

# Road trip on tap for NASA's Mars rover in new year (Update)

December 29 2012, by Alicia Chang

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This Dec. 12, 2012 file image provided by NASA shows the Mars rover Curiosity at a pit stop, a shallow depression called "Yellowknife Bay." It took the image on the 125th Martian day, or sol, of the mission (Dec. 12, 2012), just after finishing that sol's drive. The Sol 125 drive entered Yellowknife Bay and

covered about 86 feet (26.1 meters). The descent into the basin crossed a step about 2 feet (half a meter) high, visible in the upper half of this image. Curiosity will now head for Mount Sharp in mid-February after it drills into its first rock. (AP Photo/NASA/JPL-Caltech, File)

Since captivating the world with its acrobatic landing, the Mars rover Curiosity has fallen into a rhythm: Drive, snap pictures, zap at boulders, scoop up dirt. Repeat.

Topping its to-do list in the new year: Set off toward a Martian mountain—a trek that will take up a good chunk of the year.

The original itinerary called for starting the drive before the Times Square ball drop, but Curiosity lingered longer than planned at a pit stop, delaying the trip.

Curiosity will now head for Mount Sharp in mid-February after it drills into its first rock.

"We'll probably be ready to hit the pedal to the metal and give the keys back to the rover drivers," mission chief scientist John Grotzinger said in a recent interview at his office on the sprawling NASA Jet Propulsion Laboratory campus 15 miles east of downtown Los Angeles.

The road trip comes amid great expectations. After all, it's the reason the \$2.5 billion mission targeted Gale Crater near the Martian equator. Soaring from the center of the ancient crater is a 3-mile-high peak with intriguing layers of rocks.

Curiosity's job is to figure out whether the landing site ever had the right environmental conditions to support microbes. Scientists already know

water flowed in the past thanks to the rover's discovery of an old streambed. Besides water, life as we know it also needs energy, the sun.

What's missing are the chemical building blocks of life: complex carbon-based molecules. If they're preserved on Mars, scientists figure the best place to hunt for them is at the base of Mount Sharp where images from space reveal hints of interesting geology.

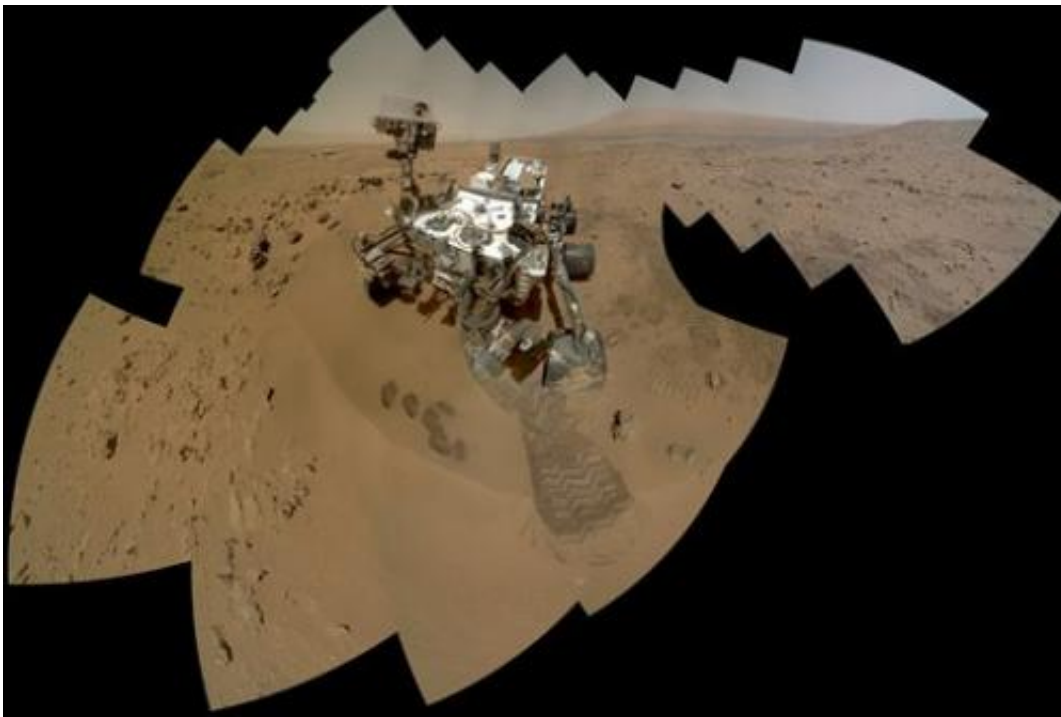
It's a six-month journey if Curiosity drives nonstop. But since scientists will want to command the six-wheel rover to rest and examine rocky outcrops along the way, it'll turn into a nine-month odyssey.



