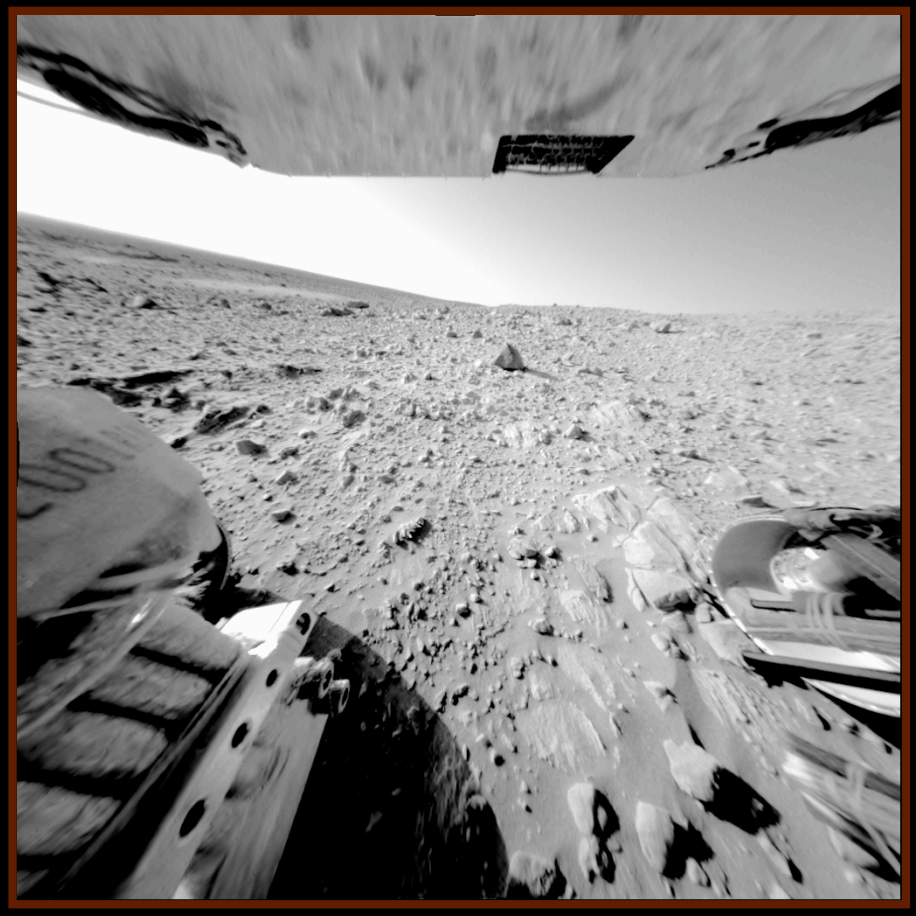
Mars Exploration Rover Mission

Spirit and Opportunity

Week in Review
July 10 - July 16

Spirit began driving backwards on five wheels to conserve the rover's sticky right front wheel.



This rear hazard avoidance camera image was taken on July 15, 2004 after Spirit drove backwards on five wheels for the first time.

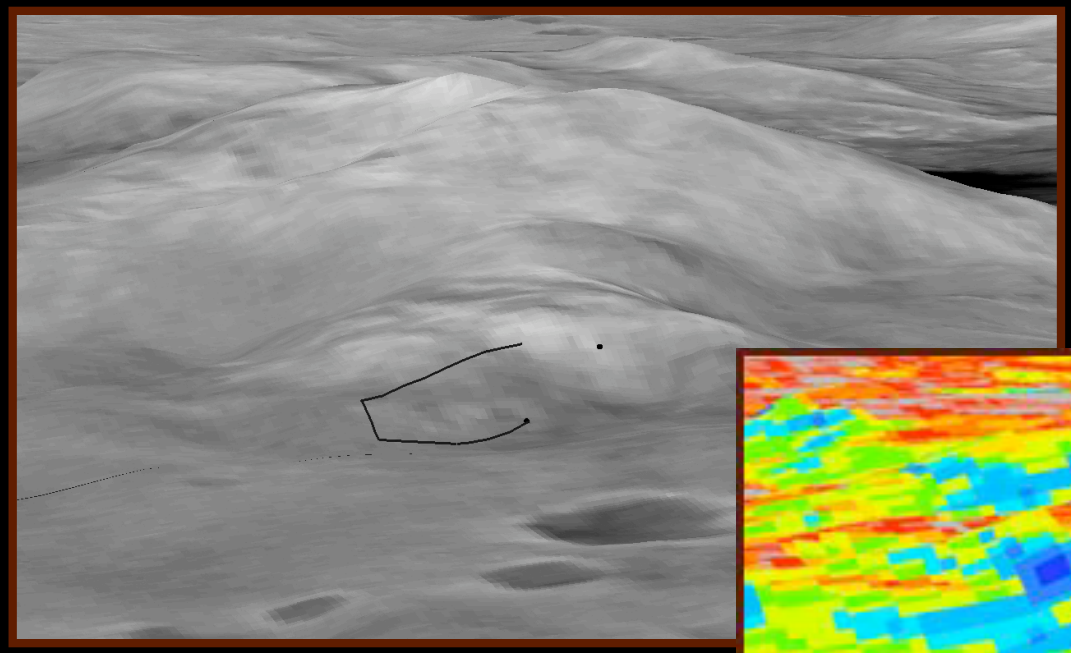
Driving backwards to drag the aging wheel is more energy-efficient than pushing the wheel forward.

