



Mercury

Mercury's elliptical orbit takes the small planet as close as 47 million kilometers (29 million miles) and as far as 70 million kilometers (43 million miles) from the Sun. If one could stand on the scorching surface of Mercury when it is at its closest point to the Sun, the Sun would appear more than three times as large as it does when viewed from Earth. Temperatures on Mercury's surface can reach 430 degrees Celsius (800 degrees Fahrenheit). Because the planet has no atmosphere to retain that heat, nighttime temperatures on the surface can drop to -180 degrees Celsius (-290 degrees Fahrenheit).

Because Mercury is so close to the Sun, it is hard to directly observe from Earth except during twilight. Mercury makes an appearance indirectly, however — 13 times each century, Earth observers can watch Mercury pass across the face of the Sun, an event called a transit. These rare transits fall within several days of May 8 and November 10. The first two transits of Mercury in the 21st century occurred May 7, 2003, and November 8, 2006.

Mercury speeds around the Sun every 88 days, traveling through space at nearly 50 kilometers (31 miles) per second — faster than any other planet. One Mercury solar day equals 175.97 Earth days.

Instead of an atmosphere, Mercury possesses a thin “exosphere” made up of atoms blasted off the surface by the solar wind and striking micrometeoroids. Because of solar radiation pressure, the atoms quickly escape into space and form a “tail” of neutral particles. Though Mercury's magnetic field has just 1 percent the strength of Earth's, the field is very active. The magnetic field in the solar wind episodically connects to Mercury's field, creating intense “magnetic tornadoes” that funnel the fast, hot solar wind plasma down to the surface. When the ions strike the surface, they knock off neutrally charged atoms and send them on a loop high into the sky.

Mercury's surface resembles that of Earth's Moon, scarred by many impact craters resulting from collisions with meteoroids and comets. While there are areas of smooth terrain, there are also lobe-shaped scarps or cliffs, some hundreds of miles long and soaring up to a mile high, formed by contraction of the crust. The Caloris basin, one of the largest features on Mercury, is about 1,550 kilometers (960 miles) in diameter. It was the result of an asteroid impact on the planet's surface early in the solar system's history. Over the next several billion years, Mercury shrank in radius about 1 to 2 kilometers (0.6 to 1.2 miles) as

the planet cooled after its formation. The outer crust contracted and grew strong enough to prevent magma from reaching the surface, ending the period of volcanic activity.

Mercury is the second densest planet after Earth, with a large metallic core having a radius of 1,800 to 1,900 kilometers (1,100 to 1,200 miles), about 75 percent of the planet's radius. In 2007, researchers used ground-based radars to study the core, and found evidence that it is molten (liquid). Mercury's outer shell, comparable to Earth's outer shell (called the mantle), is only 500 to 600 kilometers (300 to 400 miles) thick.

The first spacecraft to visit Mercury was Mariner 10, which imaged about 45 percent of the surface. In 1991, astronomers on Earth using radar observations showed that Mercury may have water ice at its north and south poles inside deep craters that are perpetually cold. Infalling comets or meteorites might have brought ice to these regions of Mercury, or water vapor might have outgassed from the interior and frozen out at the poles.

NASA's MErcury Surface, Space ENvironment, GEochemistry, and Ranging (MESSENGER) mission will study and image Mercury from orbit for one year, mapping nearly the entire planet in color. The spacecraft performed two close flybys of Mercury on January 14, 2008, and October 6, 2008. By the second flyby, the spacecraft had imaged about 80 percent of the surface at useful resolution and made discoveries about the magnetic field and how Mercury's crust was formed. A third flyby took place on September 29, 2009, a final gravity-assist maneuver to enable the spacecraft to enter orbit in March 2011.

FAST FACTS

Namesake	Messenger of the Roman gods
Mean Distance from the Sun	57.91 million km (35.98 million mi)
Orbit Period	87.97 Earth days
Orbit Eccentricity (Circular Orbit = 0)	0.206
Orbit Inclination to Ecliptic	7 deg
Inclination of Equator to Orbit	0 deg
Rotation Period	58.65 Earth days
Successive Sunrises	175.97 days
Equatorial Radius	2,440 km (1,516 mi)
Mass	0.055 of Earth's
Density	5.43 g/cm ³ (0.98 of Earth's)
Gravity	0.38 of Earth's
Exosphere Components	hydrogen, helium, sodium, potassium, calcium, magnesium

Temperature Range	-180 to 430 deg C (-290 to 800 deg F)
Known Moons	0
Rings	0

SIGNIFICANT DATES

- 1631 — Pierre Gassendi uses a telescope to watch from Earth as Mercury crosses the face of the Sun.
- 1965 — Though it was thought for centuries that the same side of Mercury always faces the Sun, astronomers find the planet rotates three times for every two orbits.
- 1974–1975 — Mariner 10 photographs roughly half of Mercury's surface in three flybys.
- 1991 — Scientists using Earth-based radar find signs of ice locked in permanently shadowed areas of craters in Mercury's polar regions.
- 2008 — MESSENGER's first flyby of Mercury initiates the most comprehensive study yet of the innermost planet. Images from the first flyby revealed about half the side of the planet not seen by Mariner 10 and the second flyby yielded many more images and discoveries. Nearly the entire planet will be imaged by MESSENGER in 2011.

ABOUT THE IMAGES



basin was created with pictures from Mariner 10 (right portion) and MESSENGER images.

- 1** A false-color, visible-infrared image of Mercury taken by MESSENGER.
- 2** This composite image of the Caloris basin was created with pictures from Mariner 10 (right portion) and MESSENGER images.
- 3** A pattern of radiating troughs named Pantheon Fossae at the center of the Caloris basin was imaged by MESSENGER.
- 4** This double-ring crater in Raditladi basin (not viewed by Mariner 10) was imaged by MESSENGER.
- 5** A close-up image of Mercury's south pole taken by Mariner 10 in 1974.

FOR MORE INFORMATION

solarsystem.nasa.gov/mercury