Rewarding summer
Members of US youth delegation say they enjoyed exchange tour
CHINA, PAGE 7

Landslides kill at least 229 in Ethiopia
WORLD, PAGE 12

A second chance
Drama captivates audiences with princess rewriting destiny in afterlife Z WEEKLY, PAGE 16

香港版
HONG KONG

CHINA DAILY

中国日报

WEDNESDAY, July 24, 2024

www.chinadailyhk.com HK $10

Scientists find molecular water in moon mineral

By YAN DONGJIE
yandongjie@chinadailu.com.cn

A team of Chinese scientists has made a groundbreaking discovery: molecular water locked within a mineral in lunar soil samples collected by the Chang'e 5 mission.

Remote sensing data had indicated signs of water molecules on the lunar surface in recent years, particularly in the polar regions, known as the permanently shadowed region. However, molecular water has not been found in returned lunar samples.

"Due to the high temperatures and vacuum environment on the moon, the existence of liquid water is not possible, so it was previously unclear how water molecules could exist on the moon," said Jin Shifeng, a member of the research team and an associate researcher at the Chinese Academy of Sciences' Institute of Physics.

The research utilized lunar soil samples collected by the Chang'e 5 lunar probe in 2020.

China's first unmanned lunar sample return mission saw the Chang'e 5 probe collect basalt lunar soil samples from a high-latitude region of the moon, providing new opportunities for the study of lunar water.

Experts from the institute's Beijing National Laboratory for Condensed Matter Physics, Beijing University of Science and Technology, Tianjin University, CAS' Qinghai Salt Lake Institute and Zhengzhou University conducted the study. They determined that lunar water exists in a hydrated mineral known as ULM-1.

The research findings were published online in the academic journal Nature Astronomy on July 16.

According to the molecular formula, the mineral contains six crystalline water molecules, with the water molecules accounting for as much as 41 percent of the sample's mass.

About five years ago, a similar mineral was discovered in a volcano in Russia, providing new clues to the source of water on the moon.

"In other words, this mineral may have been formed by volcanic eruptions on the moon," Jin said.

"This indicates that lunar volcanic gases contain a significant amount of water. Thermodynamic calculations have revealed that the water content in lunar volcanoes is comparable to the driest volcanoes on Earth."

Jin said the crystalline water discovered in the lunar soil is relatively stable in the moon's vacuum environment.

The presence of water on the moon is crucial for lunar evolution studies and resource development. Around 1970, the absence of water on the moon became a basic assumption because no water-containing minerals were found in the Apollo lunar soil samples.

"This may be due to differences in sampling latitude," Jin said. "At the Chang'e 5 sampling site, the lunar surface temperature does not exceed 80 C.

"This also indicates that the distribution of molecular water on the lunar surface is uneven. However, because this crystal is relatively stable, it could potentially exist in vast regions of the moon."

The ignition test of the new type of rocket engine designed to propel the third stage of the Long March 10 rocket is carried out at a newly built engine test facility in Beijing. PROVIDED TO CHINA DAILY

Rocket engine for lunar mission completes test

By ZHAO LEI
zhaolei@chinadaily.com.cn

Rocket scientists and engineers conducted a major test last week on the propulsion system to be used on a new type of carrier rocket, which will be the backbone of China's future mission to land astronauts on the moon.

During the ignition test that took place at a newly built engine testing facility in Beijing's Fengtai district, a new type of engine, which consumes liquid hydrogen and liquid oxygen, was ignited for more than 16 minutes in a mock high-altitude environment, according to the Academy of Aerospace Propulsion Technology in Xi'an, Shaanxi province. The academy is China's major manufacturer of liquid-propellant rocket engines.

The new engine model has been designed to propel the third stage of the Long March 10 rocket, which is under research and development at the Beijing-based China Academy of Launch Vehicle Technology. The engine will be used when the rocket reaches a high altitude.

Both academies are subsidiaries of State-owned industry giant China Aerospace Science and Technology Corp.

An expert with knowledge of the test who spoke to China Daily on condition of anonymity, said both the new engine and the new testing facility were designed for the nation's manned lunar expedition program.

"The new facility was built to test the performance of the new engine, which was developed to propel the third stage of the new Long March 10 rocket in a high-altitude environment," he said.

The Long March 10 has been tasked with launching the country's new-generation crewed spacecraft and the lunar landing module. The rocket is expected to be ready for its maiden flight around 2027.

The rocket for the moon mission will consist of a core booster and several side boosters and will be 92.5 meters tall, which is roughly the height of a 32-story residential building. The gigantic vehicle will have a liftoff weight of 2,189 metric tons and a thrust of 2,678 tons.

It will be capable of transporting spacecraft weighing at least 27 tons to an Earth-moon transfer trajectory, according to designers.