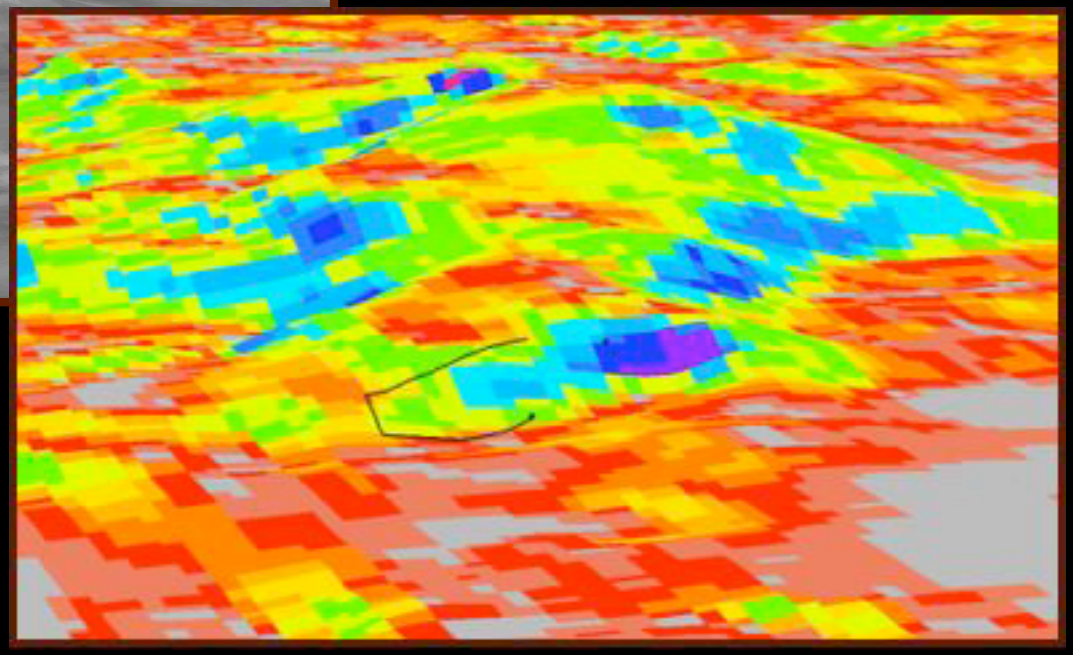
Completing a total distance of 32.8 feet (10 meters), Spirit took this picture after its second successful drive backwards on five wheels.

Front hazard-avoidance camera image, July 15, 2004.

For the rest of Spirit's mission, the rover will drive in this fashion. Rover drivers will only use the sixth wheel to drive over more demanding terrain.

These digital maps show the slopes of Columbia Hills, just in front of Spirit's current position.





