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Scientists reveal new evidence of oceans on Mars

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A team of Chinese and foreign scientists has discovered underground sedimentary layers on Mars that appear to have been shaped by oceanic activity, providing new evidence that water once existed at the planet's middle to low latitudes.

The findings, published on Tuesday in the Proceedings of the National Academy of Sciences, were led by Li Jianhui, a doctoral student at Guangzhou University, and Professor Liu Hai. Their paper, titled "Ancient Ocean Coastal Deposits Imaged on Mars", details the discovery of multilayered, inclined sedimentary structures at depths of 10 to 35 meters beneath the surface.

The data was collected by China's Zhurong rover, which landed in the southern part of Utopia Planitia in Mars' northern hemisphere in 2021 as part of the Tianwen 1 mission.

The rover is equipped with a dual-frequency ground-penetrating radar system designed to detect underground structures and potential water-ice deposits, according to Guangzhou University.

"These geological features are highly similar to coastal sedimentary deposits on Earth, providing the most direct underground evidence to date for the existence of ancient oceans in Mars' middle to low latitudes," the university said in a news release.

The discovery extends the evidence of water beyond Mars' polar regions to areas that could be more suitable for human activities, the researchers said.

"If an ocean once existed on Mars, climate change may have caused a large amount of water to be stored as underground ice, raising the possibility that future Mars bases could have ample water resources," the release said.

Compared with the polar regions, the light and temperature conditions in the planet's middle to low latitudes are more suitable for human habitation.

If future explorers can access groundwater in these ancient oceanic regions, it could significantly lower the costs of building and maintaining Mars bases, the researchers said.

The study also suggested that ancient marine sediment on Mars preserves a historical record of the planet's climate shifts. Analyzing these layers could help scientists understand how Mars transitioned from a warm, humid environment to a cold, dry one — and offer insight into how humans might one day modify the Martian environment for long-term habitation.

Mars has long been a primary target for human interplanetary exploration due to its geological features, seasonal variations and circadian rhythms, which are similar to those on Earth.

"The existence of Martian water resources has always been a controversial topic," the release said. "However, over the past few decades, human exploration of Mars has achieved many milestones."

The research team included scientists from Guangzhou University, the Chinese Academy of Sciences, Tongji University, Pennsylvania State University and the University of California, Berkeley and other institutions. Liu, along with Professor Michael Manga from UC Berkeley and Fang Guangyou of the Aerospace Information Research Institute at the Chinese Academy of Sciences, were corresponding authors of the study.

The research was supported by the China National Space Administration, the team behind China's first Mars exploration mission, Tianwen 1, and was funded by the National Natural Science Foundation of China and the Guangdong Basic and Applied Basic Research Foundation.