

# China's Space Program: For the Common Destiny of Mankind

by Marsha Freeman

Oct. 18—The most dramatic changes in history are now taking place around the globe through China's Belt and Road Initiative. Countries that have long been denied access to modern technology are now becoming part of a web of transportation links, trade and commerce, and cultural exchanges that are reforming relations among nations. Central to the success of the Belt and Road projects will be the uplifting of populations through the application of the most advanced technologies and the scientific breakthroughs that create them. Space exploration will play a key role.

Speaking during the heads of space agencies session at the annual International Astronautical Congress (IAC) on Oct. 1 in Bremen, Germany, China National Space Agency (CNSA) Administrator Zhang Kejian said the conference's theme of inclusiveness is "coherent with China's policies. For example, the Belt and Road is supporting socioeconomic development, for the progress of human society." We should "join hands with other nations for the common destiny of mankind," he said.

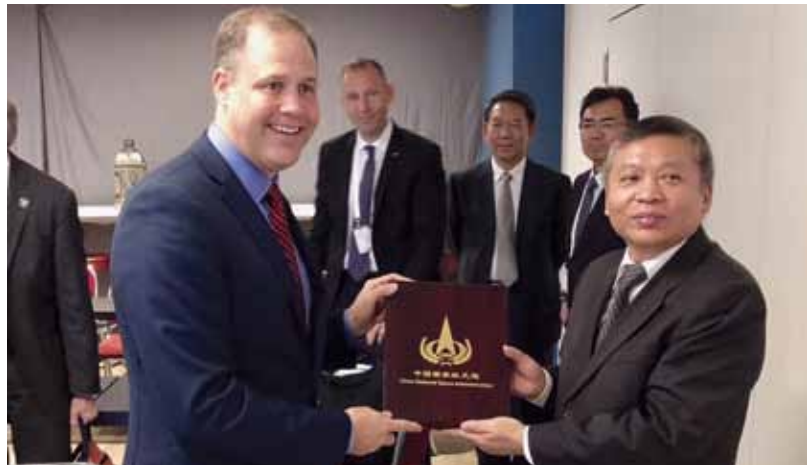
Standing out among the world's space programs, is China's steadfast commitment to advancements in science and space technology, to be shared with developing nations, as subsumed under the Belt and Road Initiative. Recently, China has opened up its leading-edge manned and lunar space programs to international participation, with the focus on the nations that have not had access to space technology in the past. The New Silk Road, or Belt and Road Initiative, announced by President Xi Jinping in 2013, originally centered on cooperation with China's neighbors in Asia. Now, with more than 100 nations involved, the infrastructure, technology sharing, and cultural exchanges span virtually the entire world, from Asia to Europe, inclusive of Africa and

Ibero-America.

Space exploration will play a leading role in the Chinese government's dedication to create the basis for future economic growth through scientific breakthroughs and technological innovation. China is offering those same opportunities to emerging space nations.

## 'A Common Home for all Humankind'

Two years ago, China's Manned Space Agency and the United Nations Office for Outer Space Affairs signed a Memorandum of Understanding to develop



NASA

*NASA head Jim Bridenstine and Chinese National Space Agency head Zhang Kejian met on October 1 in Bremen, at the International Astronautical Congress. Both stressed the importance of U.S.-China space cooperation, for each country and globally.*

the space capabilities of UN Members, using opportunities aboard China's upcoming space station. Member States were invited to submit proposals to conduct experiments aboard the station. On May 28 this year, an Announcement of Opportunity and instructions to apply for the program were released at a ceremony hosted in Vienna by the UN Office and the Permanent Mission of China to the United Nations.

The stated purpose of the initiative includes promo-

tion of international cooperation in human space flight, and “capacity-building activities,” by using human space flight technologies and resources from China’s program. In what was described as “space diplomacy in action,” Chinese Ambassador Shi Zhongjiun said at the ceremony: “The Chinese Space Station belongs not only to China, but also to the world. . . . Guided by the idea of a shared future, the [Chinese Space Station] will become a common home for all humankind. It will be a home that is inclusive and open to cooperation with all countries. . . .”

On October 11, the UN Office, responding to a request for information from

Andrew Jones of *Gbtimes*, reported that 36 teams from around the world had applied to send experiments to the station. The subject areas covered by the applications span virtually every aspect of space science, including asteroid redirection, astrophysics, plasma physics, space life science, Earth observation, and intelligent robots. UN and Chinese experts will evaluate the proposals over the next three months. The applicants selected will then have to submit implementation plans for the final selection.

