
National Aeronautics and
Space Administration
NASA
Curiosity
Mars Science Laboratory
NASA's JOURNEY TO
MARS

Curiosity's Mission: Was Mars Ever Habitable?

NASA's Curiosity rover landed in Gale Crater on August 6, 2012 (UTC). It is exploring the Red Planet as part of the Mars Science Laboratory mission. Curiosity's main objective is to determine whether Mars could have supported small life forms called microbes. Microbes were among the first life forms on Earth, and are the most abundant living things on our planet. Could microbial life have thrived on Mars, too?

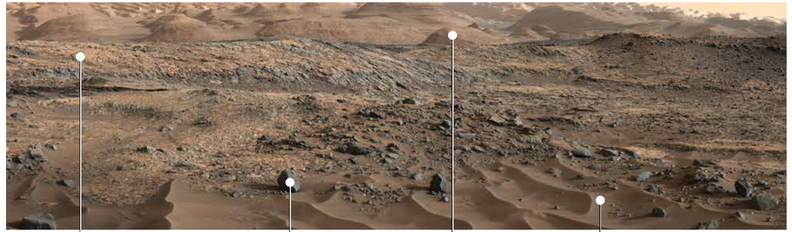
Early in its mission, Curiosity found signs that fresh water was abundant, including an ancient streambed and minerals that formed in water over long periods of time.

The long-term presence of water is key to carrying out life's functions. Curiosity also found chemical elements common in living things, and carbon-based molecules that are necessary for life as we know it. With its Prime Mission successfully completed, Curiosity is now in its Extended Mission.

Curiosity's Landing Site: Gale Crater

After an eight-month trip of about 354 million miles (570 million kilometers), Curiosity landed safely in Gale Crater. Mission engineers pioneered the use of precision-landing techniques. These included steering the spacecraft as it flew through the atmosphere before deploying a parachute, then landing using a rocket-powered "sky crane" system. The new techniques enabled a controlled landing within a drop zone four times smaller than previous missions: 4 miles by 12 miles (about 7 kilometers by 20 kilometers).

Gale Crater is 96 miles (154 kilometers) wide. The 3-mile-high (~5-kilometer-high) Aeolis Mons ("Mount Sharp") rises like the peak of a sombrero at its center. The mountain contains layers of sedimentary rock laid down over time by water and wind. Each layer records information about the climate conditions and geological events occurring as the layer formed. Curiosity is exploring these layers to see which past environments could have supported life.



Sol 953 Mastcam mosaic
Credit: NASA/JPL-Caltech/MSSS

Layer-by-layer changes in the texture and composition of the mountain record the evolving environmental conditions of early Mars. Rock layers at the bottom formed later than rock layers at the bottom. This fine-grained, dust-covered mudstone is the rock that forms the base of Aeolis Mons. It likely was deposited as sediment within an ancient, crater-filling lake.

These dark boulders may be remnants of ancient sand sheets (later turned into sandstone) that once covered this area, but now have been eroded away by wind.

These rounded buttes on Aeolis Mons contain sulfate minerals, perhaps indicating a change in the availability of water when they formed.

Curiosity has encountered small, sandy ripples like these along its traverse. In some cases, they cause the rover to lose traction, posing a hazard to driving.

Quick Facts

Launch — November 26, 2011 from Cape Canaveral, Florida, on an Atlas V-541
Arrival — August 6, 2012 (UTC)
Prime Mission — August 2012 through September 2014
Extended Mission — October 2014 onward

Extended Mission Objectives

- Search for additional environments that may have been suitable for microbial life and for preserving evidence of organic molecules
- Characterize the chemical and mineral composition of rocks and soil, including organic molecules
- Study the role of water and changes in the Martian climate over time
- Characterize the radiation environment for future human missions to Mars

Science Instruments

Remote Sensing

Mastcam — Mast Camera
ChemCam — Chemistry and Camera
MARDI — Mars Descent Imager

Contact Instruments (Arm)

APXS — Alpha Particle X-Ray Spectrometer
MAHLI — Mars Hand Lens Imager

Analytical Laboratory (Rover Body)

