Mars Lander Sees Falling Snow, Soil Data Suggest Liquid Past

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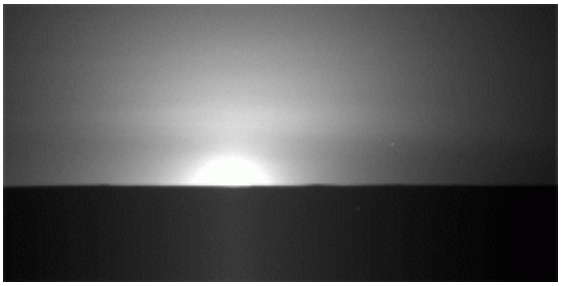

This sequence of nine images taken by the Surface Stereo Imager on NASA's Phoenix Mars Lander shows the sun rising on the morning of the lander's 101st Martian day after landing. The images were taken on Sept. 5, 2008. The local solar times at the landing site for the nine images were between 1:23 a.m. and 1:41 a.m. The landing site is on far-northern Mars, and the mission started in late northern spring. For nearly the entire first 90 Martian days of the mission, the sun never set below the horizon. As the amount of sunshine each day declined steadily after that, so has the amount of electricity available for the solar-powered spacecraft. The Phoenix Mission is led by the University of Arizona, Tucson, on behalf of NASA. Project management of the mission is by JPL, Pasadena, Calif. Spacecraft development was by Lockheed Martin Space Systems, Denver. Image: NASA/JPL-Caltech/University of Arizona/Texas A&M University

(PhysOrg.com) -- NASA's Phoenix Mars Lander has detected snow falling from Martian clouds. Spacecraft soil tests experiments also have provided evidence of past interaction between minerals and liquid water, processes that occur on Earth.

A laser instrument designed to gather knowledge of how the atmosphere and surface interact on Mars, detected snow from clouds about 2.5 miles above the spacecraft's landing site. Data show the snow vaporizing before reaching the ground.

"Nothing like this view has ever been seen on Mars," said Jim Whiteway, of York University, Toronto, lead scientist for the Canadian-supplied Meteorological Station on Phoenix. "We'll be looking for signs that the snow may even reach the ground."
Phoenix experiments also yielded clues pointing to calcium carbonate, the main composition of chalk, and particles that could be clay. Most carbonates and clays on Earth form only in the presence of liquid water.

"We are still collecting data and have lots of analysis ahead, but we are making good progress on the big questions we set out for ourselves," said Phoenix Principal Investigator Peter Smith of the University of Arizona, Tucson.

Since landing on May 25, Phoenix already has confirmed that a hard subsurface layer at its far-northern site contains water-ice. Determining whether that ice ever thaws would help answer whether the environment there has been favorable for life, a key aim of the mission.

The evidence for calcium carbonate in soil samples from trenches dug by the Phoenix robotic arm comes from two laboratory instruments called the Thermal and Evolved Gas Analyzer, or TEGA, and the wet chemistry laboratory of the Microscopy, Electrochemistry and Conductivity Analyzer, or MECA.

"We have found carbonate," said William Boynton of the University of Arizona, lead scientist for the TEGA. "This points toward episodes of interaction with water in the past."

The TEGA evidence for calcium carbonate came from a high-temperature release of carbon dioxide from soil samples. The temperature of the release matches a temperature known to decompose calcium carbonate and release carbon dioxide gas, which was identified by the instrument's mass spectrometer.

The MECA evidence came from a buffering effect characteristic of calcium carbonate assessed in wet chemistry analysis of the soil. The measured concentration of calcium was exactly what would be expected for a solution buffered by calcium carbonate.

Both TEGA, and the microscopy part of MECA have turned up hints of a clay-like substance. "We are seeing smooth-surfaced, platy particles with the atomic-force microscope, not inconsistent with the appearance of clay particles," said Michael Hecht, MECA lead scientist at NASA's Jet Propulsion Laboratory in Pasadena, Calif.

The Phoenix mission, originally planned for three months on Mars, now is in its fifth month. However, it faces a decline in solar energy that is expected to curtail and then end the lander's activities before the end of the year. Before power ceases, the Phoenix team will attempt to activate a microphone on the lander to possibly capture sounds on Mars.

"For nearly three months after landing, the sun never went below the horizon at our landing site." said Barry Goldstein, JPL Phoenix project manager. "Now it is gone for more than four hours each night, and the output from our solar panels is dropping each week. Before the end of October, there won't be enough energy to keep using the robotic arm."

Provided by NASA