Two Mars Rovers Advenrure: No Lakes Found So Far

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Scientific findings from the NASA rover Spirit's first three months on Mars will be published Friday, marking the start of a flood of peer-reviewed discoveries in scientific journals from the continuing two-rover adventure.

Researchers using Spirit's toolkit of geological instruments from early January into April read the record from rocks and soils in the rover's landing area and found a history of volcanic blanketing, impact cratering, wind effects and possible past episodes of scant underground liquid water. Evidence for the water comes from mineral alteration in the veins, inclusions and coatings of some rocks. Eleven reports with 120 collaborating authors from around the world lay out details in the Aug. 6 issue of the journal Science.

"This is the first batch," said Dr. Steve Squyres of Cornell University, Ithaca, N.Y., principal investigator for the science payload on both Mars Exploration Rovers. "You'll be seeing a lot more publications in months ahead and, no doubt, for many years to come based on information from Spirit and Opportunity. These machines just keep going and going, so the science just keeps coming and coming." Dr. Jim Garvin, NASA's Chief Scientist for Mars added, "This is the basis for beginning the remarkable scientific legacy of the rovers that will not only rewrite our textbooks about Mars, but also pave the way for human exploration."

The rovers completed three-month primary missions in April, then began bonus exploration in extended science missions. "Spirit and Opportunity have really done yeoman's work, still operating after more than twice as long as their original assignments. We don't know how much longer they'll keep working, but while they do we promise to keep them busy," said Jim Erickson, project manager at NASA's Jet Propulsion Laboratory, Pasadena, Calif.

Both rovers were equipped and targeted to collect evidence about past environmental history, especially any history of liquid water, since life as we know it depends on water. Spirit is exploring inside Gusev Crater, an ancient Connecticut-sized impact basin that was selected as a landing site because it may have once held a giant lake fed by flows of water though a large valley that empties into the crater.

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Dr. John Grant of the National Air and Space Museum, Washington, and co-authors report that the rocks on the plain that Spirit explored during its primary mission increased about fivefold in maximum size as the rover got closer to an old 210-meter (690-foot-wide) impact crater. The impact that excavated the crater brought volcanic rocks to the surface from as deep as 10 meters (33 feet). Several papers give evidence that rocks in the area are a volcanic type called basalt and bear the mineral olivine. These include reports by Cornell's Dr. Jim Bell with collaborators using Spirit's panoramic camera and by Dr. Dick Morris of NASA Johnson Space Center, Houston, with collaborators using the Moessbauer spectrometer. Dr. Hap McSween of the University of Tennessee, Knoxville, and co-authors state, "These basalts extend the known range of rock compositions comprising the martian crust."

Dr. Ken Herkenhoff of Flagstaff, Ariz., offices of the U.S. Geological Survey and other scientists using Spirit's microscopic imager offer findings that rocks cut into by the rover's rock abrasion tool have coatings and bright veins apparently from mineral alteration after the rocks formed. Dr. Ralf Gellert of Max-Planck-Insitut-fur-Chemie in Mainz, Germany, and other users of Spirit's alpha-particle X-ray spectrometer report that bromine in the veins suggests the alteration resulted from exposure to water. Dr. Phil Christensen of Arizona State University, Tempe, and collaborators using Spirit's miniature thermal emission spectrometer say the rock's coatings are consistent with exposure to moisture while buried. Dr. Ray Arvidson of Washington

University, St. Louis, and co-authors describe cohesive texture in soils and rock coatings, which they suggest could result from brief moist periods in the past.

Magnet experiments indicate almost all sampled dust particles in Mars' atmosphere contain magnetic minerals, according to a paper by Dr. Preben Bertelsen of the Niels Bohr Institute, Copenhagen, Denmark, and others. Dr. Ron Greeley of Arizona State University and co-authors found that winds from the northwest grooved some rock surfaces and shaped sand ripples in the past. They report that the way rock dust accumulates during grinding by Spirit's rock abrasion tool shows that wind still comes from the same direction.

JPL, a division of the California Institute of Technology in Pasadena, manages the Mars Exploration Rover project for NASA's Science Mission Directorate, Washington. Images and additional information about the project are available from JPL at marsrovers.jpl.nasa.gov and from Cornell University, Ithaca, N.Y., at athena.cornell.edu.