

# 21<sup>st</sup> CENTURY



## SCIENCE & TECHNOLOGY

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## CHINA IN SPACE

# A Look at China's Ambitious Space Program

by Marsha Freeman

Throughout the 40 years of the Cold War, legions of space and military analysts in the West made a career of trying to figure out what the Soviet Union was up to in space. By the early 1990s, with the fall of the Soviet Union and the establishment of a space agency in Moscow, its civilian space programs became more transparent, obviating the need for much of the sleuthing, and creating new opportunities for international cooperation.

At about the same time, the attention of Western analysts shifted to scrutiny of China's space efforts. Like the former Soviet Union, China was carrying out its closely guarded space projects under the umbrella of the military. But China's space program became an increasing object of interest as there were indications it would be embarking on a project to put a man into space.

Although a nation can try to keep its space research and development projects secret, once a satellite is space-borne, it is visible to all. In 1999, with no prior announcement, the unmanned Shenzhou I spacecraft went into Earth orbit. Although it looked similar to the Russian manned workhorse, the Soyuz, which the Russians had earlier shared with China, differences were noted by analysts. It was clear that China was testing a spacecraft that it was developing on its own, which would, at some point, carry astronauts into space.

For the first time, Chinese space officials spoke publicly about the Shenzhou I mission while it was still under way, and the amount of information that was released to the media was almost as surprising as the mission itself. There were indications that China was opening up its space program to international eyes.

*Artist's drawing of the lunar orbiter, to be launched next year in China's first deep space mission.*



Chinese Academy of Space Technology

*China is moving forward in space exploration— with or without the United States.*

Speculation about what China was planning in space increased. China watchers, and “red scare” partisans on Capitol Hill, tried to make the case that China's space program was entirely vectored toward military technology and advantage, and that this was a security threat to the United States.

In an effort to make its intentions more transparent, therefore, in November 2000, China took an unprecedented step, and released, in English, a White Paper laying out its 20-year perspective for space development. After reviewing the accomplishments of China's space program and its plans for advances in weather, remote sensing, communications, and navigational satellites, the White Paper stated officially, for the first time, that “early in the 21st Century” China would become the third nation in the world to launch a man into space.

After four unmanned tests of its Shenzhou spacecraft, in October 2003, Chinese astronaut Yang Liwei entered Earth orbit and the history books. Two years later, a pair of astronauts extended the time in orbit and capabilities of China's manned space program.

For the next manned mission, planned for 2007, Chinese astronauts will leave their Shenzhou capsule to perform a space walk in orbit, a necessary step toward later rendezvous and docking with a space station. In April, China's Chang'e lunar orbiter will be launched, laying the basis for the manned exploration of the Moon at the end of the second decade of this century.

American space supporters, hoping that Chinese spectaculars will help galvanize American policy-makers into increasing support for underfunded U.S. space programs, impatiently complain that China is going “too slow.” But China is clearly not in a “space

race" with the United States, or any other nation. When officials are asked when China will have a space station or send people to the Moon, the answer that is most likely is: "when we are ready." The reason is, that it is the *process* of developing space applications and technology, and the human and industrial resources, that is most important to China, not a particular goal.

### **Economic Development Strategy**

On Oct. 21, 2006, the State Council of the People's Republic of China released a second English-language space policy report, of 10 pages, titled "China's Space Activities in 2006," "in order to give people around the world a better understanding of the development of China's space industry over the past five years, and its plans for the near future." Although manned flight is China's most high-profile space activity, it is not the program that garners the major level of government attention or support.

The year-2000 paper stated that "China's fundamental tasks are developing its economy and continuously pushing forward

and TV," and "to give every village access to telephones." A satellite-based distance-learning education network and a satellite-based telemedicine network have been established.

Six years ago, China stressed the need to accelerate the applications of space technology, by encouraging enterprises engaged in such work to help "renovate institutions and technology." This requires "spinning off" technology developed for space exploration into other industrial sectors, and the economy as a whole, "to meet a wide range of demands of economic construction, state security, and science and technology development and social progress."

