

NASA's Juno to circle Jupiter for 'planetary recipe'

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An artist's rendition released by NASA shows the Juno spacecraft orbiting Jupiter. The US space agency plans to launch next week a solar-powered spacecraft called Juno that will journey to the gassy planet of Jupiter in search of how the huge, stormy giant was formed.

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The \$1.1 billion unmanned orbiter is scheduled for launch on August 5 -- the start of a five-year odyssey toward the solar system's most massive planet in the hopes that it will be able to circle Jupiter for a period of a year.

With its fiery red eye and a mass greater than all planets in the [solar system](#) combined, excluding the Sun, Jupiter is intriguing to astronomers because it is believed to be the first planet that took shape around the Sun.

"After the Sun formed, it got the majority of the leftovers," said Scott Bolton, [Juno](#) principal investigator and scientist at the Southwest Research Institute in San Antonio, Texas.

"And that is why it is very interesting to us -- if we want to go back in time and understand where we came from and how the planets were made, Jupiter holds this secret," he said.

"So we want to know that ingredient list. What we are really after is discovering the recipe for making planets."

Juno aims to get closer to Jupiter than any other [NASA spacecraft](#) and will be the first to undertake a [polar orbit](#) of the planet, said Bolton.

In 1989, NASA launched Galileo, an orbiter and probe that entered the planet's [orbit](#) in 1995 and plunged into Jupiter in 2003, ending its life.

Other NASA spacecraft -- including Voyager 1 and 2, Ulysses and New Horizons -- have done flybys of the fifth planet from the Sun.

"We are getting closer to Jupiter than any other spacecraft has gone in

orbiting Jupiter. We are only 5,000 kilometers (3,100 miles) above the cloud tops," Bolton told reporters this week.

"And we are actually dipping down beneath the radiation belts which is a very important thing for us because those radiation belts are the the most hazardous region in the solar system other than going right to the Sun itself."

Its trip to Jupiter, set to begin on August 5 when the launch window opens at 11:34 am (1534 GMT), will not be a direct shot, according to Jan Chodas, Juno project manager at NASA's Jet Propulsion Laboratory in Pasadena, California.

"We launch from Earth in August, we swing out past the orbit of Mars, we do a couple of deep space maneuvers to fire the engine," Chodas told reporters.

Juno then heads back toward Earth, "and we do a flyby of Earth of about 500 kilometers in October 2013, and then we slingshot ourselves out towards Jupiter arriving in July 2016," she said.

When it gets there Juno will make use of a series of instruments, some of which were provided by European space agency partners Italy, Belgium and France, to learn about the workings of the planet and what is inside.

Two key experiments are to gauge how much water is in Jupiter and whether the planet "has a core of heavy elements at the center, or whether it is just gas all the way down," said Bolton.

Scientists also hope to learn more about Jupiter's magnetic fields and its big red knot, a storm that has been raging for more than 300 years.

"One of the fundamental questions is how deep are the roots to that red

spot? How does it maintain itself for so long?" Bolton wondered.

Back in 2003, when plans for Juno were being crafted, NASA briefly considered using some sort of nuclear fuel to power the spacecraft, but engineers decided it would be quicker and less risky to go with solar, he said.

Jim Green, director of the [planetary science](#) division at NASA headquarters in Washington, said Juno is part of a series of new planetary science missions, to be followed by Grail which is headed to the Moon in September and the Mars Science Laboratory set to take off in November.

"These missions are designed to tackle some of the toughest questions in planetary science, all about our origin and the evolution of the solar system," said Green.

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