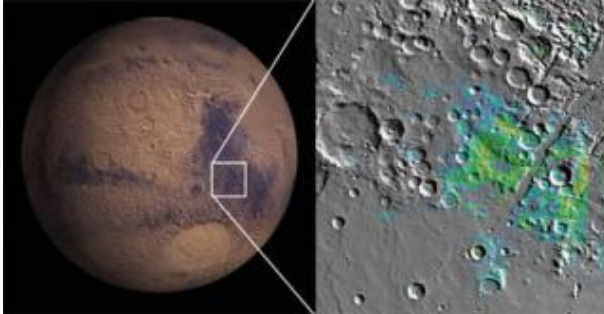


A young Mars most likely to support life, new mineral history shows



The large dark area right of center on the hemisphere view of Mars is Syrtis Major. The map shows the presence of water-bearing clay minerals identified by OMEGA data. Blue indicates small amounts and orange-red indicates large amounts.

Mars started out relatively wet and temperate, underwent a major climate shift, and evolved into a cold, dry place strewn with acidic rock – less than ideal conditions for supporting life.

This is the finding of an international team of scientists who have created the most comprehensive mineral history of Mars, a history closely linked to the presence of liquid water on the planet. According to the mineral record, created with Mars Express mission data and detailed in *Science*, Mars would only have been hospitable to life in its infancy.

"Starting about 3.5 billion years ago, conditions on Mars became increasingly dry and acidic – not a pleasant place for any form of life, even a microbe," said John Mustard, a Brown University geologist and a primary author of the *Science* paper.

If any living organisms had formed on Mars, that evidence would likely be found in clay-rich rocks and soil north of the Syrtis Major volcanic plateau, in Nili Fossae and in the Marwth Vallis Regions, the team reports.

These areas make compelling targets for future lander missions, according to Mustard, a co-investigator on the Mars Express and Mars Reconnaissance Orbiter missions. In the meantime, the Compact Reconnaissance Imaging Spectrometer for Mars, or CRISM, aboard the Mars Reconnaissance Orbiter, will in September begin beaming mineralogical data on these clay-rich regions. The images will be 20 times more precise compared with those captured by Mars Express.

"I'm eager to get the CRISM data and explore the deposits found by OMEGA, as well as discover new sites and minerals," Mustard said. "OMEGA shows that some of the most interesting sites are small – and CRISM is designed to find and characterize small deposits."

Jean-Pierre Bibring, an astrophysicist from the University of Paris, led the team of scientists from France, Italy, Russia, Germany and the United States. The investigators pieced together the mineral history using data from Mars Express, a mission launched by the European Space Agency. An instrument aboard the spacecraft dubbed OMEGA – short for Observatoire pour la Minéralogie, l'Eau, les Glaces et l'Activité – determines mineral composition from visible and infrared light reflected from the Red Planet's surface. The team used two years worth of data from OMEGA, which has mapped more than 90 percent of the planet's surface.

The team found three distinct geological eras on Mars:

-- The first era lasted from the birth of Mars, about 4.6 billion years ago, until about 4 billion years ago. The oldest rock – exposed by erosion, impact or faulting – shows the presence of clay minerals. These

minerals, such as chamosite and nontronite, need abundant water, moderate temperatures and low acidity to form.

-- The second era lasted from between 4 and 3.5 billion years ago. Minerals made during this era, such as gypsum and grey hematite, were found in Meridiani and in Valles Marineris. These rocks, traced by sulfates, mark a dramatic shift from a moist and alkaline environment to a dry, acidic one. The shift, the team concludes, was likely caused by massive volcanic eruptions that spewed sulfur into the atmosphere, which then rained back down on the planet's surface.

-- The third era began between 3.2 billion and 3.5 billion years ago and continues to the present. Minerals during this period were not formed with, or altered by, liquid water. These iron-rich minerals, dominated by ferric oxides, were found across most of the planet and reflect the cold, dry conditions that persist on Mars.

The team's analysis led them to draw an intriguing conclusion: Liquid water didn't make the Red Planet red. Instead, the team states, Mars most likely gets its glow from tiny grains of red hematite or possibly maghemite, both riddled with iron.

Source: Brown University

This document is subject to copyright. Apart from any fair dealing for the purpose of private study, research, no part may be reproduced without the written permission. The content is provided for information purposes only.