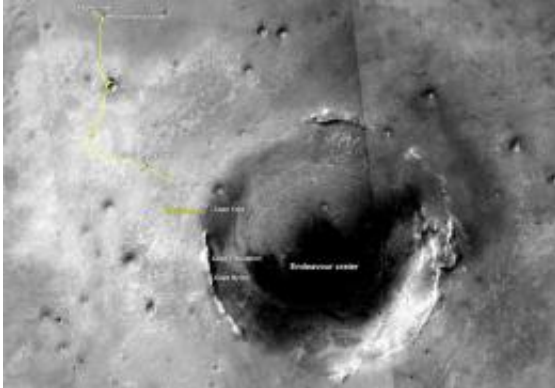


Opportunity runs the first martian marathon

July 19 2012, By Dauna Coulter



The Martian marathon route.

With all the fanfare about Mars rover Curiosity landing on the Red Planet in August 2012, it's easy to forget that there's already a rover on Mars—an older, smaller cousin set to accomplish a feat unprecedented in the history of Solar System exploration.

Mars [rover](#) Opportunity is on track to complete the first extraterrestrial marathon.

A marathon is 26.2 miles. When Opportunity landed on Mars in 2004, NASA's goal was to have the rover travel a meager 600 meters. However, no one knew what kind of “runner” Opportunity would turn out to be. As of July 2012, Opportunity has traveled almost 22 miles – only 4.2 miles short of a full marathon.

Runner-author Hal Higdon once said, "The marathon never ceases to be a race of joy, a race of wonder." That goes double for a marathon on another world where every mile promises a new discovery.

Opportunity's prime mission is to search for signs of ancient water. Today the [Red Planet](#) is a bone-dry desert with a breathtakingly thin atmosphere, conditions deadly to almost every known form of life on Earth. Billions of years ago, however, things might have been different. Many researchers believe that Mars was warmer, wetter, and friendlier to Martian life. Opportunity's job is to search for clues to that ancient time.

Just getting to the starting line was epic: "This particular marathoner had to fly about 283 million miles across space before being unceremoniously drop-bounced on the Martian surface," says Ray Arvidson, Mars Exploration Rover Mission deputy principal investigator.

Like many long-distance runners, Opportunity likes to "take it slow." On a typical drive day, the rover travels only 50 to 100 meters. This gives the rover time to pause and look for the unknown. It also allows Opportunity to take plenty of photos along the way. Recently the rover sent home its 100,000th image, a stunning [panorama](#).

Opportunity first uncovered signs of water in deposits near the landing site in Eagle Crater. There were rocks that seemed to have formed in an ancient shallow lake. Over the next four years, Opportunity scavenged ever larger and deeper craters, finding more evidence of wet periods. Indications were, however, that the ancient lake water might have been too acidic for life.

The metallic marathoner soon set its sights on Endeavour Crater – an enormous pit 14 miles wide and hundreds of meters deep. Endeavour's

depth would offer a look farther back into the history of Mars, to a time when the water was possibly less acidic. The marathon route crossing Mars' Meridiani plain to Endeavor was a daring trek —with no aid stations anywhere.

Raging dust storms reduced the rover's solar power so much that Opportunity almost entered the "sleep of death"; soft, sandy, wind-blown ripples trapped the rover's wheels, and there was an injury: A failure in Opportunity's right front steering actuator made running forward tricky. Ever resourceful, the rover ran part of its race backwards.

"The course took Opportunity over sedimentary bedrock made of magnesium, iron, and calcium sulfate minerals -- further indications of water billions of years ago," says Arvidson.

When the marathoner reached Endeavour Crater in August 2011, things got interesting.

"Endeavor is surrounded by fractured sedimentary rock, and the cracks are filled with gypsum. Gypsum forms when ground water comes up and fills cracks in the ground, depositing hydrated calcium sulfate. This is the best evidence we've ever found for liquid water on Mars."

The gypsum veins were likely formed in conditions more pH-neutral and possibly more hospitable to life: Jackpot!

But this marathoner isn't done. [Opportunity](#) is doing so well that 26.2 miles might not be the finish line after all.

"We have no plans to stop running," says Arvidson.

Extraterrestrial *ultra*-marathon anyone?

This is a video version of the story.

Source: Science@NASA

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