



### The MESSENGER mission to Mercury: Current status

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The MESSENGER (MErcury Surface, Space ENvironment, GEochemistry, and Ranging) spacecraft, launched on 3 August 2004 as part of NASA's Discovery Program, will be the first spacecraft to orbit Mercury. The innermost planet holds clues 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 early solar nebula accreted to form planetary embryos and planets. Documenting the global geological history of Mercury will elucidate the role of terrestrial planet size as a governor of magmatic and tectonic history and resolve questions concerning the nature of volcanic processes and the history of global strain on that planet. Characterizing the geometry of the planet's internal 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 spacecraft carries seven scientific instruments: a dual narrow- and wide-angle camera system; a gamma-ray and neutron spectrometer; an X-ray spectrometer; a magnetometer; a laser altimeter; an ultraviolet, visible, and near-infrared spectrometer; and an energetic particle and plasma spectrometer. The probe flew by Earth on 2 August 2005 and carried out key calibration observations of the Earth and Moon during that encounter. MESSENGER will fly by Venus twice in 2006 and 2007, following which it will fly by Mercury three times, in January and October 2008 and September 2009. 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. In March 2011 the spacecraft will be inserted into orbit about Mercury, and during the one-Earth-year orbital phase of the mission MESSENGER will complete global mapping and the detailed characterization of the exosphere, magnetosphere, surface, and interior.