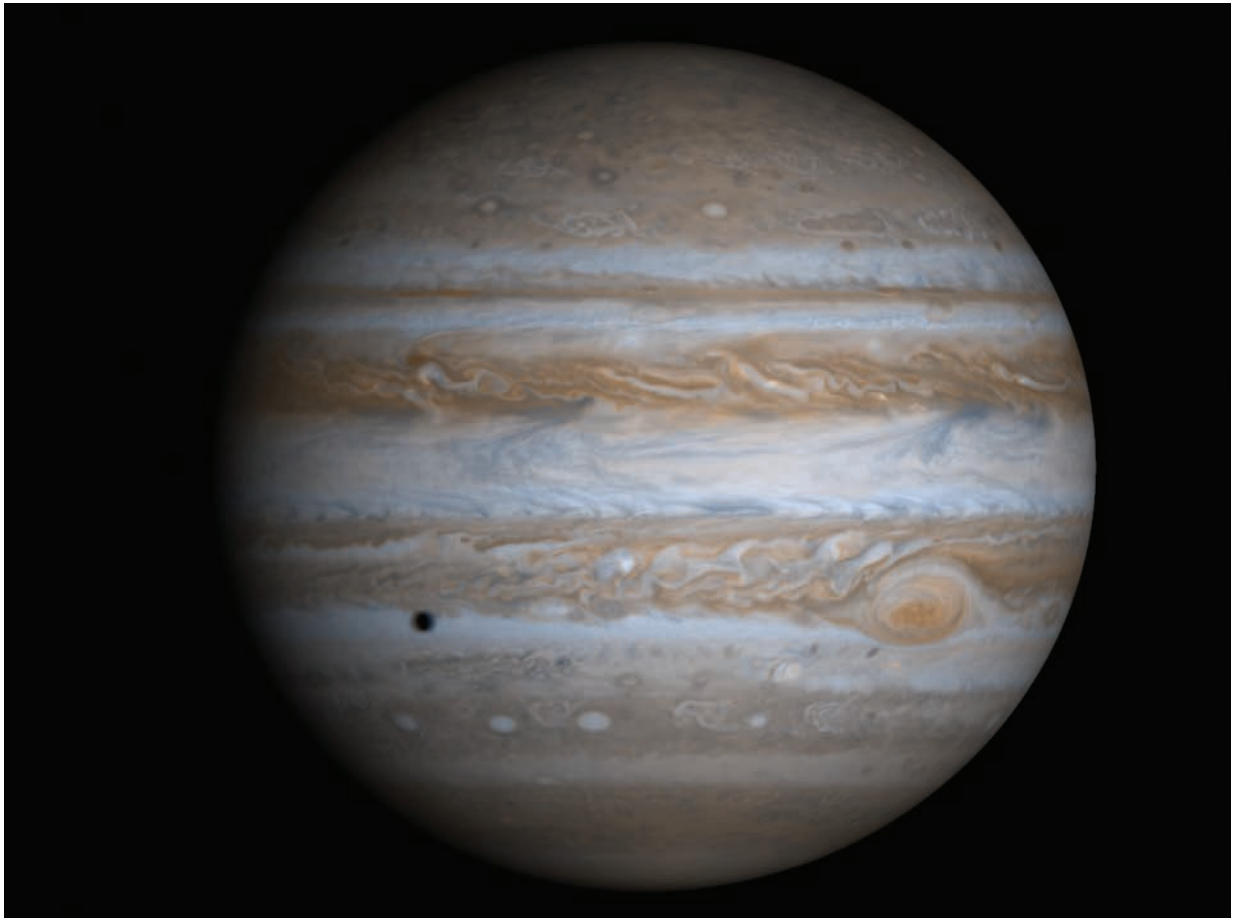

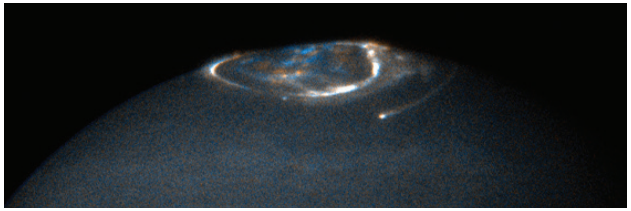

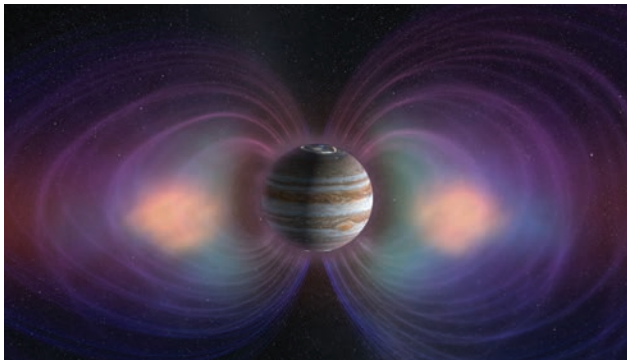

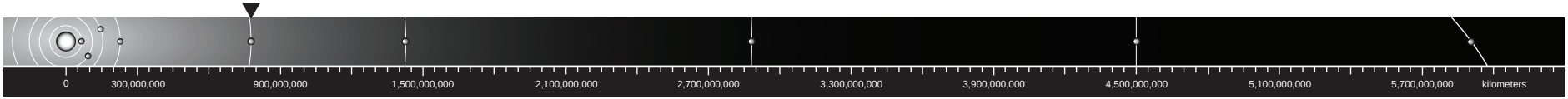
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**Jupiter**

Jupiter is the largest and most massive planet in our solar system, containing more than twice the amount of material of the other bodies orbiting our Sun combined. Most of the material left over after the formation of the Sun went to Jupiter, forming a type of planet called a gas giant.

Jupiter's appearance is a tapestry of colorful cloud bands and spots. Most visible clouds are composed of ammonia and ammonia compounds, with unknown chemicals providing color. Jupiter's fast rotation — spinning once every 10 hours — creates strong jet streams, smearing its clouds into bands across the planet.

With no solid surface to slow them down, Jupiter's spots can persist for many years. The Great Red Spot, a swirling oval of clouds twice as wide as Earth, has been observed on the giant planet for more than 300 years. More recently, three smaller ovals merged to form the Little Red Spot, about half the size of its larger cousin. Scientists do not yet know if these ovals and planet-circling bands are shallow or deeply rooted to the interior.

The composition of Jupiter's atmosphere is similar to that of the Sun — mostly hydrogen and helium. Deep in the atmosphere, pressure and temperature increase, compressing the hydrogen gas into a liquid. This gives Jupiter the largest ocean in the solar system — an ocean made of hydrogen instead of water. Scientists think that, at depths perhaps halfway to the planet's center, the pressure becomes so great that electrons are squeezed off the hydrogen atoms, making the liquid electrically conducting. Jupiter's fast rotation is thought to drive electrical currents in this region, generating the planet's powerful magnetic field. It is still unclear if, deeper down, Jupiter has a central core of solid material.

The Jovian magnetosphere is the region of space influenced by Jupiter's powerful magnetic field. It balloons 1 to 3 million kilometers (600,000 to 2 million miles) toward the Sun and tapers into a windsock-shaped tail extending more than 1 billion kilometers (600 million miles) behind Jupiter, as far as Saturn's orbit. The magnetic field rotates with the planet and sweeps up particles that have an electric charge. Near the planet, the magnetic field traps a swarm of charged particles and accelerates them to very high energies, creating intense radiation that bombards the innermost moons and can damage spacecraft.

With four large moons and many smaller moons, Jupiter forms a kind of miniature solar system. In total, the planet has more than 60 moons, including several that were discovered in just the past few years.

Jupiter's four largest moons — Io, Europa, Ganymede, and Callisto — were first observed by the astronomer Galileo Galilei in 1610 using an early version of the telescope. These four moons are known today as the Galilean satellites. Galileo would be astonished at what we have learned about these moons, largely from the NASA mission named for him: Io is the most volcanically active body in the solar system; Ganymede is the largest moon in the solar system and the only moon known to have its own magnetic field; and a liquid-water ocean with the ingredients for life may lie beneath the frozen crust of Europa, making it a tempting place to explore.