Gentlest slope

Steepest slope

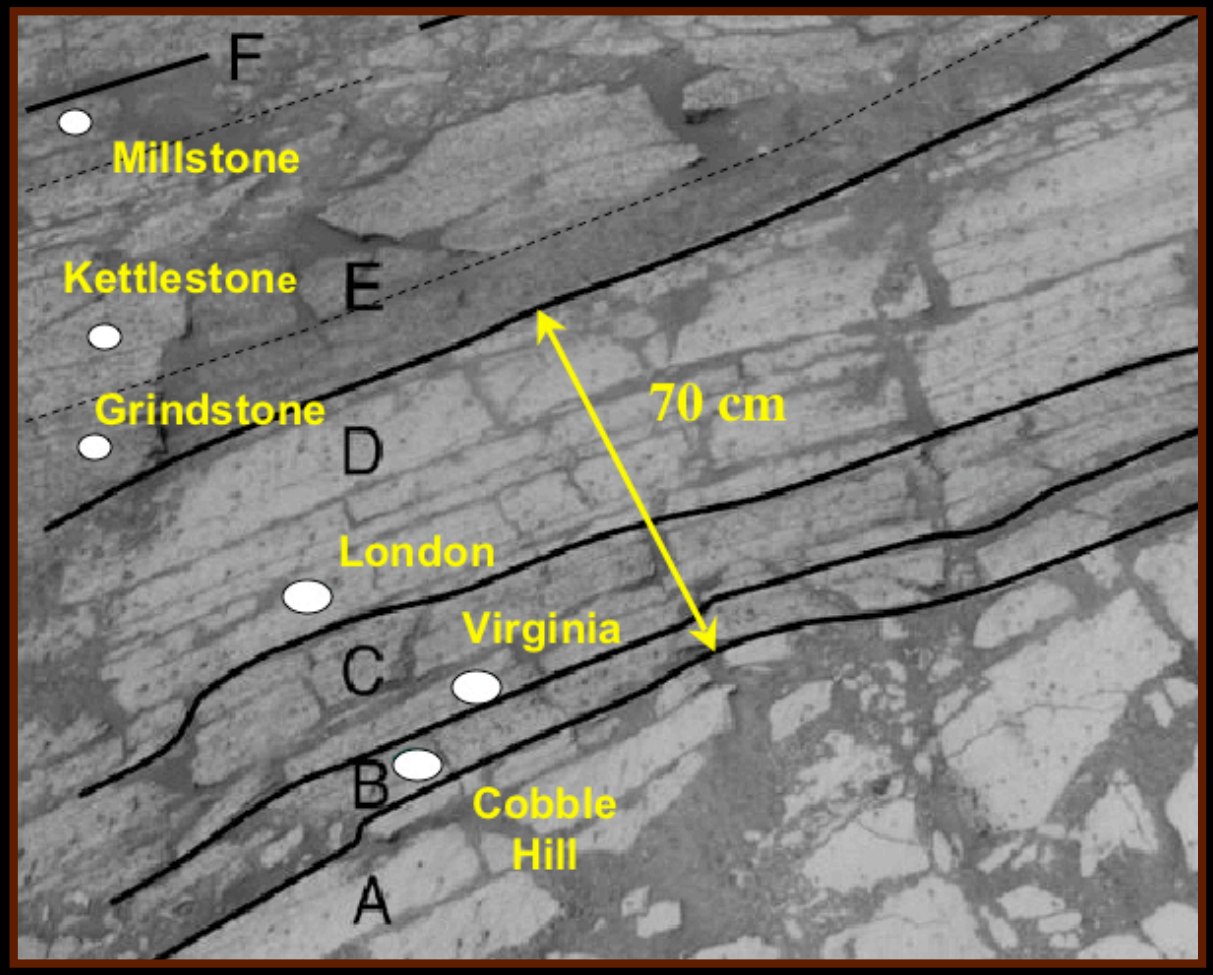
Stereo images from the Mars Orbital Camera on Mars Global Surveyor created these 3D maps. Image credit: NASA/JPL/USGS/MSSS

The black lines represent a safe route for Spirit to climb the front hill, called "West Spur."

Spirit will attempt to climb this peak-like outcrop atop “West Spur.”

Approximate true-color image taken by the panoramic camera on July 4, 2004.

