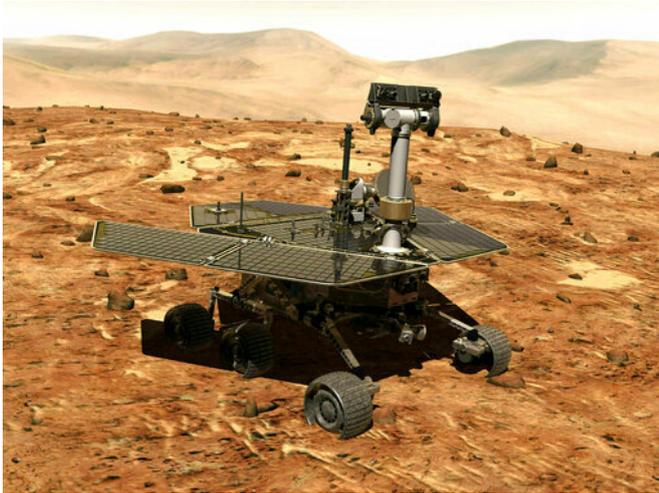


# NASA rover finally bites the dust on Mars after 15 years

13 February 2019, by Marcia Dunn



This illustration made available by NASA shows the rover Opportunity on the surface of Mars. The exploratory vehicle landed on Jan. 24, 2004, and logged more than 28 miles (45 kilometers) before falling silent during a global dust storm in June 2018. There was so much dust in the Martian atmosphere that sunlight could not reach Opportunity's solar panels for power generation. (NASA via AP)

NASA's Opportunity, the Mars rover that was built to operate for just three months but kept going and going, rolling across the rocky red soil, was pronounced dead Wednesday, 15 years after it landed on the planet.

The six-wheeled vehicle that helped gather critical evidence that ancient Mars might have been hospitable to life was remarkably spry up until eight months ago, when it was finally doomed by a ferocious dust storm.

Flight controllers tried numerous times to make contact, and sent one final series of recovery commands Tuesday night, along with one last wake-up song, Billie Holiday's "I'll Be Seeing You," in a somber exercise that brought tears to team

members' eyes. There was no response from space, only silence.

Thomas Zurbuchen, head of NASA's science missions, broke the news at what amounted to a funeral at the space agency's Jet Propulsion Laboratory in Pasadena, California, announcing the demise of "our beloved Opportunity."

"This is a hard day," project manager John Callas said at an auditorium packed with hundreds of current and former members of the team that oversaw Opportunity and its long-deceased identical twin, Spirit. "Even though it's a machine and we're saying goodbye, it's still very hard and very poignant, but we had to do that. We came to that point."



This photo made available by NASA on Aug. 6, 2004, shows sand dunes less than 1 meter (3.3 feet) high in the "Endurance Crater" on the planet Mars, seen by the Opportunity rover. (NASA/JPL/Cornell via AP)

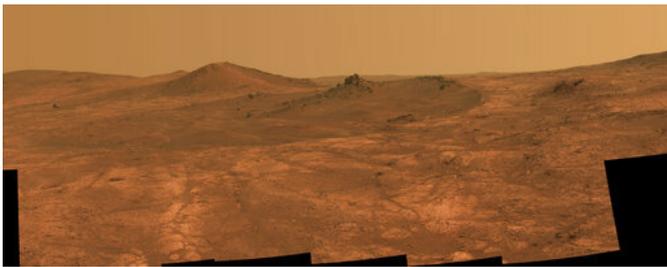
The two slow-moving, golf cart-size rovers landed on opposite sides of the planet in 2004 for a mission meant to last 90 sols, or Mars days, which are 39 minutes longer than Earth days.

In the end, Opportunity outlived its twin by eight years and set endurance and distance records that

could stand for decades. Trundling along until communication ceased last June, Opportunity roamed a record 28 miles (45 kilometers) and worked longer than any other lander in the history of space exploration.

Opportunity was a robotic geologist, equipped with cameras and instruments at the end of a mechanical arm for analyzing rocks and soil. Its greatest achievement was discovering, along with Spirit, evidence that ancient Mars had water flowing on its surface and might have been capable of sustaining microbial life.

Project scientist Matthew Golombek said these rover missions are meant to help answer an "almost theological" question: Does life form wherever conditions are just right, or "are we really, really lucky?"



