

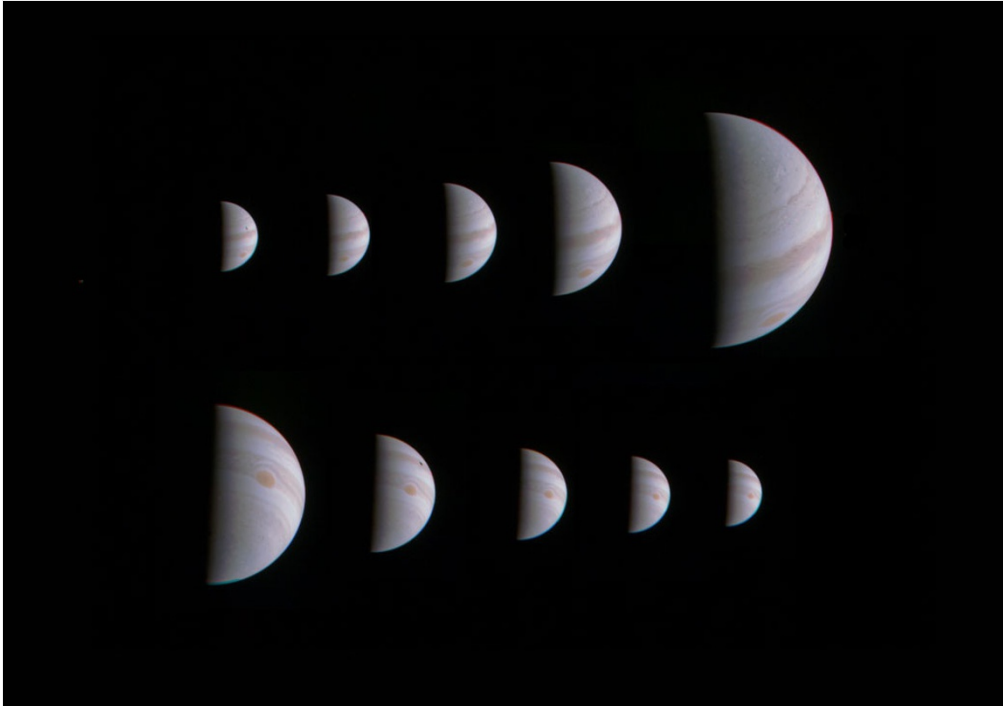
# Jupiter mission's computer glitch delays data-gathering

Juno probe goes into safe mode hours before second fly-by of the giant planet.

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NASA/JPL-Caltech/SwRI/MSSS

A composite image taken with JunoCam shows Jupiter on the spacecraft's 27 August fly-by, or perijove.

NASA's Juno spacecraft put itself into a temporary shutdown at 10:47 p.m. US Pacific Daylight Time on 18 October as it approached a fly-by of Jupiter. It was the mission's second glitch in a week, following a problem with its propellant system.

Juno remains safe and is looping around Jupiter on a 53.4-day elliptical orbit. But the spacecraft did not gather scientific data as it whizzed 5,000 kilometres above the giant planet's cloudtops on its second close pass [since arriving at Jupiter on 4 July](#).

"We'll just hang out for a couple of days while we figure out what went wrong," says Scott Bolton, a planetary scientist at the Southwest Research Institute in San Antonio, Texas, and the mission's principal investigator.

## Delayed burn

Juno slipped into 'safe mode', possibly in response to an onboard computer reboot, a little more than 13 hours ahead of its closest approach to Jupiter. The mission has been in safe mode several times since its 2011 launch; operations are typically restored within hours to days. Engineers are working through a series of steps to restore communications. If and when Juno starts talking again, they will turn towards resolving a separate, apparently unrelated propellant issue.

