

## MESSENGER spacecraft ready for science-rich encounter with venus

by Bend\_Weekly\_News\_Sources

WASHINGTON - NASA's MErcury Surface, Space ENvironment, GEOchemistry, and Ranging (MESSENGER) spacecraft will make its closest pass to Venus on Tuesday, June 5. This will place the spacecraft on target for a flyby of Mercury in January 2008. MESSENGER will be the first probe to visit the innermost planet in more than 30 years. Threading its path through an aim point 209 miles above the surface of Venus, MESSENGER will use the pull of the planet's gravity to guide it closer to Mercury. During this flyby, Venus's gravity will change the spacecraft's direction around the sun and decelerate it from 22.7 to 17.3 miles per second. "Typically, spacecraft have used planetary flybys to speed toward the outer solar system," said Andy Calloway, MESSENGER mission operations manager, Johns Hopkins University Applied Physics Laboratory (APL), Laurel, Md. "MESSENGER, headed in the opposite direction, needs to slow down enough to slip into orbit around Mercury." This will be MESSENGER's second pass by Venus. During its first flyby of the planet, in October 2006, no scientific observations were made. Venus was at superior conjunction, placing it on the opposite side of the sun from Earth, leading to a two-week radio contact blackout between the spacecraft and its operators. This upcoming encounter offers opportunities for new observations of Venus's atmosphere, cloud structure, space environment and perhaps even its surface. The spacecraft will train most of its instruments on Venus during the upcoming encounter. "During the flyby we'll ensure that the spacecraft and payload remain healthy, calibrate several of the science instruments, and practice many of the observations planned for the Mercury flybys," said Sean Solomon, MESSENGER principal investigator and planetary scientist at the Carnegie Institution of Washington. The team plans to image the upper cloud layers at visible and near-infrared wavelengths for comparison with earlier spacecraft observations. Magnetic field and charged particle observations will be made to characterize the solar wind interaction with Venus and search for solar wind pick-up ions. Ultraviolet-visible and X-ray spectrometry will permit detailed observations of the composition of the upper atmosphere, and MESSENGER will search for lightning on the Venus night side. MESSENGER will join the European Venus Express spacecraft, currently orbiting Venus, to make new observations of the Venus environment. To understand fully how solar wind plasma affects and controls the Venus ionosphere and nearby plasma dynamics, simultaneous measurements are needed of the interplanetary conditions and the particle-and-field characteristics at Venus. The combined MESSENGER and Venus Express observations will be the first opportunity to conduct such two-spacecraft measurements. "By coordinating and comparing these observations, we will be able to maximize the science from both missions and potentially learn things that would not be revealed by one set of observations alone," said APL's Ralph McNutt, MESSENGER project scientist. MESSENGER is only the second spacecraft to set sights on Mercury. NASA's Mariner 10 sailed past the planet three times in 1974 and 1975 and took detailed images of about 45 percent of the surface. Carrying seven scientific instruments on its compact and durable composite frame, MESSENGER will provide the first images of the entire planet. The mission also will collect detailed information on the composition and structure of Mercury's crust, its geologic history, the nature of its thin atmosphere and active magnetosphere, as well as the makeup of its core and polar materials. Launched in August 2004, MESSENGER has completed more than 40 percent of its 4.9-billion mile journey to Mercury, which includes 15 loops around the sun. An Earth flyby one year after launch and a large propulsive maneuver in December 2005 set the spacecraft on course for the first Venus flyby in October 2006. Next up for MESSENGER is a trio of swings past Mercury, in January and October 2008 and September 2009. During these flybys, the probe will map most of the planet and determine surface and atmospheric composition. These data will be used to help plan priorities for the yearlong orbital mission, which begins in March 2011.

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