China is planning to launch the first of three 20-ton modules to the station in 2020. The core module, called Tianhe (Harmony of Heaven), will house three astronauts, and carry their supplies for a stay of several months. The core module will control the station and provide the docking ports for up to three spacecraft at one time, to include visiting manned spacecraft and unmanned cargo ships. Over the following two years, two laboratories for scientific experiments will be added. The station will be able to carry more than 10 tons of scientific equipment and experiments. In addition to accommodating the experiments from the joint UN program, the station will also be open for use by China’s burgeoning commercial space companies.

For the past two years, officials working on China’s



China Manned Space Agency

*The completed Chinese space station is seen in this artist's rendering. The core module is central, with the flag. The two research laboratories are attached, with racks that are reserved for experiments from emerging space nations.*

space station have stressed that the spacecraft has been designed to accommodate two additional modules that could be contributed by other nations, which are welcome to send their own crew members.

Regardless of what ultimately happens regarding the International Space Station (ISS), the Chinese space station should be operational by 2022, with the participation of countries that are optimistic about their future and have never been in space before.

As is perceptively pointed out by Mingyan Nie, from Nanjing University of Aeronautics and Astronautics, in a paper presented at the astronautical congress in Germany, “Concerning space affairs, they are in the majority hailed as instruments to attract more B&R [Belt and Road] participants and serve the other B&R programs’ construction. . . . China actively makes use of its technological advantages,” with the offer of sharing space technology, as an incentive for more countries to join the Belt and Road.

### **The Space Silk Road**

In 1992, the Chinese government approved a manned space program, with the ultimate goal of an Earth-orbiting space station. The same year, China held the Asia-Pacific Workshop on Multilateral Cooperation



Shanghai Academy of Spaceflight Technology

*An artist's rendering of the Gaofen-5 Earth remote sensing satellite, launched on May 8, 2018. Note that its scientific instruments are pointed downward, toward the Earth.*

in Space Technology Applications in Beijing for the first time, taking a leadership role in applying space technology for the development of the region. Out of that meeting came the creation of the Asia-Pacific Space Cooperation Organization. Its regional space activities are now being subsumed under China's Belt and Road Initiative.

Two years ago, China's space activities White Paper proposed the creation of the Belt and Road Space Information Corridor. Taking advantage of China's 200 Earth-orbiting satellites, the Corridor is intended to bring space-based technology into the service of economic and social development, and inform and aid major infrastructure projects of the Belt and Road. The Corridor is an information service, based on the use of data from communications, navigation, remote sensing, and science satellites. It is described as creating a public service platform for China's aerospace industry.

The Space Information Corridor serves two major purposes: connectivity among the Belt and Road nations, and satellite applications for development. First, satellite communication systems provide connectivity to isolated and underdeveloped regions, many with a difficult topography, such as mountains and deserts, which have little or no access to global or even national telephone or Internet communication, nor advanced education, scientific developments, or modern health care. Communication satellites can create a bridge to the most advanced modern technology.

When Earth-orbiting satellites were launched for the first time, mankind first saw the planet in three dimensions. Earth remote sensing technology has had a

dramatic impact on nations' economies; on building infrastructure; locating and inventorying water resources; increasing the productivity of agriculture; forecasting extreme weather events; disaster recovery; and even human health.

In 2010, the government inaugurated the China High-resolution Earth Observation System—the CHEOS project. The task was to provide all-weather, 24-hour coverage using optical and radar satellites. A number of satellite constellations, each optimized for certain tasks, have been under development and are being deployed. China is sharing the data and images provided by those satellites. As space agency head Zhang reported at the Germany aerospace

conference, "Joining with partners, China has provided 260,000 images to ASEAN [the Association of Southeast Asian Nations] and African states."

At the end of July, China launched the sixth in the series of Gaofen (meaning "high resolution") Earth remote sensing satellites, stating that the data will be used by the Belt and Road infrastructure initiative, in addition to domestic applications. The satellites in the Gaofen series carry instruments for multi-spectral imaging, and synthetic aperture radar, which sends pulses of radio waves toward the Earth and then measures the timing of the reflected signal. Geological features can be revealed, as can subsurface water resources. Unlike optical cameras, radar can "see" through clouds, and at night.

