



Visitors examine a model of China's lunar rover at an exhibition of achievements in space and deep-sea sciences in Wuxi, Jiangsu province, in May. ZHU JIPENG / XINHUA

Probe to look for water on moon

Chang'e 7 robotic mission to search for ice and survey south pole landforms

By ZHAO LEI
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China plans to send its Chang'e 7 robotic probe to search for water and other resources at the moon's south pole, according to a leading space scientist.

"The Chang'e 7 mission is set to find traces of ice at the south pole, investigate the environment and weather there, and survey its landforms," said Wu Weiren, chief designer of China's lunar exploration program and an academican of the Chinese Academy of Engineering. "It will also be tasked with detecting the natural resources beneath the south pole's surface. Moreover, mission planners are considering if we can use the probe to dig into the surface to check the underground structures and compositions."

Wu was speaking on the sidelines of the fifth session of the 13th National Committee of the Chinese People's Political Consultative

Conference, which opened in Beijing on Friday. He is also a member of the CPPCC National Committee, the top political advisory body in China.

He said the selection of the south pole as Chang'e 7's destination was based on two major considerations.

"The moon's south pole is likely to have a favorable solar illumination condition that means sustained power supply and stable temperatures, and those will allow for long-term robotic exploration and manned activities," Wu said. "By comparison, on other places on the moon, solar illumination is much shorter, and temperature changes between lunar day and lunar night usually stand at about 300 C."

A lunar day equals 14 days on Earth, with a lunar night being the same length. During the lunar night, the temperature falls below -180 C and there is no sunlight to provide power to spacecraft.



Wu Weiren

"Another reason lies in water," he said. "The permanently shadowed craters on the south pole may harbor reservoirs of ice and other volatile compounds, and they will be valuable resources for manned explorations."

Wu said Chinese engineers are developing a special craft able to fly from the landing site to a nearby crater to explore for traces of water.

Speaking about the Chang'e 6 mission, Wu said scientists have been discussing its landing site.

"There are two options — somewhere on the far side of the moon or a place at the south pole," he said.

The Chang'e 6 probe is a backup to its predecessor, Chang'e 5, so it is capable of collecting and bringing samples back to Earth.

"If the probe is to conduct sampling tasks on the far side, then we will need to deploy one or two relay satellites in a lunar orbit to

transmit signals between Chang'e 6 and ground control," Wu said. "Similarly, landing it on the south pole and retrieving samples from there will also be challenging. So scientists need time to decide which plan will be adopted."

He said China has become the first nation to make specific plans to deploy probes to the moon's south pole, and those plans have intrigued scientists from many countries.

China opened its lunar program in 2004 and has launched five robotic probes since 2007. The fourth, Chang'e 4, landed on the far side of the moon in January 2019, becoming the first spacecraft to closely observe the little known lunar region. Its rover, named Yutu 2, has been working there for more than 1,000 days as the longest-operating lunar rover.

The most recent mission, Chang'e 5, landed on the moon in December 2020 and soon sent 1,731 grams of lunar rocks and soil back to Earth. They were the first samples returned from the moon in about 44 years.

Challenges await sample-return expedition to Mars

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Chinese scientists and engineers will need to solve a host of technological challenges to accomplish an ambitious sample-return mission to Mars, said Wu Weiren, a key figure in the country's deep-space exploration program and also a top political adviser.

A senior scientist with the China National Space Administration and academican of the Chinese Academy of Engineering, Wu said the mission, which is being planned, will likely involve several steps that resemble procedures in

China's Chang'e 5 lunar mission. First, a landing capsule will touch down on the Martian surface and collect and seal samples. Next, it will lift an ascender to transfer the samples to a spacecraft orbiting Mars, and then the orbiter will release a reentry craft to carry the samples back to Earth.

"The spacecraft for a sample-return mission to the Red Planet will be much heavier than lunar probes as it will carry a greater amount of fuel to fly a very long distance," Wu said on the sidelines of the fifth session of the 13th National Committee of the Chinese People's Political Consultative Conference.

"Therefore, we need to build a powerful carrier rocket to transport the spacecraft."

According to the China Academy of Launch Vehicle Technology in Beijing, the country's major rocket maker, its engineers are developing a super-heavy rocket named Long March 9 for the nation's prospective manned lunar programs and other deep-space expeditions.

China started its first independent Mars mission — Tianwen 1 — in July 2020. The probe landed a rover on the Martian surface in May last year.

The 1.85-meter-tall, 240-kilogram rover, named Zhurong, has

now worked on the Martian surface for nearly 10 months — far outliving its three-month life expectancy.

The rover, which has traveled more than 1,600 meters, has transmitted a great deal of scientific data, video clips and pictures taken en route to its destination — an ancient coastal area on the Red Planet.

"In the long run, we want to send spacecraft to explore the rim of our solar system, which is about 15 billion kilometers from us, before 2049, the year to mark the centenary of the People's Republic of China," Wu said.