Curiosity's First Six Months on Mars: from touchdown to drilling rocks

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Curiosity landed on Mars
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The HiRISE camera on the Mars Reconnaissance Orbiter took this action shot of Curiosity descending on the parachute!
Touchdown with the Sky Crane Landing System
Curiosity’s primary scientific goal is to explore and quantitatively assess a local region on Mars’ surface as a potential habitat for life, past or present

- Biological potential
- Geology and geochemistry
- Role of water
- Surface radiation
Target: Gale Crater and Mount Sharp
Curiosity’s Investigation Teams

REMOTE SENSING

- **Mastcam** (M. Malin, MSSS) - Color and telephoto imaging, video, atmospheric opacity
- **ChemCam** (R. Wiens, LANL/CNES) – Chemical composition; remote micro-imaging

CONTACT INSTRUMENTS (ARM)

- **MAHLI** (K. Edgett, MSSS) – Hand-lens color imaging
- **APXS** (R. Gellert, U. Guelph, Canada) - Chemical composition

ANALYTICAL LABORATORY (ROVER BODY)

- **SAM** (P. Mahaffy, GSFC/CNES/JPL-Caltech) - Chemical and isotopic composition, including organics
- **CheMin** (D. Blake, ARC) - Mineralogy

ENVIRONMENTAL CHARACTERIZATION

- **MARDI** (M. Malin, MSSS) - Descent imaging
- **REMS** (J. Gómez-Elvira, CAB, Spain) - Meteorology / UV
- **RAD** (D. Hassler, SwRI) - High-energy radiation
- **DAN** (I. Mitrofanov, IKI, Russia) - Subsurface hydrogen

**Technical Specifications**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheel Base</td>
<td>2.8 m</td>
</tr>
<tr>
<td>Height of Deck</td>
<td>1.1 m</td>
</tr>
<tr>
<td>Ground Clearance</td>
<td>0.66 m</td>
</tr>
<tr>
<td>Height of Mast</td>
<td>2.2 m</td>
</tr>
<tr>
<td>Mass</td>
<td>900 kg</td>
</tr>
</tbody>
</table>
Curiosity’s Science Payload

- **ChemCam** (Chemistry)
- **Mastcam** (Imaging)
- **REMS** (Weather)
- **DAN** (Subsurface Hydrogen)
- **SAM** (Chemistry and Isotopes)
- **CheMin** (Mineralogy)
- **APXS** (Chemistry)
- **MAHLI** (Imaging)
- **RAD** (Radiation)
- **MARDI** (Imaging)
- **Drill Scoop Brush Sieves**
- **Scoop Brush Sieves**
- **Drill Scoop Brush Sieves**
- **Drill Scoop Brush Sieves**

**Curiosity**
First Observations at Bradbury Landing
Mastcam-34 mosaic of Mount Sharp, descent rocket scours, and rover shadow
Navigation camera panorama of Bradbury Landing
Curiosity on Mars with a Nuclear Power Source (NPS)

The Multi-Mission Radioisotope Thermoelectric Generator (MMRTG) on Curiosity was selected to:

• maintain rover electronics and science instruments within their specific thermal limits
  – The MMRTG waste heat is used by the rover’s thermal subsystem

• allow operations of the rover at any latitude, enabling the consideration of the largest set of landing sites possible

• enables the greatest number of science samples from all possible landing sites considered by the Mars Program

• enable operations during the day or night

• enable navigation through challenging terrain without considering the view to the Sun

• enable science operations throughout the Martian year
Stretching Out the Arm
Science results thus far reveals an ancient streambed, likely originating at the northern crater rim.
Rocknest Scooping Campaign
Wheel scuff to prepare for safe scooping
MAHLI view of coarse (0.5 to 1.5 mm) sand from the ripple’s surface, and fine (< 0.25 mm) sand on wall and floor of trench
Curiosity self-portrait at Rocknest

Assembled from 55 MAHLI images

Shows four scoop trenches and wheel scuff
The Glenelg Region and Yellowknife Bay
Curiosity is currently exploring Yellowknife Bay, a basin within the Glenelg region.
Postcards from Yellowknife Bay showing a diversity of rock types, fractures, and veins
Curiosity’s first surface contact with the drill on Mars was in Yellowknife Bay
Curiosity then went on to make her first drill holes on Mars!
Mount Sharp,
The Ultimate Destination
Curiosity’s ultimate goal is to explore the lower reaches of the 5-km high Mount Sharp.
This boulder is the size of Curiosity

Layers, Canyons, and Buttes of Mount Sharp
Follow Curiosity as She Explores Gale Crater

Mission Website: mars.jpl.nasa.gov/msl

Twitter: @MarsCuriosity
Facebook: MarsCuriosity

Be A Martian!
beamartian.jpl.nasa.gov

www.nasa.gov/msl

Backup Slides
“Touchdown confirmed.”
“Let’s see where Curiosity will take us.”
Looking North to Crater Rim
Cheers break out in mission control!
First use of dust-removing brush
The first drill contact was a divot test using our percussive capabilities.