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The MESSENGER Mission to Mercury: Scientific Objectives

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Mercury holds answers to several critical questions regarding the formation and evolution of the terrestrial planets. Determining the composition of Mercury, with its anomalously high ratio of metal to silicate, will provide a unique window on the processes by which planetesimals in the primitive solar nebula accreted to form planetary embryos and planets. Documenting Mercury's global geological history will elucidate the role of terrestrial planet size as a governor of magmatic and tectonic history. Characterizing the magnetic field and the size and state of Mercury's core will advance our understanding of the energetics and lifetimes of magnetic dynamos in solar system bodies. Determining the volatile species in Mercury's polar deposits, exosphere, and magnetosphere will provide insight into volatile inventories, sources, and sinks in the inner solar system. The MESSENGER (MErcury Surface, Space ENvironment, GEochemistry, and Ranging) mission, launched on 3 August 2004 as part of NASA's Discovery Program, will fly by Mercury in 2008 and 2009 and will orbit Mercury beginning in March 2011. During the flybys of Mercury, regions unexplored by Mariner 10 will be seen for the first time, and new data will be gathered on Mercury's exosphere, magnetosphere, and surface composition. During the orbital phase of the mission, one Earth year in duration, MESSENGER will complete global mapping and the detailed characterization of the exosphere, magnetosphere, surface, and interior.

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