

# **With 10 years as Martians, rovers unveil true grit**

January 20 2014, by Blaine Friedlander

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In the 10th year of a 90-day warranty, the Mars rover Opportunity begins its second decade of exploration and still traverses the oxidized terrain to answer crucial questions of cosmic exploration.

The twin Mars Exploration Rovers, Spirit and Opportunity, landed on the red planet in January 2004 – on opposite sides of our neighboring world. Steve Squyres, Cornell professor of astronomy and the scientific principal investigator, and Bill Nye '77, president of The Planetary Society, provided key lectures at the "Opportunity: Ten Years on Mars" event Jan. 16, at NASA's Jet Propulsion Laboratory at the California Institute of Technology in Pasadena, Calif.

Like a doting father discussing precocious children, Squyres recounted the exploits of both Spirit and Opportunity. He called Spirit the "blue-collar rover" and "hard-luck vehicle" that alighted in a lava-laden landscape; nonetheless Spirit made important discoveries in places like Husband Hill and Comanche Rock, which featured an area rich in iron and magnesium carbonates – evidence for the loss of Martian atmosphere.

For Opportunity, Squyres explained how the rover's first encounter with hematite spherules – little concretions dubbed "blueberries" – offered proof that water once existed on Mars.

Geologically speaking, the rovers consistently revealed surprises. But, as Spirit has stopped working, Opportunity might eventually stop, too,

Squyres lamented: "Mars keeps throwing new things at us. ... What I have come to realize is ... that there will be something tantalizing, something wonderful just beyond our reach that we didn't quite get to."

The event recalled how popular culture embraced the rovers through Lego toys, television commercials, news programming like CBS's "60 Minutes," and through Jon Stewart and Stephen Colbert jibes. The Pasadena audience enjoyed seeing Heineken beer and Diet Pepsi commercials pay tribute to the mission. Event organizers played a long clip of Colbert playfully goading, teasing and taunting Squyres.

Whenever the rovers faced peril, "work-around" solutions showed resilience on the part of the mission scientists, engineers and technicians – and the robust machines. Together, they slogged through global dust storms, resolved stuck wheels, drove with broken steering, compensated for robotic arms refusing to open, handled heaters stuck in the "on" position, and risked operating-system and software updates. Not to mention that the rover's Earth-bound drivers consistently navigated tough terrain and high slopes, all the while staying on course with a laggard wheel.

Nye – whose father survived a World War II prisoner of war camp and had become fascinated by sundials – explained how he suggested to Squyres and Jim Bell (Cornell astronomy professor at the time) the need for placing a sundial and color key on each of the twin rovers.

Further, Nye provided star-speckled banter explaining the joys of discovery and humanity's need to know: Where did we come from? And are we alone? The science-communicator laureate grappled with our anthropological and cultural need to explore.

For one of Nye's last slides, he showed a recent portrait of Earth, taken

from beyond the planet Saturn's rings. Earth was portrayed as a tiny, pale blue dot in between the rings. "I'm no different from a grain of sand," he said. "I'm a speck on a speck orbiting a speck with a bunch of other specks in the middle of specklessness. I am nothing. ... But with a brain, we can know our place among the stars."

Provided by Cornell University

Citation: With 10 years as Martians, rovers unveil true grit (2014, January 20) retrieved 1 May 2024 from <https://phys.org/news/2014-01-years-martians-rovers-unveil-true.html>

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