Phoenix Lander Digs and Analyzes Soil as Darkness Gathers

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This false-color image shows color variations of the trench, informally named "La Mancha," and reveals the ice layer beneath the soil surface. Image credit: NASA/JPL-Caltech/University of Arizona/Texas A&M University

(PhysOrg.com) -- As fall approaches Mars' northern plains, NASA's Phoenix Lander is busy digging into the Red Planet's soil and scooping it into its onboard science laboratories for analysis.

Over the past two weeks, Phoenix's nearly 2.4-meter-long (8 feet) arm moved a rock, nicknamed "Headless," about 0.4 meters (16 inches), and snapped an image of the rock with its camera. Then, the robotic arm scraped the soil underneath the rock and delivered a few teaspoonfuls of soil onto the lander's optical and atomic-force microscopes. These microscopes are part of Phoenix's Microscopy, Electrochemistry and Conductivity Analyzer (MECA).

Scientists are conducting preliminary analysis of this soil, nicknamed "Galloping Hessian." The soil piqued their interest because it may contain a high concentration of salts, said Diana Blaney, a scientist on the Phoenix mission with NASA's Jet Propulsion Laboratory, Pasadena, Calif.

As water evaporates in arctic and arid environments on Earth, it leaves behind salt, which can be found under or around rocks, Blaney said. "That's why we wanted to look under 'Headless,' to see if there's a higher concentration of salts there."

More digging is underway. Phoenix scientists want to analyze a hard, icy layer beneath the Martian soil surface, and excavating to that icy layer underneath a rock might give scientists clues about processes affecting the ice.

So the robotic arm has dug into a trench called "La Mancha," in part to see how deep the Martian ice table is. The Phoenix team also plans to dig a trench laterally across some of the existing trenches in hopes of revealing a cross section, or profile, of the soil's icy layer.

"We'd like to see how the ice table varies around the workspace with the different topography and varying surface characteristics such as different rocks and soils," said Phoenix co-investigator Mike Mellon of the University of Colorado, Boulder. "We hope to learn more about how the ice depth is controlled by physical processes, and by looking at how the ice depth varies, we can pin down how it got there."

Over the weekend, on the 128th Martian day, or sol, Phoenix engineers successfully directed the robotic arm to dig in a trench called "Snow White" in the eastern portion of the lander's digging area. The robotic arm then delivered the material to an oven screen on Phoenix's Thermal and Evolved-Gas Analyzer.

The Phoenix team will try to shake the oven screen so the soil can break into smaller lumps and fall through for analysis.

The Phoenix lander, originally planned for a three-month mission on Mars, is now in its fifth month. As fall approaches, the lander's weather instruments detect diffuse clouds above northern Mars, and temperatures are getting colder as the daylight hours wane.

Consequently, Phoenix faces an increasing drop in solar energy as the sun falls below the Martian horizon. Mission engineers and scientists expect this power decline to curtail activities in the coming weeks. As darkness deepens, Phoenix will primarily become a weather station and will likely cease all activity by the end of the year.

Provided by NASA