts from China's State Council Information Office White paper, titled "China and the World in the New Era" published on September 27, 2019, Pg 26, available online at URL:

http://english.www.gov.cn/archive/whitepaper/201909/27/content_WS5d8d80f9c6d0bcf8c4c142ef.html

¹⁴⁶⁸ Excerpts from General Administration of Customs of the PRC (GACC) Paper dated January 14, 2020 titled "Review of China's Foreign Trade in 2019", available online at URL:

<http://english.customs.gov.cn/Statics/f63ad14e-b1ac-453f-941b-429be1724e80.html>