

# Rover Opportunity wrapping up study of Martian valley

June 15 2016, by Guy Webster

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Credit: NASA/JPL-Caltech/Cornell Univ./Arizona State Univ.

"Marathon Valley," slicing through a large crater's rim on Mars, has provided fruitful research targets for NASA's Opportunity rover since July 2015, but the rover may soon move on.

Opportunity recently collected a sweeping panorama from near the western end of this east-west valley. The vista shows an area where the mission investigated evidence about how water altered the ancient rocks and, beyond that, the wide floor of Endeavour Crater and the crater's eastern rim about 14 miles (22 kilometers) away.

Marathon Valley lured the mission because researchers using NASA's

Mars Reconnaissance Orbiter had mapped water-related clay minerals at this area of the western rim of Endeavour Crater. The [rover](#) team chose the valley's informal name because Opportunity's arrival at this part of the rim coincided closely with the rover surpassing marathon-footrace distance in total driving since its January 2004 Mars landing.

"We are wrapping up our last few activities in Marathon Valley and before long we'll drive away, exiting along the southern wall of the valley and heading southeast," said Opportunity Principal Investigator Steve Squyres, of Cornell University, Ithaca, New York.

As Opportunity examined the clay-bearing rocks on the valley floor that were detected from orbit, the rover's own observations of the valley's southern flank revealed streaks of red-toned, crumbly material. The science team chose to investigate this apparently weathered material. The rover approached exposures of it to prepare for using the Rock Abrasion Tool, called the RAT. This tool grinds away a rock's surface to expose the interior for inspection.



"Marathon Valley" on Mars opens to a view across Endeavour Crater in this enhanced-color version of a scene from the Pancam of NASA's Mars Exploration Rover Opportunity. The scene merges many exposures taken during

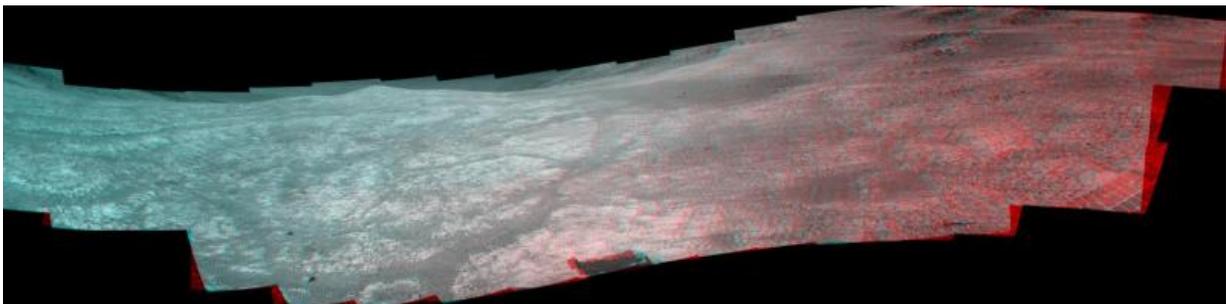
April and May 2016. The foreground shows the fractured texture of the valley.  
Credit: NASA/JPL-Caltech/Cornell Univ./Arizona State Univ.

"What we usually do to investigate material that's captured our interest is find a bedrock exposure of it and use the RAT," Squyres said. "What we didn't realize until we took a close-enough look is that this stuff has been so pervasively altered, it's not bedrock. There's no solid bedrock you could grind with the RAT."

Instead, the rover exposed some fresh surfaces for inspection by scuffing some of the reddish material with a wheel.

Squyres said, "In the scuff, we found one of the highest sulfur contents that's been seen anywhere on Mars. There's strong evidence that, among other things, these altered zones have a lot of [magnesium sulfate](#). We don't think these altered zones are where the clay is, but magnesium sulfate is something you would expect to find precipitating from water.

"Fractures running through the bedrock, forming conduits through which water could flow and transport soluble materials, could alter the rock and create the pattern of red zones that we see."



"Marathon Valley" on Mars opens northeastward in this stereo version of a scene from the Pancam of NASA's Mars Exploration Rover Opportunity. The scene, recorded in April and May 2016, appears three-dimensional when seen through blue-red glasses with the red lens on the left. Credit: NASA/JPL-Caltech/Cornell Univ./Arizona State Univ.

Provided by Jet Propulsion Laboratory

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