In its recent paper, China reports that over the next five years, it will "accelerate the industrialization of space activities," in order to "upgrade traditional industries," or what is generally described as technology transfer. In order to do this, the paper states, China will put emphasis on "sparing no efforts for the education and cultivation" of young people. The government plans to "encourage people from all walks of life to participate in space-related activities."

China has made a great effort to bring information and the excitement about its space program to young people. The main exhibit prominently displayed inside the entrance to the Beijing Science and Technology Museum is a Shenzhou capsule. Student competitions, travelling space exhibits, appearances by astronauts, and science fairs in China are reminiscent of the excitement about space exploration in the United States during the 1960s Apollo missions to the Moon.

Answering questions from students after a presentation on China's space program in Beijing in July, Academician Ouyang Ziyuan, the chief scientist of China's lunar program, explained that China cannot be left out of the enterprise that advances great nations.

### **A Worldwide Enterprise**

Since the start of its 1980s "opening up" to the outside world, China has embarked on a two-pronged international cooperation policy. It carries out joint projects "reinforcing cooperation with developing countries," especially "attaching importance to space cooperation in the Asia-Pacific region," while pursuing cooperation on advanced projects with established spacefaring nations.

Since its initial cooperation with the Soviet Union decades ago, China has established bilateral, government-to-government space cooperation agreements with more than two dozen nations. While cooperation with the Soviet Union waxed and waned as did political relations, China's Shenzhou spacecraft designers first learned about the technology necessary for manned spaceflight from the Soyuz, and the Chinese astronauts were trained in Russia.

As China's space program has progressed, so has the content of its cooperation with Russia. There are ongoing talks between space experts and political leaders of both nations, with suggestions that China may participate in Russia's planned mission to Phobos, a moon of Mars. Russia, it is reported, will join China in the later stages of its lunar program.

"We are currently working on the Moon as partners, and we have concluded that Russia and China have moved beyond



Courtesy of China Space News

*Two Shenzhou astronauts, shown here in training.*

its modernization drive." One of the goals six years ago was an Earth-observation system for "long-term stable operation," including meteorological, land remote-sensing, ocean-sensing, and disaster-monitoring satellites. These programs are either well under way, or have been accomplished. As the recent paper reports, over the past five years, China has developed and launched 22 different types of Earth-orbiting satellites.

Data from its remote sensing satellites are being applied to major state projects, the recent Space Activities paper reports, such as the South-North Water Diversion Project, the Three Gorges Dam Project, and the Project to Transmit Natural Gas from West to East.

By the end of 2005, China had more than 80 international and domestic telecommunications and broadcasting Earth stations, and 34 satellite broadcasting and television link stations, with the goal of giving "every village access to broadcasting

their previous relationship, when China was a buyer and we were a seller," Russian space agency head, Anatoli Perminov, said in September. "We have already adopted a cooperation program with China for 2007-2009. China is now a leading space power."

One of China's most successful and in-depth space cooperation programs is with Brazil—a nation also of the "south," and also embarked on a broad-ranging program of developing its own satellites and launch vehicles. In October 2003, the joint Sino-Brazil Earth Resources Satellite was launched, and an agreement to build three additional satellites is in force.

China has worked for many years with the European Space Agency on an array of projects, from instructing scientists on the use of Earth remote-sensing data, in the "Dragon Program," to the joint Double Star mission to explore the mysteries of the Sun. Over the past five years, China has signed cooperation agreements with Argentina, Canada, Malaysia, Pakistan, and Ukraine, and conducted exchanges with space-related organizations in Algeria, Chile, Germany, Italy, Japan, and Peru.

In 1992, China, Thailand, and Pakistan, later joined by other nations, sponsored the Asian-Pacific Multilateral Space Technology Cooperation Symposium. Then, joined by Iran, the Republic of Korea, and Mongolia, in April 1998 China signed a Memorandum of Understanding to develop small multi-mission satellites. Small satellites are an ideal avenue through which non-space countries can gain access to education, training, and basic space technology.

