The Terrestrial Planets: Worlds of Rock and Metal

The terrestrial planets are the four inner planets of the Solar System: Mercury, Venus, Earth, and Mars. They are also known as the "rocky planets" because they are primarily composed of silicate rocks and metals, sharing a common structural model.

Defining Characteristics

The key distinction between terrestrial planets and the outer gas giants (Jupiter, Saturn) or ice giants (Uranus, Neptune) is their solid composition and structure. All four terrestrial planets have a similar internal layout:

Core: A central, metallic core, composed mostly of iron and nickel. Earth's core has a solid inner part and a liquid outer part, which generates its magnetic field. Mars and Venus are thought to have solid or partially molten cores, while Mercury has a disproportionately large core for its size.

Mantle: A thick layer of dense silicate rock that surrounds the core. The mantle is plastic-like, allowing for slow convection over geological time, which drives processes like volcanism and, on Earth, plate tectonics.

Crust: A thin, solid outer layer of less dense rock (like basalt and granite) that forms the planet's surface.

Comparative Overview

Despite their shared structure, the four terrestrial planets are incredibly diverse worlds, each shaped by its unique history, mass, and distance from the Sun.

Mercury: The smallest and innermost planet. It lacks any significant atmosphere and, as a result, has the most extreme temperature swings in the Solar System, from 427°C (800°F) on its day side to -173°C (-280°F) on its night side. Its surface is heavily cratered, resembling Earth's Moon.

Venus: Similar in size to Earth but defined by a runaway greenhouse effect. Its surface is a scorching furnace hidden beneath a thick, toxic atmosphere of carbon dioxide and sulfuric acid clouds.

Earth: The largest of the terrestrial planets and the only world known to harbor life. Its unique features include a nitrogen-oxygen atmosphere, vast oceans of liquid water covering 70% of its surface, and an active system of plate tectonics.

Mars: A cold, desert world with a very thin carbon dioxide atmosphere. It shows compelling evidence of a warmer, wetter past, with now-dry riverbeds and lakes. It is the most explored planet besides Earth.

The terrestrial planets generally have few or no moons. Earth has one large moon, Mars has two small, captured-asteroid-like moons (Phobos and Deimos), while Mercury and Venus have none.