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MESSENGER Mission Overview

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NASA's MErcury Surface, Space ENvironment, GEochemistry, and Ranging (MESSENGER) spacecraft, launched on 3 August 2004, has begun its voyage to initiate a new era in our understanding of the terrestrial planets. The mission, spacecraft, and payload are designed to answer six fundamental questions regarding the innermost planet. To answer these questions in the most efficient manner a oneyear-long, near-polar-orbital observational campaign is planned. The mission consists of a cruise phase and an orbital phase. The cruise phase to date has been used to commission the spacecraft and instruments and begin the transition to automated use of the instruments with on-board, time-tagged commands. One year after launch an Earth flyby will begin removing kinetic energy from the spacecraft while also enabling calibration measurements of the Earth and Earth's Moon. Venus flybys in October 2006 and June 2007 increase the inclination of MESSENGER's transfer orbit to match that of Mercury. Three Mercury flybys, interspersed with deep space maneuvers, slow the spacecraft sufficiently for Mercury orbit injection in March 2011. The flybys, in January and October 2008 and in September 2009, will be used to provide initial maps of the hemisphere of the planet never before seen, as well as the first mineralogical data on Mercury's surface. In the orbital phase, the spacecraft's nominal periapsis of 60° N will gradually drift northward as the periapsis altitude of 200 km gradually drifts upward due to solar gravitational perturbations. The 12-hour period and 80° inclination are maintained while the altitude is readjusted downward to 200 km every Mercury revolution about the Sun. The profile enables mapping of the entire planet and acquiring detailed elemental and topographical data over the northern hemisphere. After conclusion of the nominal mission in March 2012, an additional year of data analysis and archiving is planned before the conclusion of the MESSENGER project. To broaden scientific participation in the mission, the MESSENGER project is working with NASA to establish a Participating Scientist Program. The MESSENGER team is also continuing its informal interaction with members of the BepiColombo project to maximize the overall scientific return from both missions.

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