In October 2005, representatives of China, Bangladesh, Indonesia, Iran, Mongolia, Pakistan, Peru, and Thailand signed the Asia-Pacific Space Cooperation Organization (APSCO) Convention in Beijing. A year later, Turkey signed. APSCO headquarters will be in Beijing, with the aim of developing programs to make available to these nations the technology and applications of space development.

#### **With or Without the United States**

Ten years ago, during a trip to China, former Senator and astronaut John Glenn stated in Beijing that if the United States did not invite China to participate in the then-evolving International Space Station, China would build its own. Aside from what is necessarily gained in any collaboration on challenging science and engineering endeavors, refusing to cooperate in space as a way of "punishing" China for policies that do not meet U.S. approval, has only led China to develop its own indigenous technology, industry, and technical manpower.



CCTV

*The Chinese spacecraft Shenzhou after its return from an unmanned test in November 1999.*

Further, it has encouraged China to seek partnerships with other spacefaring nations, which it has done very successfully. Marching to its own "human rights" and "export control" drum, the United States is now the only nation of significance in space that is *not* cooperating with the world's most impressive emerging space power.

There has been prodding from Democrats and Republicans on Capitol Hill to find areas of common interest in space cooperation with China—until recently, without positive response from the Bush Administration. But pressure from Congress, the aerospace/defense industry, and space supporters, not to mention China's accomplishments in manned spaceflight, led to NASA's announcement that Administrator Mike Griffin would accept the China National Space Administration's invitation to visit its academies and manufacturing facilities, and talk with its officials.

Before his trip in September 2006, Griffin was skeptical, repeating the *non sequitur* that there were still things we disagreed with the Chinese on, such as human rights.

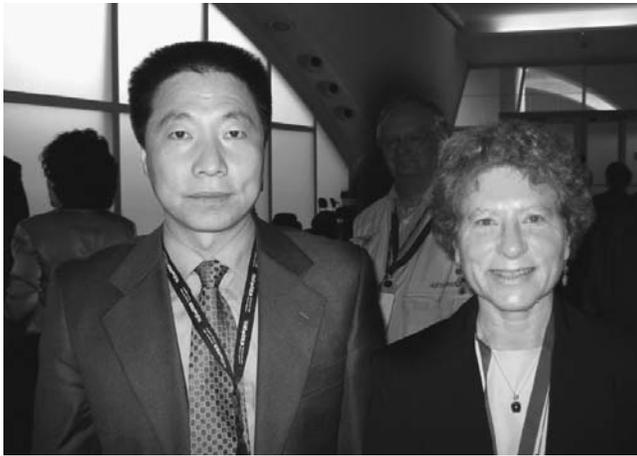
But whatever his preconceived notions about China, the Chinese, or their space program, Griffin was impressed with what China is doing in space.

While in China, Mike Griffin met with his counterpart, the head of the China National Space Administration (CNSA), Sun Laiyan; he met with the Minister of Science and Technology; he toured some of China's premier space research and design facilities; and he talked to graduate students at the Chinese Academy of Sciences.

In a press conference on Sept. 25, U.S. Ambassador to China, Clark Randt, whose father worked for NASA in the 1950s, located Administrator Griffin's visit as "another indication of the growth in our relationship with China." In a somewhat surprising statement, Griffin said that "one of my purposes here was to convey, on behalf of our nation, our congratulations to, and appreciation of, China's accomplishments in space, being only the third nation to develop its own capability to put people in space."

Although NASA did not take Chinese officials up on their offer to visit the Beijing command center where manned spacecraft are controlled, or the launch site, so as not to give the Chinese the impression that the United States is willing to put manned space cooperation on the table, Dr. Griffin said at the press conference that he "particularly enjoyed the visit to CAST [China Academy of Space Technology], seeing the facilities that have been used to develop the Shenzhou spacecraft."