This file image provided by NASA shows the base of Mount Sharp on Mars. The Curiosity rover is set to drive toward the mountain in mid-February after drilling into a rock. The image was taken by Curiosity's 100-millimeter Mast Camera on Aug. 23, 2012. Scientists enhanced the color in one version to show the Martian scene under the lighting conditions we have on Earth, which helps in analyzing the terrain. (AP Photo/NASA/JPL-Caltech/MSSS, File)

Before Curiosity can tackle a mountain, there's unfinished business to tend to. After spending the holiday taking measurements of the Martian atmosphere, Curiosity gears up for the first task of the new year: Finding the perfect rock to bore into.

The exercise—from picking a rock to drilling to deciphering its chemical makeup—is expected to last more than a month.



This file image provided by NASA shows a color self-portrait of the Mars rover Curiosity. It is set to drive toward a Martian mountain in mid-February after drilling into a rock. On the 84th and 85th Martian days of the NASA Mars rover Curiosity's mission on Mars (Oct. 31 and Nov. 1, 2012), NASA's Curiosity rover used the Mars Hand Lens Imager (MAHLI) to capture dozens of high-resolution images to be combined into self-portrait images of the rover. (AP Photo/NASA/JPL-Caltech/MSSS, File)

"We have promised everybody that we're going to go slowly," said Grotzinger, a geologist at the California Institute of Technology.

Curiosity's low-key adventures thus far are in contrast to the drama-filled touchdown that entranced the world in August. Since the car-size rover was too heavy to land using a parachute and airbags, engineers invented a daring new way that involved lowering it to the surface by cables. The risky arrival proved so successful and popular that NASA is planning an encore in 2020.

Curiosity joined another NASA rover, Opportunity, which has been exploring the Martian southern hemisphere since 2004. Opportunity's twin, Spirit, stopped communicating in 2010.

After nailing the landing, Curiosity fell into a routine. The first month was dominated by health checkups—a tedious but essential prerequisite before driving. A chemistry laboratory on wheels, it's the most high-tech spacecraft to land on another planet so extra care was taken to ensure its tools, including its rock-zapping laser and robotic arm, worked.

Once it got the green light, it trundled to a waypoint that's home to three unique types of terrain to perform science experiments. Every time Curiosity roves, it leaves Morse code tracks in the soil, providing a visual signal between drives. The message spells out JPL, short for Jet Propulsion Lab, which built the rover.

So far, its odometer has logged less than a mile. Despite the slow going, scientists have been smitten with the postcards it beamed home, including a stylish self-portrait and tantalizing glimpses of Mount Sharp.

Huge expectations weigh on the mission with NASA balancing the need to feed the public's appetite while pursuing discoveries at its own pace. Last month, the space agency quashed Internet speculation that Curiosity

had detected complex carbon compounds in a pinch of Martian soil by issuing a statement ahead of a science meeting where the team was due to present the latest findings.

American University space policy professor Howard McCurdy said Curiosity is currently in a transition, caught between the viral landing and the scientific payoff expected at Mount Sharp.

"It is interesting, but slow," he said in an email. "I expect public interest will rise as the rover gets closer to its destination."

Curiosity's prime mission lasts two years, but NASA expects the plutonium-powered rover to live far longer. A priority for its human handlers is to learn to operate it more efficiently so that it becomes second nature. Before heading to Mount Sharp, engineers plan a software update to Curiosity's computers to fix remaining bugs.

"We'll need to be pretty careful," project manager Richard Cook said of the upcoming drive. "We may find terrain that we're not comfortable driving in and we'll have to spend time driving around stuff."

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