This composite of March 2015 photos made available by NASA shows a shallow crater called Spirit of St. Louis, about 110 feet (34 meters) long and about 80 feet (24 meters) wide, with a floor slightly darker than surrounding terrain. The rocky feature toward the far end of the crater is about 7 to 10 feet (2 to 3 meters) tall, rising higher than the crater's rim. (NASA/JPL-Caltech/Cornell University/Arizona State University via AP)

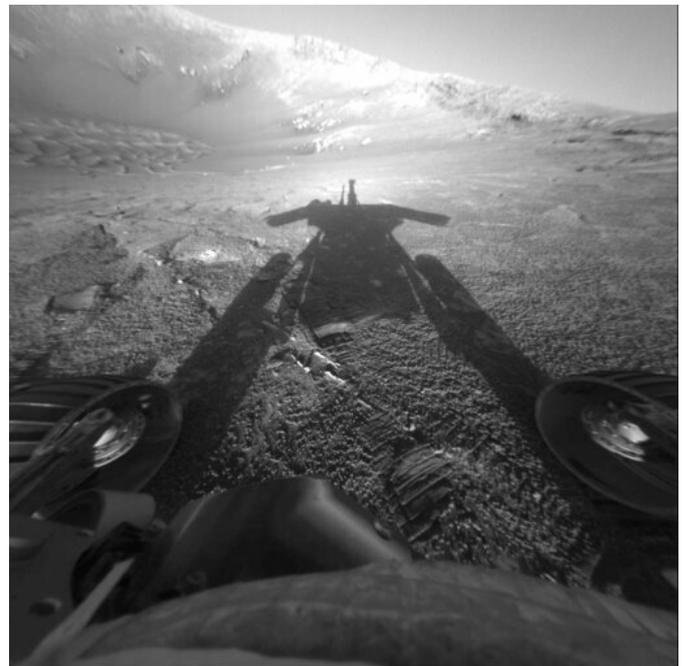
The twin vehicles also pioneered a way of exploring the surface of other planets, said Lori Glaze, acting director of planetary science for NASA.

She said the rovers gave us "the ability to actually roll right up to the rocks that we want to see. Roll up to them, be able to look at them up close with a microscopic imager, bang on them a little bit, shake them up, scratch them a little bit, take the

measurements, understand what the chemistry is of those rocks and then say, 'Oh, that was interesting. Now I want to go over there.'"

Opportunity was exploring Mars' Perseverance Valley, fittingly, when the fiercest dust storm in decades hit and contact was lost. The storm was so intense that it darkened the sky for months, preventing sunlight from reaching the rover's solar panels.

When the sky finally cleared, Opportunity remained silent, its internal clock possibly so scrambled that it no longer knew when to sleep or wake up to receive commands. Flight controllers sent more than 1,000 recovery commands, all in vain.



This July 26, 2004 photo made available by NASA shows the shadow of the Mars Exploration Rover Opportunity as it traveled farther into Endurance Crater in the Meridiani Planum region of Mars. (NASA/JPL-Caltech via AP)

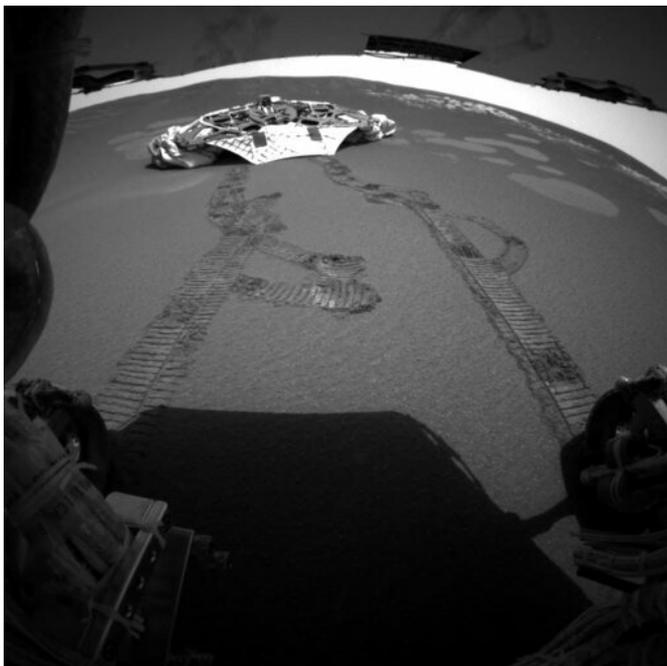
With project costs reaching about \$500,000 a month, NASA decided there was no point in continuing.

Callas said the last-ditch attempt to make contact

the night before was a sad moment, with tears and a smattering of applause when the operations team signed off. He said the team members didn't even bother waiting around to see if word came back from space—they knew it was hopeless.

Scientists consider this the end of an era, now that Opportunity and Spirit are both gone.

Opportunity was the fifth of eight spacecraft to successfully land on Mars, all belonging to NASA. Only two are still working: the nuclear-powered Curiosity rover, prowling around since 2012, and the recently arrived InSight, which just this week placed a heat-sensing, self-hammering probe on the dusty red surface to burrow into the planet like a mole.