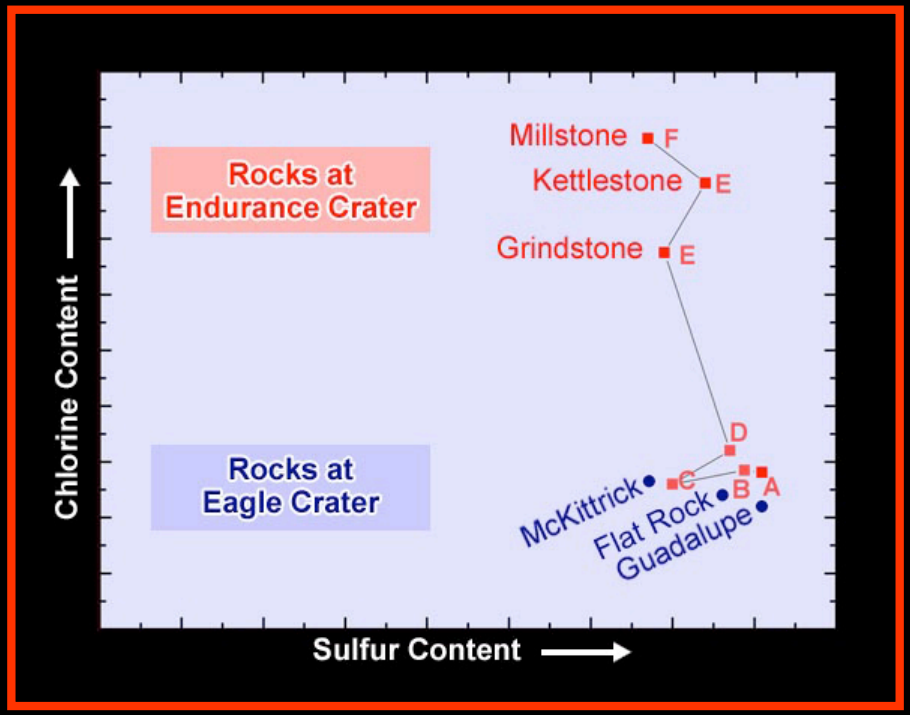
Meanwhile, Opportunity continued investigating distinct layers of rock for clues to Mars' buried past.



Navigation camera image of bedrock that lines the walls of Endurance Crater.

Various layers are labeled as "A" through "F."
Targets within these layers for further study are in yellow.

Abundances of elements in the shallow rock layers of Endurance Crater resemble those of Eagle Crater, but going deeper reveals new findings.



Alpha particle X-ray spectrometer data at Endurance Crater and Eagle Crater.

As Opportunity inched down Endurance Crater, scientists discovered that levels of chlorine rise dramatically in the deeper rocks lining the walls of the crater.

Deeper layers of Endurance Crater possess increasingly higher concentrations of chlorine.

Navigation camera image taken at Endurance Crater on July 15, 2004.

Scientists hope new data will help them figure out what the abundance of chlorine tells us about the history of water at Endurance Crater.

Scientists are also examining “Razorback,” a chunk of rock sticking up at the edge of flat rocks in Endurance Crater.

False-color panoramic camera image.

Scientists believe these features may have formed when fluids moved through cracks, depositing minerals.

If it is safe for Opportunity, scientists eventually hope to study the dunes or "ripples" at the bottom of Endurance Crater.

Spirit will probably attempt to climb West Spur on the energy-efficient path (blue line).

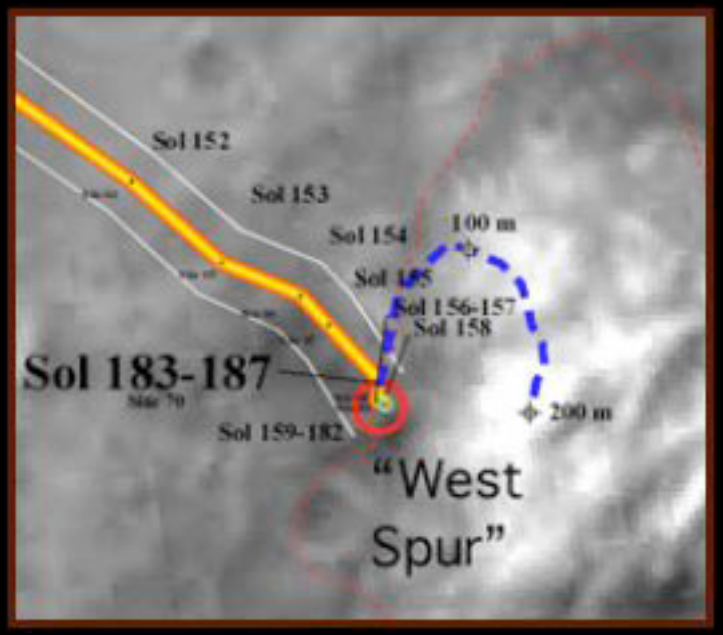


Image credit:
NASA/JPL/MSSS/ASU/New Mexico Museum of Natural History

Approximate true-color panoramic camera image.
Image credit: NASA/JPL/Cornell