# NASA research offers new prospect of water on Mars

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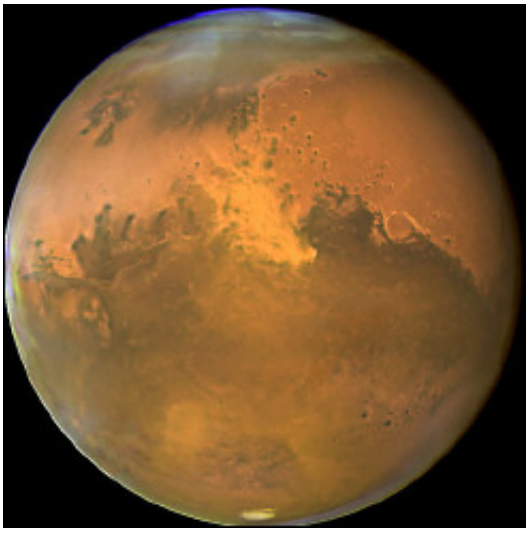

(PhysOrg.com) -- NASA scientists are seeing new evidence that suggests traces of water on Mars are under a thin varnish of iron oxide, or rust, similar to conditions found on desert rocks in California's Mojave Desert.

Mars could be spotted with many more patches of carbonates than originally suspected. Carbonates are minerals that form readily in large bodies of water and can point to a planet's wet history. Although only a few small outcrops of carbonates have been detected on Mars, scientists believe many more examples are blocked from view by the rust. The

findings appear in the Friday July 1, online edition of the International Journal of Astrobiology.

"The plausibility of life on Mars depends on whether liquid water dotted its landscape for thousands or millions of years," said Janice Bishop, a planetary scientist at NASA's Ames Research Center at the SETI Institute at Moffett Field, Calif., and the paper's lead author. "It's possible that an important clue, the presence of carbonates, has largely escaped the notice of investigators trying to learn if liquid water once pooled on the Red Planet."

Scientists conduct field experiments in desert regions because the extremely dry conditions are similar to Mars. Researchers realized the importance of the varnish earlier this year when Bishop and Chris McKay, a planetary scientist at Ames investigated carbonate rocks coated with iron oxides collected in a location called Little Red Hill in the Mojave Desert.

"When we examined the carbonate rocks in the lab, it became evident that an iron oxide skin may be hindering the search for clues to the Red Planet's hydrological history," McKay said. "We found that the varnish both altered and partially masked the spectral signature of the carbonates."

McKay also found dehydration-resistant blue-green algae under the rock varnish. Scientists believe the varnish may have extended temporarily the time that Mars was habitable, as the planet's surface slowly dried up.

"The organisms in the Mojave Desert are protected from deadly ultraviolet light by the iron oxide coating," McKay said. "This survival mechanism might have played a role if Mars once had life on the surface."

In addition to being used to help characterize Mars' water history, carbonate rocks also could be a good place to look for the signatures of early life on the Red Planet. Every mineral is made up of atoms that vibrate at specific frequencies to produce a unique fingerprint that allows scientists to accurately identify its composition.

Research data were similar to observations provided by NASA's Mars Reconnaissance Orbiter (MRO) spacecraft, as it orbited an ancient region of Mars called Nili Fossae. The area revealed the strongest carbonate signature ever found. Although MRO recently detected small patches of carbonates, approximately 200-500 feet wide, on the Martian surface, the Mojave study suggests more patches may have been overlooked because their spectral signature could have been changed by the pervasive varnish.

"To better determine the extent of carbonate deposits on Mars, and by inference the ancient abundance of liquid water, we need to investigate the spectral properties of carbonates mixed with other minerals," Bishop said.

The varnish is so widespread that NASA's Mars Exploration Rovers, Spirit and Opportunity, used a motorized grinding tool to remove the rust-like overcoat on rocks before other instruments could inspect them. In 2010, scientists using data collected by Spirit also identified a small carbonate outcrop at a crater called Gusev. NASA's newest and most capable rover, the Mars Science Laboratory Curiosity is schedule to launch in November. It will use tools to study whether the Mars had environmental conditions favorable for supporting microbial life and favorable for preserving clues about whether life existed.

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