

# Unsolved mysteries about the solar system's biggest planet

July 1 2016, by Alicia Chang

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This composite image of photographs made by NASA's Cassini spacecraft on Dec. 29, 2000 shows the planet Jupiter. The photographs taken during the Cassini's closest approach to the gas giant at a distance of approximately 10

million kilometers (6.2 million miles). The Great Red Spot, a fierce storm larger than Earth, has been observed for centuries. But in recent years, it has been mysteriously shrinking. (NASA/JPL/Space Science Institute via AP)

Swirling storms. Dusty rings. Glowing polar lights.

Glimpses of Jupiter have been beamed back by robotic explorers since the 1970s. Most visits were brief and only one spacecraft spent time circling the planet. So there's still lots to learn about the biggest planet in the solar system and its four main moons.

NASA is headed to Jupiter again for what's promised to be the best views and most extensive exploration yet. Named for the king of the Roman gods, Jupiter is one of five [planets](#) visible with the naked eye. It's so massive that it could hold everything else in the solar system, minus the sun.

The Juno spacecraft, named after the Roman goddess who was Jupiter's wife, arrives Monday after a nearly five-year voyage. It will orbit the planet for over a year.

A look at what's still unknown about Jupiter:

## WATER

Like the sun, Jupiter is a ball of mostly hydrogen and helium. It was probably the first planet to form. Jupiter is 11 times wider than Earth and 300 times heavier. Juno will hunt for water in Jupiter's atmosphere, which may help explain how Earth got its water. Previous spacecraft found only a trace amount in Jupiter's atmosphere, but scientists think they didn't look deep enough. Juno carries an instrument that can pierce

through thick clouds to measure the water content.

## GREAT RED SPOT

A world of swirling clouds and colorful stripes, Jupiter's most prominent feature is the Great Red Spot, a fierce storm in the atmosphere larger than Earth that has lasted for centuries. In recent years, the spot has been mysteriously shrinking. Once an oval about 25,500 miles wide (41,036 kilometers) in the late 1880s, the spot shrank to its smallest observed size in 2014—the shape of a circle about 10,250 miles across (16,495 kilometers). Juno will study how deep into the atmosphere the Great Red Spot extends in an effort to understand what may happen next to Jupiter's trademark.



This composite image provided by NASA on Thursday, June 30, 2016 illustrates auroras on the planet Jupiter. This view was produced by NASA using a photograph made by the Hubble Space Telescope in spring 2014, and ultraviolet observations of the auroras in 2016. Earth's polar lights are triggered by solar storms, which occur when a cloud of gas from the sun encounters the planet's magnetic field. Jupiter's powerful auroras are sparked by the planet's own rotation. (NASA/ESA/Hubble via AP)

## AURORAS

Earth's dazzling southern and northern lights are dim compared to Jupiter's auroras, the brightest in the solar system. Earth's polar lights are triggered by solar storms, which occur when a cloud of gas from the sun slams into the planet's magnetic field. Jupiter's powerful auroras are sparked by the planet's own rotation. Jupiter is the fastest-spinning planet in the [solar system](#), taking just 10 hours to complete a rotation. As Jupiter spins, it drags its magnetic field around with it. Juno will observe the light show and learn about the driving forces behind it.

## POLAR REGIONS

The first peek of Jupiter's poles came in 1974 when Pioneer 11 flew by en route to Saturn. Juno will get a more detailed look by passing over Jupiter's polar regions. During the next year, the spacecraft will circle Jupiter 37 times from pole to pole—a path that will cover the whole planet. At its closest approach, Juno will skim within 3,100 miles (5,000 kilometers) of Jupiter's cloud tops.

**More information:** Mission: [tinyurl.com/jupitermission](http://tinyurl.com/jupitermission)

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Citation: Unsolved mysteries about the solar system's biggest planet (2016, July 1) retrieved 21 September 2024 from <https://phys.org/news/2016-07-unsolved-mysteries-solar-biggest-planet.html>

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