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China plans to retrieve Martian soil by 2030

By ZHAO LEI in Hefei
zhaolei@chinadaily.com.cn

China's Chang'e 5 robotic mission created history when it brought back samples from the lunar surface in 2020, and now, Chinese space scientists have set their sights on another celestial body — Mars.

According to Wu Yanhua, chief designer of China's deep-space exploration programs, the nation plans to bring Martian soil back to Earth around 2030. The mission has been named Tianwen 3, which means it will be the third in China's interplanetary exploration schedule.

The Tianwen 3 robotic probe will have four components — a lander, an ascender, an orbiter and a reentry module — and will be launched on two Long March 5 heavy-lift carrier

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Wu Yanhua, chief designer of China's deep-space exploration programs

rocket flights from the Wenchang Space Launch Center in Hainan province. Wu said on Tuesday during the First International Deep-

Space Exploration Conference (Tiandu Forum) in Hefei, Anhui province.

The lander and ascender will take an Earth-Mars transfer trajectory and carry out orbital correction maneuvers before entering the Martian orbit, after which they will attempt an engine-assisted soft-landing.

Meanwhile, the orbiting stack — the orbiter and reentry module — will follow the same path to reach the Martian orbit, after which they will fly around Mars to relay signals and wait for the samples.

Once the samples are collected and packed into a vacuumed metal container, the ascender's engines will elevate it to orbit to rendezvous and dock with the reentry module, transfer the samples and undock.

The orbiting stack will then leave the Martian orbit and return to the Earth's orbit, where the pair will break up and the reentry module will conduct a series of complicated maneuvers to return to a preset landing site.

If everything goes according to plan, the samples could become the first to be returned to Earth from Mars, and will help scientists look for traces of life on Mars, learn more about the planet's geology and inner structures, and understand its atmospheric cycles and escape process, Wu said. All this will allow researchers to expand their knowledge about the creation and evolution of Mars, he added.

China launched its first Mars program, Tianwen 1, in July 2020. It was the country's first independent

interplanetary exploration endeavor. The landing craft of Tianwen 1 touched down on the Martian surface in May 2021 and then released a rover, named Zhurong, to perform scientific tasks. Zhurong has traveled 1,921 meters on Mars is currently dormant.

Tianwen 2, a robotic mission to retrieve samples from an asteroid, is scheduled for launch around 2025 and is expected to return to Earth with samples around 2027, according to Wu.

In another development, China is also planning an asteroid defense exercise that will involve using a high-speed spacecraft to make a hyperfast, kinetic impact on an approaching asteroid with a diameter of about 50 meters, Wu said. This technology can deflect a potentially hazardous asteroid, putting it on a different trajectory and steering it away from the Earth's orbital path, he said.

China proposes building lunar research station with partners

Mega project to share scientific advances with host of multinational stakeholders

By ZHAO LEI in Hefei
zhaolei@chinadaily.com.cn

China is proposing to establish a multinational organization to take charge of the construction and operation of the International Lunar Research Station, an ambitious venture led by China.

Wu Weiren, an academician at the Chinese Academy of Engineering and the chief planner of the country's lunar programs, said on Tuesday in Hefei, Anhui province, that the organization will be responsible for planning, building and running the lunar outpost and will share scientific findings with all member states.

The headquarters of the mega science project will consist of five centers in charge of design and simulation, operation and maintenance, data processing, sample storage and research, and international exchange and training, according to the scientist.

Founding members will have preferential rights and better access to the station's achievements, he added. Wu said the first version of the International Lunar Research Station will consist of components of China's Chang'e 7 and Chang'e 8 robotic missions — orbiters, landers, rovers and a flyby craft as well as a relay satellite.

Both the Chang'e 7 and Chang'e 8 probes are designed to land on the moon's south pole. Chang'e 7 is scheduled to set out around 2026 while Chang'e 8 will join it around 2028.

In the long run, there will be more spacecraft deployed on the south pole to bring more infrastructure to

the science outpost. The station will utilize robotics most of the time but it will also be capable of accommodating astronauts for short stays, according to him.

Wu said there are three major reasons why China wants to intensify its lunar exploration efforts. “The moon is an important due to uncovering the secrets behind the origins of the universe, the solar system and terrestrial life. The Earth's natural satellite will become a ‘transfer station’ for humans to fly beyond it to other celestial bodies and the resources on it will be very meaningful to mankind's sustainable development,” he explained.

Liu Jizhong, a leading scientist in China's deep-space exploration programs, said the lunar station will act as an international platform for moon-based scientific experiments and mineral exploitation. It will help to revolutionize technologies pertaining to the flight, energy, communication, navigation and remote

control of man-made objects on extra-terrestrial bodies, and will also lay a foundation for larger-scale exploration and development on the moon.

“Scientifically speaking, the station will help researchers to better study a host of questions like the creation and evolution of the moon, what happened in the early ages of the universe, and the ties between the Earth and the moon,” Liu said.

The scientists made their remarks at the First International Deep Space Exploration Conference (Tiandu Forum) that opened in Hefei on Tuesday. The event was hosted by the Deep Space Exploration Laboratory with the participation of the Asia-Pacific Space Cooperation Organization, the China Space Foundation and the University of Science and Technology of China.

Hundreds of scientists, engineers and industry representatives from home and abroad are taking part in the two-day forum.

Rocket ignition test site to propel development

By ZHAO LEI in Hefei
zhaolei@chinadaily.com.cn

China has big plans to advance its space exploration and development, but whether those plans can become a reality depends on the capability of the country's carrier rockets, or more specifically, rocket engines.

China has some of the world's best rocket engines, ranging from huge ones lifting the Long March 5 heavy-lift rocket to small models elevating a craft from the lunar surface, but the nation continues to seek new types to meet the needs of future ambitious projects.

The latest step toward achieving these plans was announced on Monday, China's Space Day, by the Academy of Aerospace Propulsion Technology in Xi'an of Shaanxi province, a subsidiary of China Aero-

space Science and Technology Corp and the country's dominant maker of liquid-propellant rocket engines.

The academy said in a news release that a new ignition testing facility has been put to use in Tongchuan, Shaanxi province, becoming Asia's first that can test super-powerful engines with a maximum individual thrust of 700 metric tons.

An ignition test of an engine, which has a smaller thrust, took place at the facility on Monday, it said, noting the facility's construction took only a single year.

Tan Yonghua, head of the academy's science and technology committee, said the facility will be a major testing site for liquid-propellant rocket engines and will extensively support the research and development of the nation's super-heavy rockets.



A new ignition testing facility in Tongchuan, Shaanxi province, conducts a successful test on Monday. PROVIDED TO CHINA DAILY

With new rockets propelled by reliable, powerful engines, China will be able to fulfill its manned missions to the moon and deep-space expeditions, according to him. The most powerful liquid-propellant rocket engine in Asia is under development at the Xi'an academy. The 500-ton-thrust engine is four times mightier than the current

strongest rocket engine in China which has a thrust of 120 tons. Its first ignition test took place at another testing facility in November.

In another development, the academy put three of its engine models into the commercial space market over the weekend, saying they can help private enterprises in China build strong rockets.