

PLANETARY SCIENCE

Liquid Water Found on Mars, But It's Still a Hard Road for Life

Researchers appear to have finally achieved one of the Phoenix lander's primary goals. After digging through piles of data left from the mission to Mars more than 2 years ago, they've discovered signs that liquid water has lately flowed on the frigid planet.

In a paper in press in *Geophysical Research Letters*, Phoenix team members report that liquid water—probably only thin films of it—appears to have concentrated salts onto small patches of soil that Phoenix uncovered. The water may be liquid every martian spring or summer, or perhaps it only melted many millennia ago. Liquid water “seems plausible, quite reasonable,” says planetary geochemist Sushil Atreya of the University of Michigan, Ann Arbor. If so, life might—just might—be holding out a bit beneath the surface of the martian arctic.

On the face of it, Phoenix team members are merely reporting a second detection of perchlorate salts by Phoenix. The lander's mass spectrometer had found the chlorine-containing salts uniformly distributed down through the soil, a pattern that suggested there had been no liquid water to move salts around. But planetary scientist Selby Cull of Washington University in St. Louis, Missouri, and her colleagues later used observations from Phoenix's Surface Stereo Imager to map the visible and near-infrared “color” of soils exposed by the lander's robotic arm.

Cull and colleagues found a simple spectroscopic signature of magnesium or calcium perchlorates, but only in centimeter-size patches where the perchlorates had been concentrated. The only way to concentrate perchlorates that way, the group says, would be for perchlorates at the soil surface—where they settle after the ultraviolet of sunlight forms them—to dissolve in liquid water and diffuse or flow downward.

It's not entirely clear just how water could melt at the 68°N-latitude Phoenix site, which never got warmer than -28°C. Perchlorates do take up water vapor from the atmosphere, and they powerfully lower the melting point of water, but something more may have been needed.

Cull and her colleagues offer the so-called solid-state greenhouse as a possible energy source for helping to melt Phoenix ice. Thirty centimeters of frozen carbon dioxide—dry ice—freezes out of the atmosphere each winter at the Phoenix site. That's on top of a thin

layer of autumnal water frost. Come spring, the translucent dry ice can trap solar energy at its base the way a greenhouse built of glass does. Such a solid-state greenhouse is thought to fuel the carbon dioxide-driven black “spiders” that mark southern high latitudes each martian spring.



Once wet? Whitish patch (in box, above) in a Phoenix trench has spectral signs (right, red) of perchlorate salts.

But it's very hard for water to melt under dry ice that has to stay at -128°C, says planetary science consultant Hugh Kieffer of Celestial Reasonings in Genoa, Nevada. Kieffer originated the solid-state greenhouse explanation for martian spiders. It would be a stretch, Cull says, but today's summer heat might suffice. Alternatively, melting may have occurred during the warmer summers that prevailed millennia ago when Mars was tilted farther over on its axis.

Even if a briny dampness returns to the martian arctic every year, “it's not necessarily a good habitat for life,” notes astrobiologist Christopher McKay of NASA's Ames Research Center in Mountain View, California. The problem is the perchlorate brine that helps lower water's melting point. On Earth, many extremophile microbes have evolved a tolerance for high concentrations of salt, he notes, but any liquid water at the Phoenix site would be even brinier than most Earth brines (<http://scim.ag/salty-mars>). Besides confirming the perchlorate patches, then, researchers may want to figure out just how briny the waters of Mars might get.

—RICHARD A. KERR

ScienceInsider

From the *Science* Policy Blog



A battle over a **prize in the life sciences** that honors Teodoro Obiang Nguema Mbasogo, president and longtime dictator of Equatorial Guinea, has ended with the effective **cancelation of the award**. The executive board of the United Nations Educational, Scientific and Cultural Organization has adopted a diplomatic compromise that would require “consensus,” thus putting the award on indefinite hold. In an interview, an Obiang representative said the decision sends “the wrong message.” http://scim.ag/prize_kibosh
http://scim.ag/obiang_comment

Next week, citizens in Arizona will vote on Proposition 109, which includes language that gives “exclusive authority” to lawmakers over hunting, fishing, and “harvesting wildlife.” The broad wording of the measure has some fearing that its passage would remove the central **role of government scientists in wildlife management** there. Others say the measure's requirement of “reasonable” rules will protect the process should it pass. http://scim.ag/AZ_prop109

An anonymous, self-described “**stem cell research** watch group” has sent e-mails to prominent stem cell researchers, scientific journals, and reporters raising spurious accusations of scientific misconduct in two papers. <http://scim.ag/spurious-claims>

The death of Bob Guccione, the founder of *Penthouse* magazine, invoked memories of his investments in **fusion energy research** and in *Omni*, a science and science-fiction magazine published in the 1980s and '90s. http://scim.ag/Gucc_fusion

The University of Virginia and Ken Cuccinelli, the state's attorney general, continue to wrangle over **documents related to Michael Mann**, a climate scientist who worked at the school until 2005. In the latest twist, the university has challenged a third request for documents—the first two were thrown out by a state judge—as too broad. Cuccinelli says the documents are needed to investigate possible fraud on grant proposals. http://scim.ag/Cuccinellis_saga

For more science policy news, visit <http://news.sciencemag.org/scienceinsider>.