This photo released Thursday, Feb. 5, 2004 made by one of the rear hazard-avoidance cameras on NASA's Opportunity rover, shows Opportunity's landing platform, with freshly made tracks leading away from it. Opportunity rolled about 11 feet on Thursday, the first day it has moved since it left the lander on Saturday. Engineers commanded Opportunity to turn slightly during the drive, to test how it steers while rolling through the martian soil. (NASA/JPL via AP)

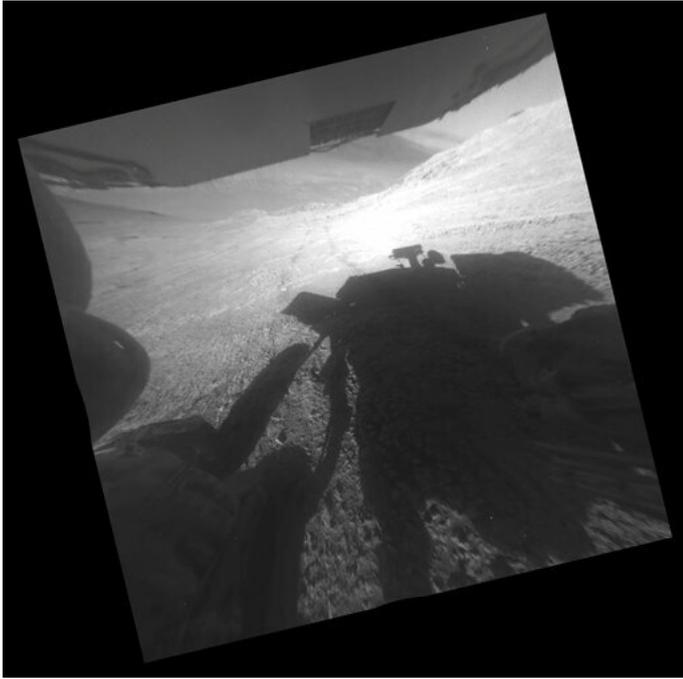
Three more landers—from the U.S., China and Europe—are due to launch next year.

NASA Administrator Jim Bridenstine said the overriding goal is to search for evidence of past or even present microbial life at Mars and find suitable locations to send astronauts, perhaps in the 2030s.

"While it is sad that we move from one mission to the next, it's really all part of one big objective," he said.



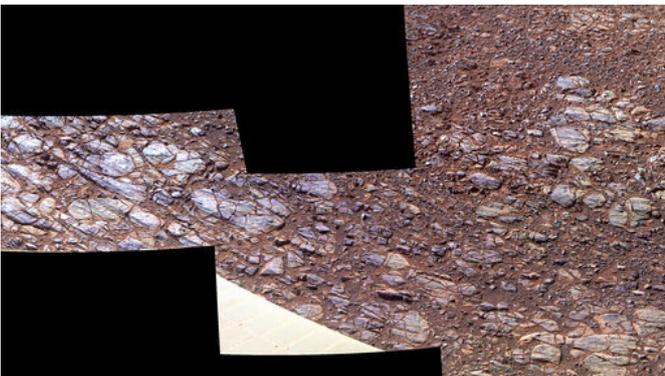
This Jan. 5, 2016 photo made available by NASA shows the tool turret at the end of the the Opportunity rover's robotic arm on the southern side of "Marathon Valley," which goes through the western rim of Endeavour Crater. (NASA/JPL-Caltech via AP)



This March 22, 2016 photo made available by NASA shows the shadow and wheel tracks of the Mars Exploration Rover Opportunity just after a drive on a slope above Endeavour Crater. The image has been rotated 13.5 degrees to adjust for the tilt of the rover on a hillside. (NASA/JPL-Caltech via AP)



This image sent by NASA's Opportunity rover on Wednesday, Jan. 7, 2015 shows a view from atop a hill on Mars. (NASA via AP)



This October 2017 photo made available by NASA shows an enhanced-color view of ground sloping downward to the right in "Perseverance Valley," seen by the Opportunity rover on Mars. The textures may be due to abrasion by wind-driven sand. (NASA/JPL-Caltech/Cornell University/Arizona State University via AP)



This composite of May 2017 photos made available by NASA shows "Perseverance Valley" which is just on the other side of the dip in the crater rim as seen by the Mars Exploration Rover Opportunity, in preparation for driving down into the valley. (NASA/JPL-Caltech via AP)



This March 31, 2016 photo made available by NASA shows a dust devil in a valley on Mars, seen by the Opportunity rover perched on a ridge. The view looks back at the rover's tracks leading up the north-facing slope of "Knudsen Ridge," which forms part of the southern edge of "Marathon Valley." (NASA/JPL-Caltech via AP)

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