

First Chinese Crew Lives, Works in Space

by Marsha Freeman

June 23—The success of the June 16 launch of China’s manned Shenzhou-9 spacecraft, and its docking with the orbiting Tiangong-1 space module two days later, has accomplished the next step in China’s long-range plan to have astronauts live and work in space. Each of China’s four manned space flights has qualitatively increased, through incremental steps, the capabilities required for its multi-decade manned space exploration program.

While much of the publicity during this mission has focused on China’s first female astronaut, 33-year-old Liu Yang, what the mission has already demonstrated is that China can safely deliver a crew to an orbiting spacecraft, bring up supplies to the laboratory to enable long-term stays, and provide the environmental life support on board the laboratory for safe and productive missions.

What a contrast! While China methodically proceeds toward its ultimate goal of living and working on the Moon, the U.S. space program is suffering its fourth directionless year. While any space program will face temporary setbacks, not only is there now no American capability to even deliver astronauts to space, much less push the frontiers of exploration, there is also no *intention* on President Obama’s part, to do so in the future.

The President’s Science Advisor, population-reduction proponent John Holdren, arrogantly testified before Congress June 21, that the U.S. continues “to lead the world in space, although sometimes the contrary is asserted.” He continued, “some people say China is overtaking [us].” He went on to say that what the Chinese are doing now, the U.S. did decades ago. What he neglected to say is that if current policies continue, what the Chinese will be doing in the future will make that lead a faint memory.

Although China’s seemingly slow pace in manned space flight often frus-

trates outside observers, in Beijing’s view, once they have successfully demonstrated a capability, there is no reason to repeat such missions. Each manned mission should entail a new challenge, as a milestone along a developmental pathway. And each mission should fly when it is ready. Shenzhou-9 is an important next step.

The Tiangong-1 ‘Target’

Chinese space engineers and designers describe the relatively small Tiangong-1 module as a “target”: Its primary purpose is to demonstrate the ability to rendezvous and dock with Shenzhou capsules. The first test took place last November, when the unmanned Shenzhou-8 craft carried out an automatic docking via computer instructions from mission control on the ground. Automatic control will be the primary method of docking in the future, but the purpose of the manned Shenzhou-9 mission is to carry out a manual docking, as an available back-up, should the automatic mode fail.

In fact, the computer-controlled docking is more difficult, since if there is a crew on board, it can respond immediately, and with human intelligence, to an emergency. But China cautiously carried out the unmanned docking first, so as to create the least amount of risk to a crew.

The lesson of the importance of having a crew on board when spacecraft dock was learned in the late 1990s, when an unmanned Russian Progress cargo ship



The successful docking of the Shenzhou-9 spacecraft places China in the forefront of manned space exploration. Shown: the astronauts inside the Tiangong-1 module, June 18.

was testing a new automated docking procedure, and crashed into the Mir space station, depressurizing one laboratory module. Quick thinking and action by the crew saved the rest of the station. The manual docking during this Shenzhou-9 mission will make this capability available for any future contingency.

Although rendezvous and docking are a primary mission objective, Chinese planners have multiple tasks for the crew and module. As seen in extensive live coverage carried by China Central Television, Tiangong-1 is a spacious enough craft to accommodate sleep quarters for the crew, personal hygiene needs, exercise, and laboratory equipment for scientific experiments.

This crew will remain in orbit for more than ten days, twice as long as any previous Chinese manned mission. This longer stay gives Chinese scientists and medical doctors an opportunity to study the effects of microgravity on the astronauts.

According to manned space program spokeswoman Wu Ping, three aspects of space medicine will be investigated by the crew. One, is the real-time monitoring of the health of the astronauts during the mission. The second is to study the physiological effects of weightlessness, which will change over the course of their stay in microgravity. And the third is to examine the operational capabilities of the astronauts in this new environment, to see if any disorientation interferes with their performance. All of these aspects are vectored toward China's planned longer-duration stays in space. The inclusion of a woman in the Shenzhou-9 crew is seen by Chinese space planners as a necessary step toward the permanent settlement of space.

On June 23, on the fifth day of the docked mission, half of the ten planned space medicine experiments had been completed, including cardiovascular studies.

A Model for Developing Countries

For decades, both the Soviet, and especially the American, space programs were admired around the globe, and provided an opportunity for dozens of nations to participate in human space exploration.

Today, all of Russia's manned transport capacity is deployed to service the International Space Station (ISS), by default, thanks to the retirement of the Space Shuttle. In the future, nations eager to become spacefaring, will likely look to China.

On June 19, speaking to *Xinhua* after viewing the



China Manned Space Engineering

This drawing depicts the moments before the successful docking of the Tiangong-1 test module (right) with the Shenzhou-8, in the first rendezvous and docking of two Chinese spacecraft.

launch of the Shenzhou-9 mission, Dr. Mazlan Othman, a Malaysian astrophysicist and director of the UN Office for Outer Space Affairs, reflected this view. She sees China's space program as including an opportunity for "great involvement of developing countries."

Dr. Othman added that the world "is waiting very anxiously for China's [future] space station to be completed," as this "will give another opportunity for international cooperation." "The world is watching China," she added.

In the future, she said, China's space station will offer the UN opportunities to conduct experiments, adding, "Medical research in space has benefit[ed] people on Earth, which can be improved further when we have the Chinese space station [around 2020]."

Dr. Othman also pointed out that by 2020, when China's space station is scheduled to be completed, it may be the only one in orbit, since currently, the agreement to extend the life of the ISS extends only to 2020.

During the Shenzhou-9 mission, the Chinese leadership again expressed its interest in international cooperation in space. If, in 2020, China has the only operating space station, there could be one nation, however, that will be left out in the cold—the United States. One might assume that "turnabout is fair play," and the Chinese might want to exclude the U.S. from its space station, as the U.S. has excluded China from the ISS. But, as it now stands, the U.S. may exclude itself, since under U.S. law, NASA is prohibited from *any* space cooperation with China.

In the future, China, with its international partners, could be leading the effort to explore space.