Phoenix Mars Lander is Silent, New Image Shows Damage

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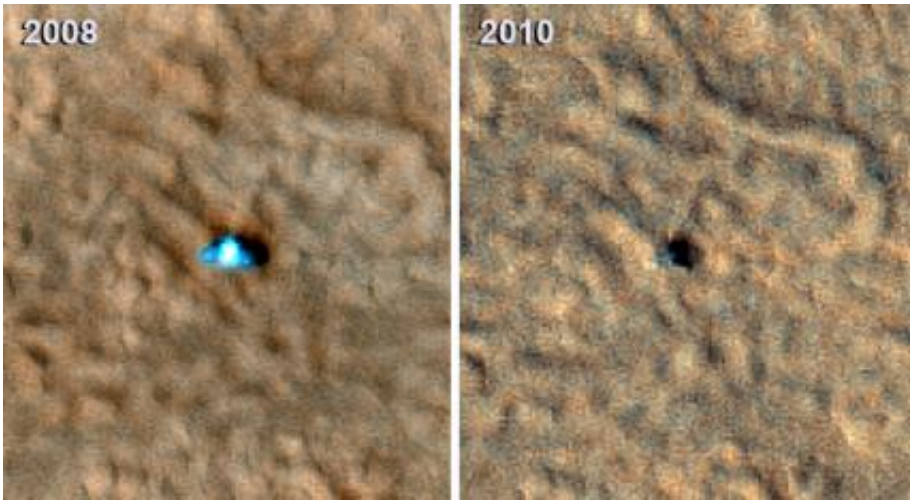

Two images of the Phoenix Mars lander taken from Martian orbit in 2008 and 2010. The 2008 lander image (left) shows two relatively blue spots on either side corresponding to the spacecraft's clean circular solar panels. In the 2010 (right) image scientists see a dark shadow that could be the lander body and eastern solar panel, but no shadow from the western solar panel. Image Credit: NASA/JPL-Caltech/University of Arizona

(PhysOrg.com) -- NASA's Phoenix Mars Lander has ended operations after repeated attempts to contact the spacecraft were unsuccessful. A new image transmitted by NASA's Mars Reconnaissance Orbiter shows signs of severe ice damage to the lander's solar panels.

"The Phoenix spacecraft succeeded in its investigations and exceeded its

planned lifetime," said Fuk Li, manager of the Mars Exploration Program at NASA's Jet Propulsion Laboratory in Pasadena, Calif. "Although its work is finished, analysis of information from Phoenix's science activities will continue for some time to come."

Last week, NASA's Mars Odyssey orbiter flew over the Phoenix landing site 61 times during a final attempt to communicate with the lander. No transmission from the lander was detected. Phoenix also did not communicate during 150 flights in three earlier listening campaigns this year.

Earth-based research continues on discoveries Phoenix made during summer conditions at the far-northern site where it landed May 25, 2008. The solar-powered lander completed its three-month mission and kept working until sunlight waned two months later.

Phoenix was not designed to survive the dark, cold, icy winter. However, the slim possibility Phoenix survived could not be eliminated without listening for the lander after abundant sunshine returned.

An image of Phoenix taken this month by the High Resolution Imaging Science Experiment, or HiRISE, camera on board the Mars Reconnaissance Orbiter suggests the lander no longer casts shadows the way it did during its working lifetime.

"Before and after images are dramatically different," said Michael Mellon of the University of Colorado in Boulder, a science team member for both Phoenix and HiRISE. "The lander looks smaller, and only a portion of the difference can be explained by accumulation of dust on the lander, which makes its surfaces less distinguishable from surrounding ground."

Apparent changes in the shadows cast by the lander are consistent with

predictions of how Phoenix could be damaged by harsh winter conditions. It was anticipated that the weight of a carbon-dioxide ice buildup could bend or break the lander's solar panels. Mellon calculated hundreds of pounds of ice probably coated the lander in mid-winter.

During its mission, Phoenix confirmed and examined patches of the widespread deposits of underground water ice detected by Odyssey and identified a mineral called calcium carbonate that suggested occasional presence of thawed water. The lander also found soil chemistry with significant implications for life and observed falling snow. The mission's biggest surprise was the discovery of perchlorate, an oxidizing chemical on Earth that is food for some microbes and potentially toxic for others.

"We found that the soil above the ice can act like a sponge, with perchlorate scavenging water from the atmosphere and holding on to it," said Peter Smith, Phoenix principal investigator at the University of Arizona in Tucson. "You can have a thin film layer of water capable of being a habitable environment. A micro-world at the scale of grains of soil -- that's where the action is."

The perchlorate results are shaping subsequent astrobiology research, as scientists investigate the implications of its antifreeze properties and potential use as an energy source by microbes. Discovery of the ice in the uppermost soil by Odyssey pointed the way for Phoenix. More recently, the Mars Reconnaissance Orbiter detected numerous ice deposits in middle latitudes at greater depth using radar and exposed on the surface by fresh impact craters.

"Ice-rich environments are an even bigger part of the planet than we thought," Smith said. "Somewhere in that vast region there are going to be places that are more habitable than others."

The Mars Reconnaissance Orbiter reached the planet in 2006 to begin a

two-year primary science mission. Its data show Mars had diverse wet environments at many locations for differing durations during the planet's history, and climate-change cycles persist into the present era. The mission has returned more planetary data than all other Mars missions combined.

Odyssey has been orbiting Mars since 2001. The mission also has played important roles by supporting the twin Mars rovers Spirit and Opportunity.

Provided by JPL/NASA