

Opinion divided on images of Martian 'ocean'

Washington

Researchers remain split on whether a large ocean — or oceans — existed on Mars some two billion years ago, when the now desert-like planet was warmer and wetter.

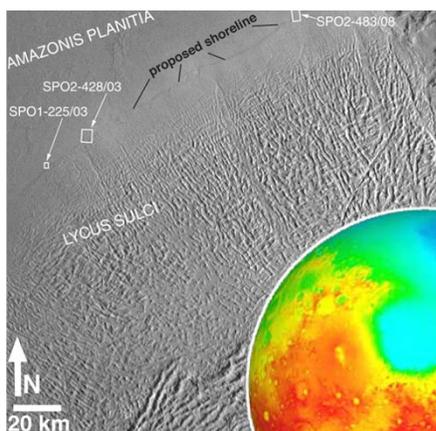
The theory has intrigued planetary scientists for a decade, ever since Timothy Parker of NASA's Jet Propulsion Laboratory discerned in Viking spacecraft images what looked like ancient coastlines bordering dried-up basins in the planet's northern lowlands.

Recent results from the Mars Global Surveyor (MGS), which is currently orbiting the planet, have provided evidence both for and against the ocean interpretation — but nothing approaching a verdict.

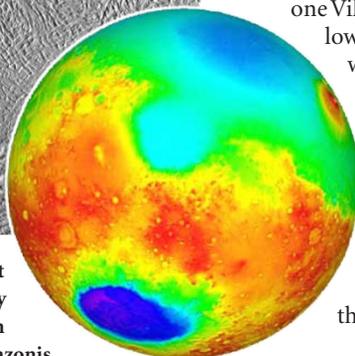
The Mars Orbiter Laser Altimeter (MOLA) on MGS, which measures topographic relief on the surface, has shown the northern lowlands to be even flatter than previously thought — as flat, in fact, as the abyssal plains beneath Earth's oceans.

While this alone proves nothing (lava flows can also be flat), the MOLA results were what might have been expected from an ocean floor. Estimates of the volume of water this basin could have held also fit neatly with estimates of the volume drained by channels still visible on the surface and the amount of water the subsurface could hold after the ocean disappeared.

Using MOLA data, James Head of Brown University, in Providence, Rhode Island, has checked different locations along the lower of Parker's two 'shorelines' ('Contact 2') and



Blue planet? The jury is out as to whether the unusually flat regions in the northern lowlands of Mars (the 'Amazonis Planitia' in the photo above, and blue at upper right) are evidence of an ancient ocean.



found them to be very nearly the same height, supporting the notion of a level ocean rim. The boundaries of this proposed sea even correlate well with a geologic unit known as Vastitas Borealis (the 'northern vastness').

But when a team at Malin Space Science Systems in San Diego examined more than a dozen high-resolution views of different sections of the purported shoreline taken by the MGS Mars Orbiter Camera, they came up empty-handed.

Michael Malin and Kenneth Edgett reported in the 1 October issue of *Geophysical Research Letters* that "none of the images that cross the proposed coasts exhibit features that could be interpreted as having an obvious or unambiguous littoral origin".

What looked like wave-cut cliffs in one Viking picture turn out to be shallow slopes. In another place, where Parker and others had drawn a boundary line for the hypothetical ocean, Malin and Edgett found nothing. But even they say that such a meagre sample cannot settle the matter. By Head's reckoning, Malin and Edgett have examined only 0.04 per cent of the mapped Contact 2.

Parker admits that the high-resolution views have been "very frustrating" so far, but has found other images from the same Mars Orbiter Camera that support the ocean hypothesis. He is combining MOLA elevation data with Viking imagery to refine his maps, while continuing to study the close-up images.

Part of the problem, according to Head, is knowing what to look for. Would Martian coastal features have been sculpted by crashing ocean waves, or by subtler processes akin to those found in terrestrial lakes? Would the surface have been liquid or ice?

The tug of gravity is different on Mars, and there is no large moon to generate strong tides. Any shoreline would probably have experienced tectonic change and two billion years of wind action. Sorting all this out, says Head, is a "long, tedious, arduous task", unlikely to yield quick answers.

Other researchers are adding pieces to the puzzle. James Garvin, of NASA's Goddard Spaceflight Center, has found that crater morphologies inside the 'ocean' basin are strikingly different from those outside it. The small, shallow craters inside the basin could be explained by ground ice or loose sediments at the impact site.

The Thermal Emission Spectrometer on MGS, which maps surface mineralogy, has found a general lack of carbonates and evaporites, not just in the northern lowlands but all over the planet. If there was an ocean on Mars, its chemistry may well have been different from the seas on Earth.

Edgett, who is unconvinced by the high-resolution pictures he has examined so far — no clear coastal landforms have emerged from the images he has studied since the October paper was published — claims to be agnostic on the subject of the Mars ocean.

But one thing is certain. Martian geology is turning out to be strange and complex. "It's really alien," he says.

Tony Reichhardt

South African telescope to go ahead

Cape Town

Ben Ngubane, South Africa's minister of arts, culture, science and technology, gave the green light last week for the construction of the Southern African Large Telescope (SALT), the largest single telescope for optical and infrared astronomy in the Southern Hemisphere.

The design of the new telescope will be based on that of the recently completed Hobby-Eberly Telescope at McDonald Observatory, in Texas, United States. The decision to authorize construction followed the signing of an agreement on science and technology between Poland and South Africa by Ngubane and his Polish counterpart, Andrzej Wiszniewski.

Poland's contribution to SALT is more than 15 million rand (US\$2.5 million), making up one third of the 45 million rand committed so far by international partners towards the telescope. The South African government has

committed 50 million rand, enabling construction of the telescope to commence next year.

"SALT will enable South Africa to remain internationally competitive in astronomy well into the twenty-first century," says Ngubane. He went on to say that the telescope's activities will range from observing some of the most distant galaxies in the Universe and studying the early evolution of the cosmos to searching for planets around neighbouring stars.

Now that formal approval has been given by the government, the project team can be recruited and the construction of the telescope, expected to take five years, can be started next year.

The telescope will be situated at Sutherland in the Northern Cape, an outstation of the South African Astronomical Observatory operated by the National Research Foundation.

Michael Cherry