China's burgeoning commercial space companies, most of which are spinoffs from China's giant state-owned aerospace enterprises, are actively engaged in marketing data from the commercial and government remote sensing satellites. Beijing Space View Technology Limited also operates a constellation of SuperView remote sensing satellites for Swei Star Company Ltd, which is a subsidiary of China Aerospace and Science Corporation. The objective of the SuperView minisatellites is to deliver panchromatic (essentially, black and white) images with a 0.5-meter resolution, and multi-spectral images with a lower 2-meter resolution. Last January, the second pair of SuperView satellites was launched. The completed constellation is designed to have 12 additional satellites by 2022.

But the goal is not just to provide ready-made images to emerging space nations, but also for them to have their own ground stations to receive the satellite

data directly, and have the trained staff able to analyze and interpret, and present the data in a usable form to policymakers, farmers, urban planners, and others. To that end, China is deploying teams of specialists to create the necessary highly skilled workforce capable of tailoring data interpretation to other nations' specific needs.

### Navigation and Positioning Systems

A third leg of the Space Silk Road, following communications and augmented remote sensing satellites, are navigation and positioning satellite constellations.

In 2000, China began the deployment of its Beidou satellite navigational system. One purpose was to end the Chinese military's reliance on the American Global Positioning System (GPS). Also considered were the many uses of navigational and positional data for the economy. The civilian applications of navigational satellites are critical for the projects along the Belt and Road corridors.

Positioning data are very useful for any mode of transportation, including cars, airplanes, and ships. Beidou satellites are being used for monitoring shipping in busy corridors, observing road traffic, and mapping and surveying land to determine routes for transportation projects, including road construction, and precise location and topography data for high-technology projects such as high-speed rail.

China is nearing completion of its Beidou satellite navigation system. The first series of satellites provided coverage of China. The second series, whose deployment will be completed this year, extends coverage across the Asian region of the Silk Road. By 2020, the third series of Beidou navigational satellites will establish global coverage. The completed third series constellation will consist of 35 satellites and will have a positioning accuracy of 2.5 meters. On October 15, China launched two third-generation Beidou satellites, with more planned for the remainder of this year.

Scientists are developing increasingly sophisticated applications for positioning technology. It was recently demonstrated that, using high-precision navigational satellite data, the slightest movement underneath a



China Aerospace Science and Technology Corporation

*A Beidou navigation satellite, covered by protective faring, is ready to be mated to its launch vehicle in 2016.*

bridge or a dam that is under construction, such as soil subsidence, could be detected—avoiding a potential catastrophe.

The Space Silk Road provides the connectivity required for the construction of the multi-nation infrastructure projects underway, and, with future advancement in space technology, for the long-term economic growth of the Belt and Road nations.

