



Study: Mars may have had an ocean

- Geological features on Mars probably are remnants of shorelines of an ocean
- The long lines on the surface rise and fall in a way resembling a sea wave
- The ocean may have covered a third of the Martian surface
- Two features suspected of being shorelines named Arabia and Deuteronilus

WASHINGTON (Reuters) -- Long, undulating features on the northern plains of Mars probably are remnants of shorelines of an ocean that covered a third of the planet's surface at least 2 billion years ago, scientists said Wednesday.

The geological features, stretching thousands of miles, were first revealed in the 1980s in Viking spacecraft images. But topographical data collected by NASA's Mars Global Surveyor in the 1990s cast doubt on whether the features truly marked a long-gone sea coast.

The Global Surveyor found big, mountain-sized variations in elevation along the suspected shorelines, whereas a shoreline should be a constant elevation matching sea level.

But scientists writing in the journal *Nature* said the movement of the Martian poles and also the planet's spin axis by roughly 2,000 miles in the past 2 billion to 3 billion years would have triggered deformation of surface features just like that seen in the suspected coastlines.

"The pole moves and it warps the shorelines," planetary scientist Taylor Perron of Harvard University, the study's lead author, said in a telephone interview.

"We haven't have direct confirmation that there were oceans because, of course, the water isn't there any more. But what we've done is to eliminate one of the main reasons to doubt that they were ever there."

Earth's poles also have moved in the past.

At some point, a big shift of mass on Mars caused its north pole to shift 50 degrees toward its present location and the planet's change in orientation changed the topography of the shorelines, said physicist Jerry Mitrovica of the University of Toronto, one of the researchers.

The ocean may have covered a third of the Martian surface during the first half of the planet's history before disappearing at least 2 billion years ago for unknown reasons, the researchers said.

"Relative to the size of the planet, this ocean would have been about the same with respect to Mars as the Pacific Ocean is with respect to Earth," Perron said.

Some water is retained as ice at the Martian poles and some scientists believe much more is trapped underground.

Beyond adding to the understanding of Earth's next-door neighbor in our solar system, evidence of water also is critical to the issue of whether Mars has ever harbored life as we know it.

"It is certainly true that the issue of life is inextricably linked to the question of water. So, at least indirectly, we have shown that there were once huge bodies of water on Mars," Mitrovica said by e-mail.

Scientists have named the two features suspected of being ancient shorelines Arabia and Deuteronilus. The long lines on the Martian surface rise and fall in a way resembling a sea wave.

The elevation of the Arabia shoreline changes by 1.5 miles, while the Deuteronilus shoreline varies by four-tenths of a mile.

The researchers said another important Martian geological feature -- the volcano Tharsis -- lends support to their hypothesis on polar movement.

Tharsis is so massive it would always keep itself on the spinning planet's equator, they said. They calculated that the suspected path taken by the moving poles would have preserved the volcano's equatorial position.

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