"We welcome China to the fraternity of spacefaring nations,"



William Jones/EIRNS

*China's first astronaut, Yang Liwei, here with the author, at the annual Congress of the International Astronautical Federation, held in Valencia, Spain, in October 2006.*

Griffin said. On the question of cooperation, Griffin explained that "the problems of spaceflight, whether human or robotic, are very difficult. They are right at the edge of what is technically possible, and, indeed when nations become able to conduct spaceflight activities . . . it is a symbol of very significant technological prowess. . . . [O]ne of things that we derive from international cooperative activities is seeing how different nations and

different cultures solve those problems. We learn things; they learn things . . . this *is* rocket science, and it is very demanding."

NASA and CNSA agreed to discuss sharing Earth remote-sensing data, data from each of their upcoming lunar orbiters, and from environmental and weather satellites, and then to explore the possibility of placing instruments on each other's future lunar spacecraft. The specifics of cooperation will be detailed by working-level American and Chinese space officials. More important than any particular program, the decision was made for annual high-level talks on space cooperation, to raise new ideas and have oversight over the projects and data coordination efforts that were outlined in the initial, September meeting.

At the press conference, Administrator Griffin was asked to give an example of Chinese space technology that impressed him. He provided an answer only after being goaded by the press, and apologizing beforehand for what he said would be a "geeky" answer. "For example," he said, "we saw a very nice algorithm today by which Chinese weather satellite developers correct for the apparent motion of the Earth as a result of minor shifts in the orbit of geostationary spacecraft." In fact, sharing breakthroughs and developments, and solving problems across barriers, to the benefit of all parties, and in spite of other differences, is what cooperation should be based on.

As has been observed by Russian space official Anatoli Perminov, and recently also by Mike Griffin, China has made impressive strides in space. It is now in a position to contribute to, and not just benefit from, international cooperation. And it will be going forward in space exploration, with or without the United States.

## The Lunar Beijing Declaration

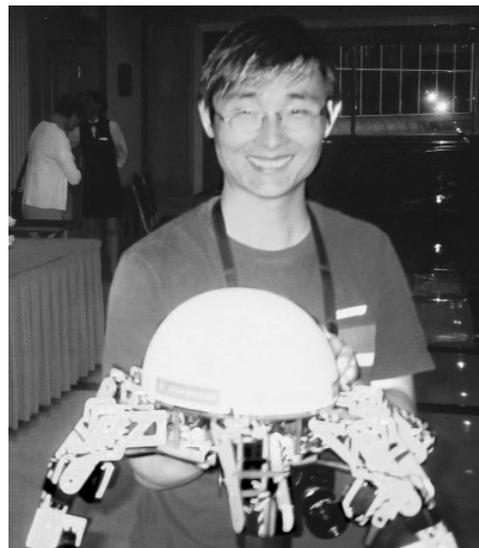
In July 2006, representatives of 18 nations attending the eighth conference of the International Lunar Exploration Working group in Beijing, signed a declaration committing the spacefaring nations to coordinate the upcoming missions to the Moon, to be launched in the next two years. China, India, Japan, and the United States have spacecraft in preparation, and the European Space Agency's SMART-1 spacecraft is completing its one-year lunar mission.

The Lunar Beijing Declaration affirmed that when these four new spacecraft begin their missions, "our understanding of the Moon and its resources will be revolutionized as the rich array of data from this flotilla is analyzed around the world." It proposes a series of international actions to optimize the return from the coming missions. Should the proposals be

implemented, cooperation among the world's leading nations will proceed on the highest level, the exploration of the Solar System.

The delegates also adopted a proposal for an International Lunar Decade, modelled on the International Geophysical Year of 1957-1958, which promoted the study of the Earth, and during which the first Earth-orbiting satellite was launched into space. The proposed Lunar Decade would span the 2007 launching of the new robotic lunar orbiters, to the approximate 2019 planned manned return to the Moon.

One of the goals of the Declaration is to "inspire a new generation of lunar explorers." To that end, China's National Space Administration sponsored a public day during the July conference, which brought 300 students into contact with top lunar scientists and program managers.



Marsha Freeman/EIRNS

*The second stage of China's lunar program will include a lander and rover. College students are competing to design the lunar robot. This model was demonstrated at the Beijing conference.*