

MAGS EXPLORER



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Look out Mars, here we come!

MIKE BALDWIN-It seems that every space-exploring country in the world is going to visit Mars in 2004. The United States will have two rovers on the red planet in January 2004. Spirit will land first and Opportunity will follow in just a few days. Since you are interested in geology, I thought you might be interested in what these rovers are going to be doing on Mars. Read on to find out for yourself.

Mars Rovers Head for Exciting Landings in January

NASA's robotic Mars geologist, *Spirit*, must complete a demanding set of challenges before it can start examining the red planet. *Spirit's* twin Mars Exploration Rover, *Opportunity*, also faces tough martian challenges. If they pass the first challenge [landing on Mars] we can gain a lot of knowledge about how planets work.

Spirit is the first of two golf-cart-sized rovers headed for Mars landings in January. The rovers will try to find out whether the environment in two areas of Mars might have once been capable of supporting



life. Engineers at NASA's Jet Propulsion Laboratory, Pasadena, Calif., have navigated *Spirit* to arrive during the evening of January 3, 2004. That's a Saturday night, so be sure and check the Sunday morning paper for any news of the arrival of *Spirit*.

Spirit will land near the center of Gusev Crater, which may have once held a lake at one time. Three weeks later, *Opportunity* will reach the Meridiani Planum, a region containing exposed deposits of a mineral that usually forms under watery conditions.

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Martian Rovers . . . continued from page one

NASA has already cleared two big hurdles for these rovers [building them and successfully launching them]. Now the rovers face the third challenge [getting them safely onto the ground of Mars].

Since their launches on June 10 and July 7 respectively, each rover has been flying tucked inside a folded-up lander. The lander is wrapped in deflated airbags, cocooned within a protective aeroshell and attached to a cruise stage that provides solar panels, antennas and steering for the seven month journey to Mars.

Spirit will cast off its cruise stage 15 minutes before hitting the top of the martian atmosphere at 12,000 miles per hour. Friction during the next four minutes will heat part of the aeroshell to about 2,600° F and slow the craft down to about 960 miles per hour. Less than two minutes before landing, the spacecraft will open its parachute.

Twenty seconds later, it will jettison the bottom half of its aeroshell, exposing the lander. The top half of the shell, still riding the parachute, will lower the lander on a rope-like tether. In the final six seconds, airbags will inflate, retro rockets on the upper shell will fire, and the tether will be cut about 49 feet above the ground.

Several bounces and rolls could take the airbag-cushioned lander about 0.6 mile from where it first lands. If any of the initial few bounces hits a big rock that's too sharp, or if the spacecraft doesn't complete each task at just the right point during the descent, the mission could be over. More than half of all the missions launched to Mars have failed.

Landing safely is the first step for three months of Mars exploration by each rover. Before rolling off its lander, each rover will spend a week or more unfolding itself, rising to full height, and scanning surroundings. *Spirit* and *Opportunity* each weigh about 17 times as much as the *Sojourner* rover of the 1997 *Mars Pathfinder* mission. They are big enough to roll right over obstacles nearly as tall as *Sojourner*.

Spirit and *Opportunity* are robotic field geologists. They will look around with a stereo, color camera and with an infrared instrument that can classify rock types from a distance. They go to the rocks that seem most interesting. When they get to one, they reach out with a robotic arm that has a handful of tools, a microscope, two instruments for identifying what the rock is made of, and a grinder for getting to a fresh, unweathered surface inside the rock.

For information about the Mars Exploration Rover project on the Internet, visit <http://mars.jpl.nasa.gov/mer>

Reference:

Guy Webster [Jet Propulsion Laboratory, Pasadena, Calif.]; Donald Savage [NASA Headquarters, Washington D.C.]; <http://info.jpl.nasa.gov>; News Release: 2003-158; December 2, 2003.

Happy Holidays to you and your family!