News Release

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THEY JUST KEEP GOING AND GOING AND GOING: MARS ROVERS APPROACH FIVE YEARS OF EXPLORATION

When it was first conceived, the plan for NASA's Mars Explorer Rover mission was rather bold: to rocket a pair of solar-powered robots to the surface of the Red Planet and collect data for approximately three months – the expected lifetime of the robots.

Bold though it was, scientists got a lot more than they bargained for.

The *Spirit* rover reached the surface of Mars on Jan. 4, 2004, in a region that appeared to be a long dead lakebed. *Spirit*'s twin, *Opportunity*, touched down on the opposite side of the planet three weeks later, on Jan. 24, 2004 – unexpectedly landing in an ancient crater. Scientists were eager to use their three-month window to learn as much about the geologic history of Mars as possible. However, three months came and went, and the pair of robots continued to function. This month marks the five-year anniversary of their touchdown, and both rovers are still going strong.

"They were just designed really well," said William Farrand, a research scientist with the *Space Science Institute* in Boulder, Colo. and one of the scientists who has collected Martian data using both rovers. "And there's an excellent team of engineers that have kept them from getting any grievous injury that would disable them."

Farrand has worked extensively with the panoramic cameras mounted on each of the rovers since they landed safely on the surface. More than just taking snapshots of the Martian landscape, the Pancam – as the scientists call it – is able to look at the robot's surroundings in a variety of electromagnetic wavelengths. This has allowed the rovers to identify the mineral composition of their respective landing sites.

"We found evidence of Mars' history in which water was much more abundant," Farrand said. "Some of the sediments we located were deposited by actual flowing water at one time."

Both *Spirit* and *Opportunity* found evidence of a Martian past replete with liquid water, even though they were deposited on opposite sides of the planet, he said.

According to Farrand, the extended lifetime of the robots has provided hundreds of opportunities for scientific discovery that would otherwise have been impossible.

The *Opportunity* rover, for example, after investigating the crater it landed in – dubbed "Eagle crater" by scientists – drove 800 m to a 150 m diameter crater "Endurance," after exploring that crater for 6 months, *Opportunity* trekked about 6 kilometers to another large crater – called "Victoria crater." With a top speed of only about 50 mm per second, the entire trip took one year and ten months, and would never have happened had the robot only lasted until its life expectancy was reached.

Although *Opportunity* and *Spirit* are still communicating with ground control and collecting valuable data about Mars' past, both are getting old and eccentric.

"Both recently managed to survive a huge dust storm," Farrand said. "But they're showing signs of aging."

Well into *Spirit*'s mission, one of its front wheels stopped working, according to Farrand. Now the rover is forced to drive backwards, dragging its dead leg behind it. Although this has been somewhat troublesome for scientists, it has also allowed them to investigate the shallow trenches that the wheel now inadvertently digs into the ground – uncovering soil deposits altered by the action of water.

Similarly, *Opportunity* has dealt with ongoing problems with its robotic arm, in addition to other minor quirks.

Despite these struggles, scientists are optimistic about the pair's future.

"I think we can get another couple of years out of them, hopefully," Farrand said.

Next on the table for the durable robots from Earth will be analyzing what might be an ancient spring, for *Spirit*, and a two-year journey to the massive "Endeavor crater" for *Opportunity*, which started this past November.

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