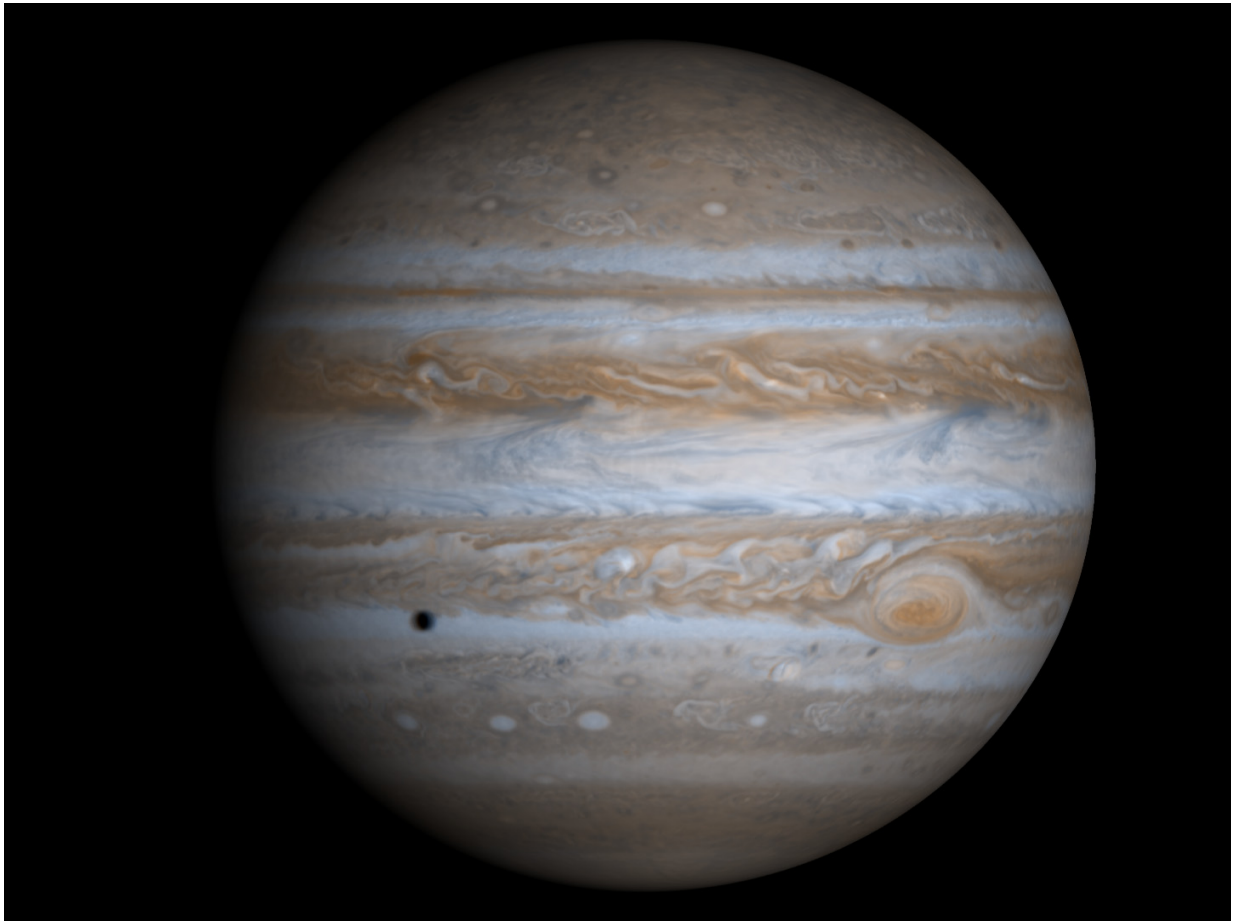
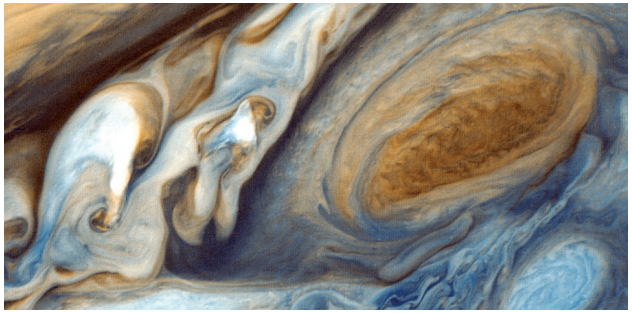
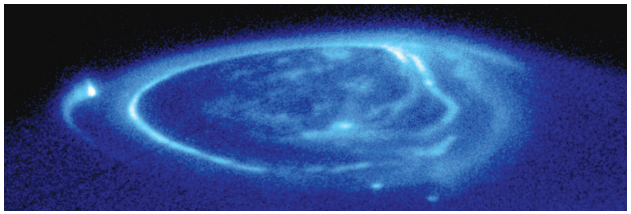
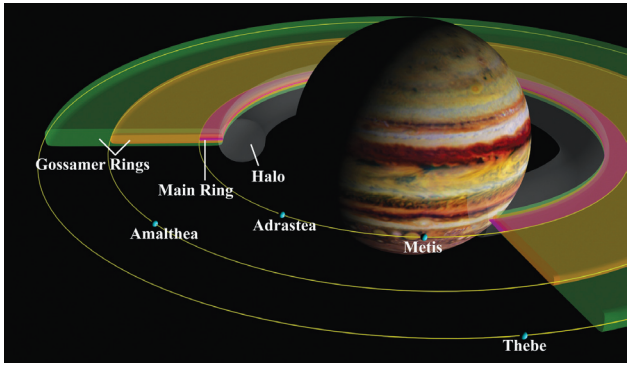
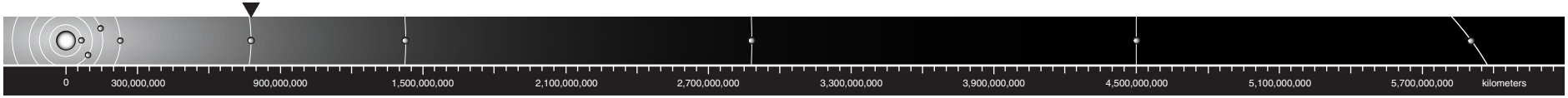







