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NASA Sending a MESSENGER to Mercury
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NASA's first trip to Mercury in 30 years − and the closest look ever at the innermost planet − starts in August with the predawn launch of the MESSENGER spacecraft from Cape Canaveral Air Force Station, Fla.

MESSENGER will conduct an in−depth study of the Sun's closest neighbor, the least explored of the terrestrial ("rocky") planets that also include Venus, Earth and Mars. After a scheduled 2:16 a.m. (EDT) liftoff aboard a Delta II launch vehicle on Aug. 2 − the first day of a 13−day launch period − MESSENGER's voyage includes three flybys of Mercury in 2008 and 2009 and a yearlong orbit of the planet starting in March 2011.

"Our missions to Mars and Venus have produced exciting data and new theories about the processes that formed the inner planets," says Orlando Figueroa, director of the Solar System Exploration Division at NASA Headquarters, Washington. "Yet Mercury still stands out as a planet with a fascinating story to tell. MESSENGER should complete the detailed exploration of the inner solar system − our planetary backyard − and help us to understand the forces that shaped planets like our own."

MESSENGER (short for MErcury Surface, Space ENvironment, GEochemistry, and Ranging) is only the second spacecraft to set sights on Mercury; Mariner 10 sailed past it three times in 1974 and 1975 and gathered detailed data on less than half 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 will also collect detailed information on the composition and structure of Mercury's crust, its geologic history, the nature of its thin atmosphere and active magnetosphere, and the makeup of its core and polar materials.

MESSENGER's science team will shape its investigation around several questions, including: Why is Mercury − the densest planet in the solar system − mostly made of iron? Why is it the only inner planet besides Earth with a global magnetic field? How can the planet closest to the Sun, with daytime temperatures near 840 degrees Fahrenheit, have what appears to be ice in its polar craters?

"For nearly 30 years we've had questions that couldn't be answered until technology and mission designs caught up with our desire to go back to Mercury," says Dr. Sean C. Solomon, MESSENGER principal investigator, from the Carnegie Institution of Washington. "Now we are ready. The answers to these questions will not only tell us more about Mercury, but illuminate processes that affect all the terrestrial planets."

Mercury's proximity to the Sun makes it both a fascinating subject and an unprecedented mission design challenge. The Sun can be up to 11 times brighter than what we see on Earth and surface temperatures at Mercury's equator can reach 450 degrees Celsius (about 840 degrees Fahrenheit), but MESSENGER will operate at room temperature behind a sunshade of heat−resistant ceramic fabric. The 1.2−ton spacecraft also features a heat−radiation system and will pass only briefly over Mercury's hottest regions, limiting exposure to the intense heat bouncing back from the broiling surface.

"We're doing something no one has ever tried before," says MESSENGER Project Manager David G. Grant, of the Johns Hopkins University Applied Physics Laboratory (APL), Laurel, Md. "After launch and a long trip through the inner solar system, we still face the risky and difficult job of orbiting the planet next to the Sun. The team is confident that the spacecraft they designed, built and tested is ready for this journey and its mission to Mercury."

On a 4.9−billion mile (7.9−billion kilometer) journey that includes 15 loops around the Sun, the solar−powered MESSENGER will fly past Earth once, Venus twice and Mercury three times before easing into orbit around its target planet. The Earth flyby, a year after launch, and the Venus flybys, in October 2006 and June 2007, use the pull of the planets' gravity to guide MESSENGER toward Mercury's orbit. The Mercury flybys in January 2008, October 2008 and September 2009 fine−tune and slow MESSENGER's track while allowing the spacecraft to gather data

critical to planning the mission's orbit phase.

The MESSENGER project is the seventh in NASA's Discovery Program of lower−cost, scientifically focused space missions. Solomon leads the mission as principal investigator; APL manages the mission for NASA's Office of Space Science and designed, built and will operate the MESSENGER spacecraft. MESSENGER's science instruments were built by APL; NASA Goddard Space Flight Center, Greenbelt, Md.; University of Michigan, Ann Arbor; and University of Colorado, Boulder. GenCorp Aerojet, Sacramento, Calif., and Composite Optics Inc., San Diego, provided MESSENGER's propulsion system and composite structure, respectively.

The MESSENGER science team draws expertise from APL; Brown University, Providence, R.I.; Carnegie Institution of Washington; Goddard Space Flight Center; Los Alamos National Laboratory, N.M.; Massachusetts Institute of Technology, Cambridge; Northwestern University, Evanston, Ill.; Southwest Research Institute, Boulder, Colo.; University of Arizona, Tucson; University of California, Santa Barbara; University of Colorado, Boulder; University of Michigan, Ann Arbor; and Washington University, St. Louis.

Additional information about MESSENGER is available on the Web at: http://messenger.jhuapl.edu

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