Discovered in 1979 by NASA's Voyager 1 spacecraft, Jupiter's rings were a surprise, as they are composed of small, dark particles and are difficult (but not impossible) to see except when backlit by the Sun. Data from the Galileo spacecraft indicate that Jupiter's ring system may be formed by dust kicked up as interplanetary meteoroids smash into the giant planet's small innermost moons.

In December 1995, NASA's Galileo spacecraft dropped a probe into one of the dry, hot spots of Jupiter's atmosphere. The probe made the first direct measurements of the planet's composition and winds. Galileo studied Jupiter and its largest moons until 2003. Beginning in 2016, NASA's Juno spacecraft will conduct an in-depth investigation of the planet's atmosphere, deep structure, and magnetosphere for clues to its origin and evolution.

## FAST FACTS

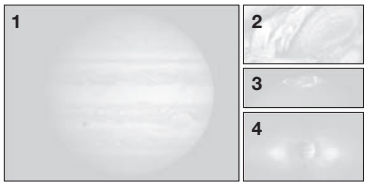
| | |
|---|---|
| Namesake | King of the Roman gods |
| Mean Distance from the Sun | 778.41 million km (483.68 million mi) |
| Orbit Period | 11.8565 Earth years (4,330.6 Earth days) |
| Orbit Eccentricity (Circular Orbit = 0) | 0.04839 |
| Orbit Inclination to Ecliptic | 1.305 deg |
| Inclination of Equator to Orbit | 3.12 deg |
| Rotation Period | 9.92 hr |
| Equatorial Radius | 71,492 km (44,423 mi) |
| Mass | 317.82 of Earth's |
| Density | 1.33 g/cm$^3$ |
| Gravity | 20.87 m/sec$^2$ (68.48 ft/sec$^2$) |
| Atmosphere Primary Components | hydrogen, helium |
| Effective Temperature at 1 bar | –108 deg C (–163 deg F) |
| Known Moons* | 50 |
| Rings | 1 (three major components) |

*Plus 17 awaiting official confirmation, total 67, as of July 2013.

## SIGNIFICANT DATES

1610 — Galileo Galilei makes the first detailed observations of Jupiter.
1973 — Pioneer 10 becomes the first spacecraft to cross the asteroid belt and fly past Jupiter.
1979 — Voyager 1 and 2 discover Jupiter's faint rings, several new moons, and volcanic activity on Io's surface.
1994 — Astronomers observe as pieces of comet Shoemaker–Levy 9 collide with Jupiter's southern hemisphere.
1995–2003 — The Galileo spacecraft drops a probe into Jupiter's atmosphere and conducts extended observations of Jupiter and its moons and rings.
2007 — Images taken by NASA's New Horizons spacecraft, on the way to Pluto, show new perspectives on Jupiter's atmospheric storms, the rings, volcanic Io, and icy Europa.
2009 — On July 20, almost exactly 15 years after fragments of comet Shoemaker–Levy slammed into Jupiter, a comet or asteroid crashes into the giant planet's southern hemisphere, creating a dark scar.

## ABOUT THE IMAGES




1 A natural-color image taken by the Cassini spacecraft as it flew by on its way to Saturn. Europa's shadow can be seen against the planet's cloud tops.

2 A Voyager 1 image of Jupiter's Great Red Spot.

3 A Hubble Space Telescope ultraviolet image of Jupiter's complex, glowing aurora. The bright spot with a curving tail at the right is the auroral footprint of the moon Io.

4 An artist's rendering of Jupiter's inner magnetosphere, showing magnetic field lines (connecting the north and south poles) and auroras, along with a region of intense radiation around the planet's middle.

## FOR MORE INFORMATION

*solarsystem.nasa.gov/jupiter*

*solarsystem.nasa.gov/planets/profile.cfm?Object=Jupiter&Display=Moons*

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