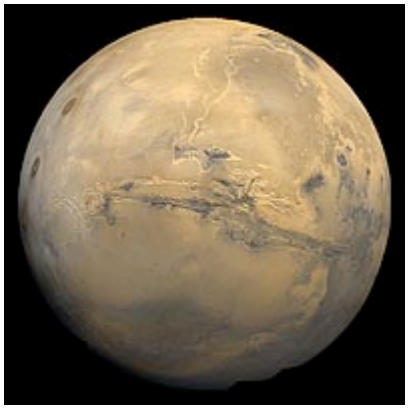


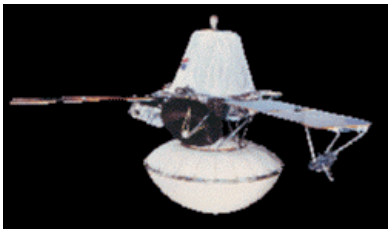
Mariner

104K GIF
Mariner 4 spacecraft

Spacecraft exploration of Mars began in 1964 with Mariner 4. Previous attempts by both the USSR and United States to send a spacecraft to Mars had failed. Mariner 4 reached the red planet on July 15, 1964 and returned photographs and atmospheric measurements. Three more Mariner spacecraft, Mariner 6,7 and 9, successfully orbited Mars by the end of 1971.

Mariner Mission Information and Images

Viking



Viking Orbiter

The Viking Mission consisted of two orbiting spacecraft, each carrying a lander that was deployed to the surface of Mars. Viking was the first mission to successfully land and operate from the surface of Mars. See The Viking Mission for details of the mission experiments and image data.

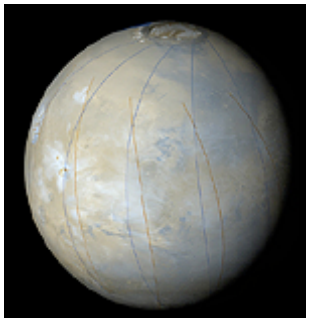
Mars Pathfinder

64K JPEG
Mars Pathfinder rover *Sojourner* and rock "Yogi".
Image from NASA/Jet Propulsion Laboratory

The Mars Pathfinder spacecraft landed on the surface of Mars on July 4, 1997. The Lander camera and instruments returned data on the Mars atmosphere and surrounding terrain in an ancient floodplain in the Ares Vallis region. The rover *Sojourner* became the first micro-rover to operate on another planet, analyzing rocks and soils and testing new rover technology for use in future planetary exploration.

More Information:
Mars Pathfinder home page:
http://mars.jpl.nasa.gov/default.html

Mars Global Surveyor



143K JPEG
MGS Global Mosaic
Image from Malin Space Science Systems/NASA

The Mars Global Surveyor spacecraft entered Mars orbit in September of 1997. The spacecraft began high-resolution mapping of the Mars surface in March of 1999, and is still in operation today. The spacecraft will also gather data on the planet's topographic, thermal, mineral and magnetic properties.

More information:
Mars Global Surveyor Home Page -
http://marsweb.jpl.nasa.gov/mgs

2001 Mars Odyssey

59K JPEG

THEMIS Image of Hrad Valles

Image from ASU THEMIS Science Team

The 2001 Mars Odyssey is an orbiter spacecraft that was launched to Mars April 7, 2001 and arrived in October, 2001. The Orbiter carries 3 science instruments: The Thermal Emission Imaging System (THEMIS) designed to map mineralogy and morphology or the Martian surface, The Gamma Ray Spectrometer (GRS) used for global mapping of the elemental composition of the surface to determine the abundance of hydrogen in the shallow subsurface, and the Mars Radiation Environment Experiment (MARIE) which examines the near-space radiation environment to assess radiation-related risks to human explorers.

More information:
2001 Mars Odyssey Home Page -
http://mars.jpl.nasa.gov/odyssey/

Mars Express

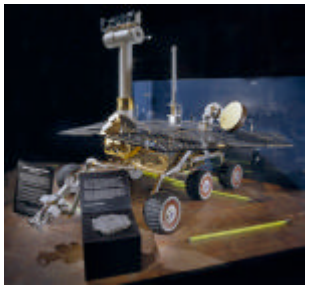
59K JPEG

Valles Marineris from the High Resolution Stereo Camera on Mars Express

ESA/DLR/FU Berlin (G. Neukum)

The European Space Agency with cooperation from NASA and the Italian Space Agency launched the Mars Express spacecraft in 2003 to explore the atmosphere and surface of Mars from polar orbit. The mission objective is to search for sub-surface water from orbit. A small lander named Beagle, was sent to the surface, but communications were lost. The spacecraft carries seven scientific instruments, including some similar to the European instruments lost on the ill-fated Russian Mars '96 mission.

2003 Mars Exploration Rovers



Full-scale model of MER rover in the Exploring the Planets gallery *Model courtesy of Cornell University*

In 2003, two large rovers called Spirit and Opportunity were launched to Mars to explore the Martian surface in much the same way that the Mars Pathfinder Sojourner rover did in 1997. However, these rovers have greater maneuverability and range, traveling up to 100 meters (about 110 yards) across the surface in a Martian day. Each rover carries instruments designed to search for evidence of liquid water that may have been present in the planet's past. Spirit's mission is to explore Gusev Crater which may hold ancient lake deposits, and Opportunity's site is Meridiani Planum which contains a large deposit of hematite, an iron mineral. In March 2004, Opportunity discovered a rock with cross-bedding, a sedimentary structure formed by flowing water. This, combined with chemical data, indicates that the rock formed in a shallow, salty body of surface water.