# Mars Orbiter Completes First Phase of Science Mission

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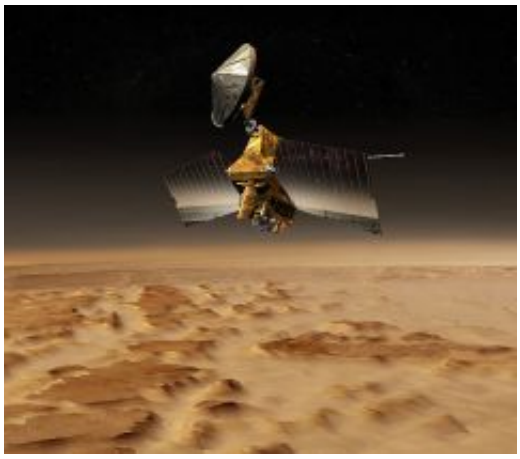

This artist's concept of the Mars Reconnaissance Orbiter. Image: NASA/JPL

(PhysOrg.com) -- NASA's Mars Reconnaissance Orbiter has completed its primary, two-year science phase. The spacecraft has found signs of a complex Martian history of climate change that produced a diversity of past watery environments.

The orbiter has returned 73 terabits of science data, more than all earlier Mars missions combined. The spacecraft will build on this record as it continues to examine Mars in unprecedented detail during its next two-year phase of science operations.

Among the major findings during the primary science phase is the revelation that the action of water on and near the surface of Mars occurred for hundreds of millions of years. This activity was at least regional and possibly global in extent, though possibly intermittent. The spacecraft also observed that signatures of a variety of watery environments, some acidic, some alkaline, increase the possibility that there are places on Mars that could reveal evidence of past life, if it ever existed.

Since moving into position 186 miles above Mars' surface in October 2006, the orbiter also has conducted 10,000 targeted observation sequences of high-priority areas. It has imaged nearly 40 percent of the planet at a resolution that can reveal house-sized objects in detail, with one percent in enough detail to see desk-sized features. This survey has covered almost 60 percent of Mars in mineral mapping bands at stadium-size resolution. The orbiter also assembled nearly 700 daily global weather maps, dozens of atmospheric temperature profiles, and hundreds of radar profiles of the subsurface and the interior of the polar caps.

"These observations are now at the level of detail necessary to test hypotheses about when and where water has changed Mars and where future missions will be most productive as they search for habitable regions on Mars," said Richard Zurek, Mars Reconnaissance Orbiter project scientist at NASA's Jet Propulsion Laboratory in Pasadena, Calif.

Included in the observations are hundreds of stereo pairs used to make detailed topography maps and classic images in support of other Mars missions. One image showed the Mars rover Opportunity poised on the rim of Victoria Crater, and another was of NASA's Phoenix Mars Lander during its descent to the surface. Orbiter data prompted the Phoenix team to change the spacecraft's landing site, and are being used to select the landing location for NASA's Mars Science Laboratory, which is scheduled for launch in 2011. For five months of Phoenix operations on Mars that ended in November, the Mars Reconnaissance Orbiter and NASA's Mars Odyssey orbiter shared the vital communications roles of relaying commands to the lander, and data from Phoenix back to Earth.

The Mars Reconnaissance Orbiter has found repetitive layering in Mars' permanent polar ice caps. The patterns suggest climate change cycles continuing to the present. They may record

possible effects of cyclical changes in Mars' tilt and orbit on global sunlight patterns. Recent climate cycles are indicated by radar detection of subsurface icy deposits outside the polar regions, closer to the equator, where near-surface ice is not permanently stable. Other results reveal details of ancient streambeds, atmospheric hazes and motions of water, along with the ever-changing weather on Mars.

Most observations from the orbiter will be discontinued for a few weeks while the sun is between Earth and Mars, which will disrupt communications. This month, the orbiter will begin a new phase, with science observations continuing as Mars makes another orbit around the sun, which takes approximately two Earth years.

"This spacecraft truly exemplifies the best in capabilities to support science and other Martian spacecraft activities," said Michael Meyer, lead scientist for the Mars Exploration Program at NASA Headquarters in Washington. "MRO has exceeded its own goals and our expectations. We look forward to more discoveries as we continue to look at the Red Planet in spectacular detail."

Provided by NASA