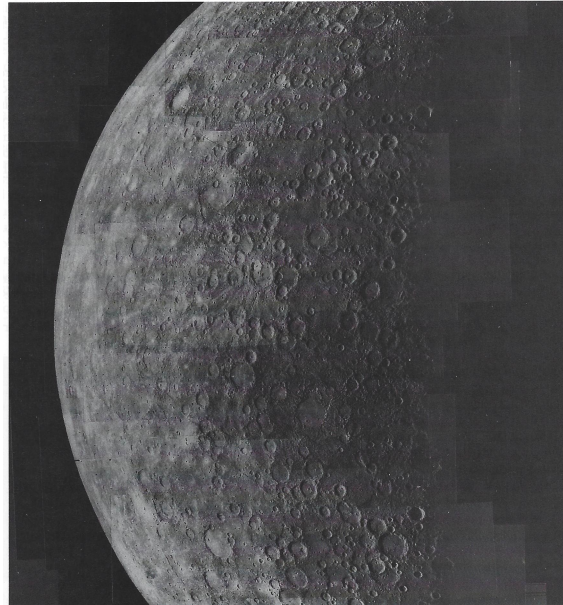


## Chapter 12. Mercury



Mercury as seen from space (a NASA image).

**Note.** In this section we survey physical properties of Mercury.

**Note.** Some general facts about Mercury include:

Orbital semimajor axis	0.387 AU
Orbital Period	88 days
Rotation Period	58.65 days
Tilt of Axis	28°
Surface Gravity	0.38 of Earth's
Albedo	6%
Satellites	None

Notice that the orbital period and the rotation period imply that Mercury rotates exactly three times for every two times it goes around the Sun. Mercury is close

to the Sun and only is visible a few degrees above the horizon in the morning and evening sky.

**Note.** No trace of an atmosphere was detected from Earth-based observations. But a trace of an atmosphere does appear to exist, as detected by the U.S. probe Mariner 10, which detected a very small quantity of a number of gases above the surface. The daylight side of Mercury is  $700^{\circ}$  and the dark side is about  $100^{\circ}$  K. Mercury has one side less dense than the other. The heavy side either faces the Sun or exactly the opposite direction at each perihelion passage. There is a huge impact crater called *Caloris Planitia* that suggests that the object that crashed into Mercury was responsible for making the planet denser on one side. The 3:2 relationship between Mercury's orbital and rotational periods is a *spin-orbital coupling*.

**Note.** The U.S. probe Mariner 10 flew by Mercury in February 1974. It flew past Mercury a total of three times. Mariner 10 detected a magnetic field around Mercury. Mercury has a magnetosphere and a core that must be relatively large. The large core implies that Mercury is differentiated.

**Note.** The mantle of Mercury occupies the outer 25% of its radius. Mercury has prominent and extensive cliffs, called *scarps*. Their appearance suggests that Mercury shrank after its crust hardened, causing it to shrivel and shrink.

**Note.** Opposite the impact site *Caloris Planitia* appears a wavy region called *weird terrain*. This feature may have been created by seismic waves that went around the planet when the impact occurred that create the Caloris Planitia feature.

*Revised: 2/10/2021*