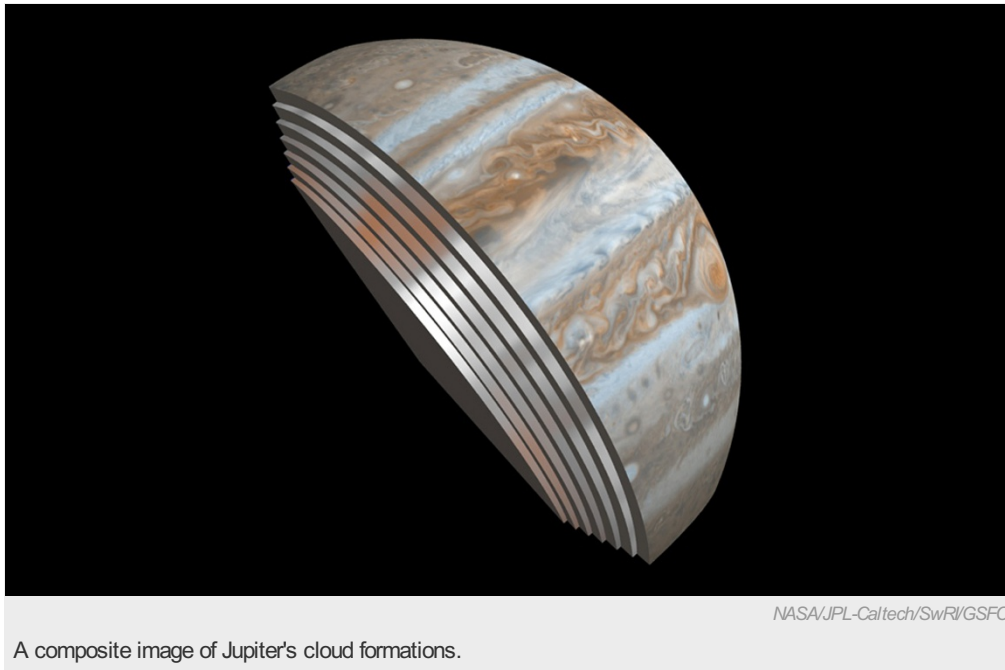
On 14 October, NASA announced that Juno would delay burning its engines as planned during the 19 October close fly-by, or perijove. The engine burn would have nudged the craft from its 53.4-day orbit to a 14-day orbit. But two helium valves needed for the procedure did not respond as expected while being pressurized in the lead-up to the burn. Mission managers decided to put it off, hastily scheduled a series of science observations for the upcoming perijove — and then, four days later, saw their spacecraft enter safe mode.

Juno can stay in its 53.4-day orbit indefinitely and still achieve nearly all of [the science it had been planning to gather at Jupiter](#), Bolton

says, including unravelling the mysteries of the planet's origin and whether or not it has a core. The science discoveries come mostly at each close fly-by, so stretching out the time between each perijove means that researchers gather data more slowly.

### An early look

Despite Juno's current issues, there was a spot of good news. Bolton presented early results from Juno's first, 27 August fly-by of Jupiter at a joint meeting in Pasadena, California, of the American Astronomical Society's Division for Planetary Sciences and the European Planetary Science Congress. The data included one of the best looks yet into Jupiter's deep swirling clouds.



A microwave instrument on Juno has found that Jupiter's atmospheric cloud bands extend as much as 400 kilometres deep into the gas giant — although the bands display new twists and turns the deeper they go. “Deep down Jupiter is similar but also very different from what we see on the surface,” Bolton says.

Juno's camera has captured new visual details on the storms that rage across Jupiter, such as the famous Great Red Spot. Unlike other spacecraft that have visited the gas giant, Juno is whizzing up and over the planet's poles, giving researchers the first-ever view of the northern and southern extremes. The spacecraft's first fly-by found that [Jupiter's north pole](#) lacks the mysterious hexagon of swirling clouds that dominate Saturn's north pole.

Another new image shows a towering cyclone, its clouds illuminated from the side as the Sun rises on Jupiter. At 7,000 kilometres across and 100 kilometres tall, “it is a truly towering beast of a storm”, Bolton says.

Other data not yet made public include information on Jupiter's powerful magnetic and gravity fields, as well as its shimmering auroras. “Every data set has a discovery aspect in it that we're in the middle of trying to understand,” says Bolton.

The next fly-by is scheduled for 11 December.

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### Updates

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**Updated:** NASA announced that Juno successfully recovered from safe mode on Monday, 24 October. The spacecraft fired its thrusters in preparation for its next close flyby in December.