SAM — Sample Analysis at Mars
CheMin — Chemistry and Mineralogy

Environmental Instruments

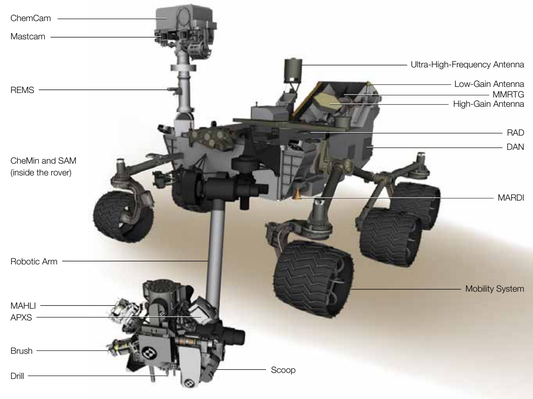
REMS — Rover Environmental Monitoring Station
RAD — Radiation Assessment Detector
DAN — Dynamic Albedo of Neutrons

Rover Size

Length —10 feet (3 meters), not including the 7-foot (2.1-meter) arm
Width — 9 feet (2.8 meters)
Height — 7 feet (2.1 meters) tall
Weight — 2000 pounds (900 kilograms)

Heating and Electrical Power

Radioisotope Power System — a Multi-Mission Radioisotope Thermoelectric Generator (MMRTG)



The Rover

The size of a small car, Curiosity has six wheels to carry it over rough and varied terrain, from ancient riverbeds to the layered deposits of Mount Sharp. The rover has 10 advanced science experiment packages, including one with a laser that zaps rocks to reveal their chemical content. Several of its instruments are deployed on the tip of a long robotic arm, and three of its camera systems are mounted on a 7-foot-tall (~2-meter-tall) mast. A drill collects powdered rock samples for analysis by the two miniaturized laboratories onboard. The rover communicates all engineering and scientific data back to Earth through three radio antennae.

Curiosity aids in NASA's Journey to Mars, in which robots make key discoveries and test novel technologies to pave the way for astronauts to go to Mars.

More Information

mars.jpl.nasa.gov/msl
www.nasa.gov/msl
Facebook.com/MarsCuriosity
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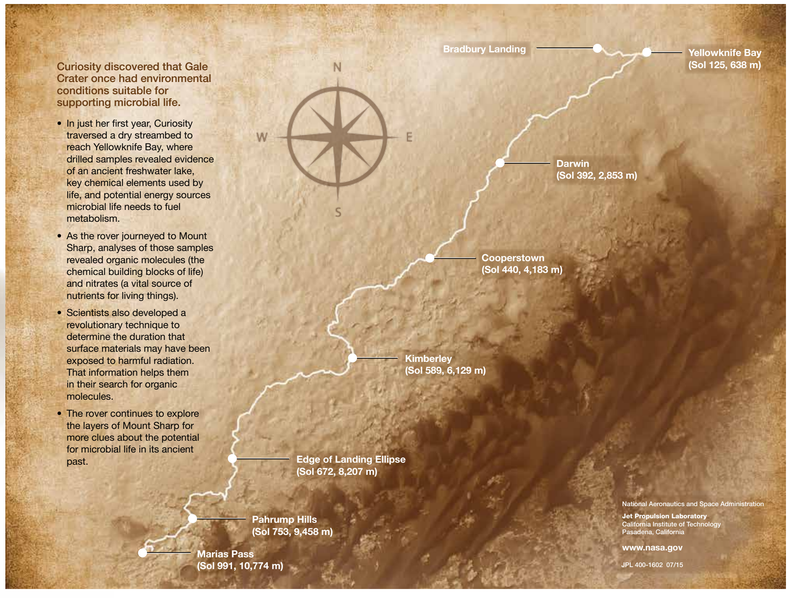
The Jet Propulsion Laboratory, a division of the California Institute of Technology, manages the Mars Science Laboratory mission for NASA's Science Mission Directorate.



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