Gossamer Rings
Main Ring
Halo
Amalthea
Adrastea
Metis
Thebe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kilometers

Jupiter

The most massive planet in our solar system, with four large moons and many smaller moons, Jupiter forms a kind of miniature solar system. Jupiter resembles a star in composition. In fact, if it had been about 80 times more massive, it would have become a star rather than a planet.

On January 7, 1610, using his primitive telescope, astronomer Galileo Galilei saw four small "stars" near Jupiter. He had discovered Jupiter's four largest moons, now called Io, Europa, Ganymede, and Callisto. These four moons are known today as the Galilean satellites.

Newly discovered moons of Jupiter are reported by astronomers and acknowledged with a temporary designation by the International Astronomical Union; once their orbits are confirmed, they are included in Jupiter's large moon count. Including the "temporary" moons, Jupiter has 62 total.

Galileo would be astonished at what we have learned about Jupiter and its moons, largely from the NASA mission named after him. Io is the most volcanically active body in our solar system. Ganymede is the largest planetary moon and the only moon in the solar system known to have its own magnetic field. A liquid ocean may lie beneath the frozen crust of Europa, and icy oceans may also lie beneath the crusts of Callisto and Ganymede. Jupiter's appearance is a tapestry of beautiful colors and atmospheric features. Most visible clouds are composed of ammonia. Water vapor exists deep below and can sometimes be seen through clear spots in the clouds. The planet's "stripes" are dark belts and light zones created by strong east–west winds in Jupiter's upper atmosphere. Dynamic storm systems rage on Jupiter. The Great Red Spot, a giant spinning storm, has been observed for more than 300 years. In recent years, three storms merged to form the Little Red Spot, about half the size of the Great Red Spot.

The composition of Jupiter's atmosphere is similar to that of the Sun — mostly hydrogen and helium. Deep in the atmosphere, the pressure and temperature increase, compressing the hydrogen gas into a liquid. At depths about a third of the way down, the hydrogen becomes metallic and electrically conducting. In this metallic layer, Jupiter's powerful magnetic field is generated by electrical currents driven by Jupiter's fast rotation. At the center, the immense pressure may support a solid core of rock about the size of Earth.

Jupiter's enormous magnetic field is nearly 20,000 times as powerful as Earth's. Trapped within Jupiter's magnetosphere (the area in which magnetic field lines encircle the planet from pole to pole) are swarms of charged particles. Jupiter's rings and moons are embedded in an intense radiation belt of electrons and ions trapped by the magnetic field. The jovian magnetosphere, comprising these particles and fields, 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.

Discovered in 1979 by NASA's Voyager 1 spacecraft, Jupiter's rings were a surprise: a flattened main ring and an inner cloud-like ring, called the halo, are both composed of small, dark particles. A third ring, known as the gossamer ring because of its transparency, is actually three rings of microscopic debris from three small moons: Amalthea, Thebe, and Adrastea. 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 four small inner moons. The main ring probably is composed of material from the moon Metis. Jupiter's rings are only visible when backlit by the Sun.

In December 1995, NASA's Galileo spacecraft dropped a probe into Jupiter's atmosphere, which made the first direct measurements of the planet's atmosphere. The spacecraft then began a multiyear study of Jupiter and the largest moons. As Galileo began its 29th orbit, the Cassini–Huygens spacecraft was nearing Jupiter for a gravity-assist maneuver on the way to Saturn. The two spacecraft made simultaneous observations of the magnetosphere, solar wind, rings, and Jupiter's auroras.

NASA is planning a mission named Juno (launch expected in 2011) that will conduct an in-depth study from polar orbit around Jupiter, examining the planet's chemistry, atmosphere, interior structure, and magnetosphere.

FAST FACTS

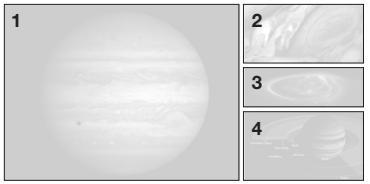
Namesake	King of the Roman gods
Mean Distance from the Sun	778.41 million km (483.68 million mi)
Orbit Period	11.8565 Earth years (4,330.6 Earth days)
Orbit Eccentricity (Circular Orbit = 0)	0.04839
Orbit Inclination to Ecliptic	1.305 deg
Inclination of Equator to Orbit	3.12 deg
Rotation Period	9.92 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	–148 deg C (–234 deg F)
Known Moons*	49
Rings	1 (three major components)

*Plus 13 awaiting official confirmation, total 62, as of September 2009.

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 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.

ABOUT THE IMAGES



1 A true-color image of Jupiter taken by the Cassini spacecraft. The Galilean moon Europa casts a shadow on the planet's cloud tops.

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

3 An ultraviolet image of a complex, glowing aurora, showing the main oval centered on the magnetic north pole. Electric currents generated by Io, Ganymede, and Europa produce emissions that flow along the magnetic field and appear as bright spots in the image.

4 A schematic of the components of Jupiter's intricate ring system.

FOR MORE INFORMATION

solarsystem.nasa.gov/jupiter

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

LG-2009-09-573-HQ — JPL 400-1344L 09/09