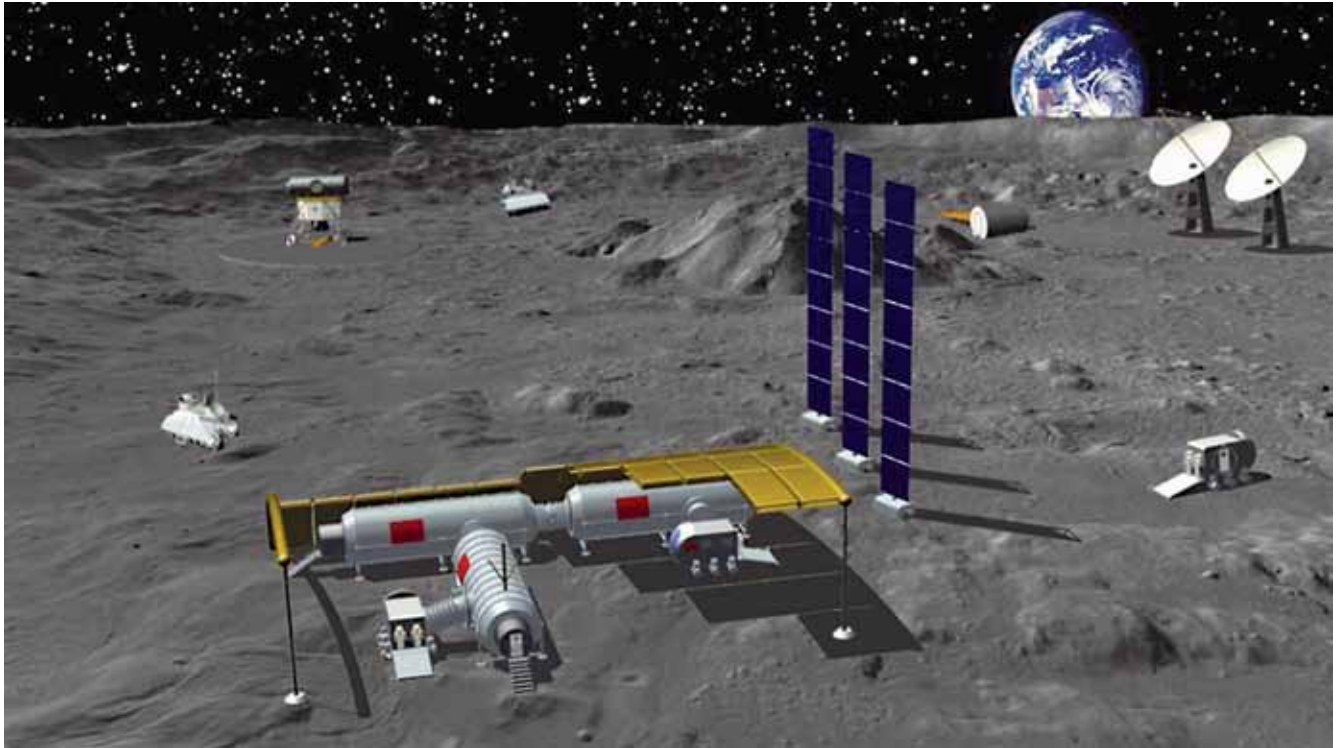
### The Next Frontier: The Moon

China has launched successful missions to orbit the Moon, land on the Moon, and direct a rover on its surface. In December, China will launch the Chang'e-4 spacecraft to land on the far side of the Moon. This has never been done before.<sup>1</sup>

Then, planned for 2020 is the Chang'e-5 mission to return samples of lunar soil to Earth, for intensive study of lunar chemistry and minerals, and of precious resources, such as the potential fusion fuel, helium-3, that have collected on its surface, deposited by the solar wind. In the following decade, China plans to begin a series of manned landings on the Moon. Cislunar transportation vehicles, living quarters, and other new infrastructure will be put in place.

As China's lunar program has progressed, it has

1. "China's Lunar Program Is Breaking New Ground," by Marsha Freeman, *EIR*, May 18, 2018, pp.11-14.



China Academy of Space Technology

*An artist's representation of a Moon base, the goal over the next decade of China's manned space program. Note the two astronauts on the lower left, for a sense of scale.*

been increasingly opened to international participation. The Chang'e-4 lander, for example, houses a Low Frequency Spectrometer and Lunar Lander Neutrons and Dosimetry experiment, developed in Germany. At the IAC space conference, China's space agency head announced that on its lunar sample return mission, there are 10 kilograms of payload space being offered to other countries for their scientific experiments.

Next year virtually the entire world will celebrate the 50th anniversary of mankind's first landing on the Moon. That program was successful thanks to the forceful and consistent support from President Kennedy, a NASA Administrator who mobilized the resources, the astronauts who understood history was being made, and the more than a quarter of a million skilled workers, technicians, scientists, and engineers who brought it to fruition.

President Trump's first Space Policy Directive, released on December 11, 2017, directs NASA to "lead an innovative and sustainable program of exploration with commercial and international partners.... Beginning with missions beyond low-Earth orbit, the United States will lead the return of humans to the Moon for long-

term exploration and utilization...."

China is following this path as we have seen.

China's space program will ultimately be successful because it is increasingly seen as a critical aspect of the Belt and Road Initiative, from youth being inspired to master science and engineering, through the practical applications of space technology, to new scientific discoveries resulting from missions of exploration.

Using "American methods" of federal credit and federal direction and support for great projects, and appreciating the success of that method in the Apollo program, China is leading projects that will change the face of much of the Earth through the Belt and Road, while opening deep space to human exploration.

In this regard, it would be wise for the United States to take a lesson from the Chinese and return to the American System economic policy of federal credit for infrastructure projects and support for science and technology research. Ensure the growth of the economy of the future through an educational system that has the goal of creating geniuses. Highlight for the public the fruits of science and research, and missions of challenge and exploration.