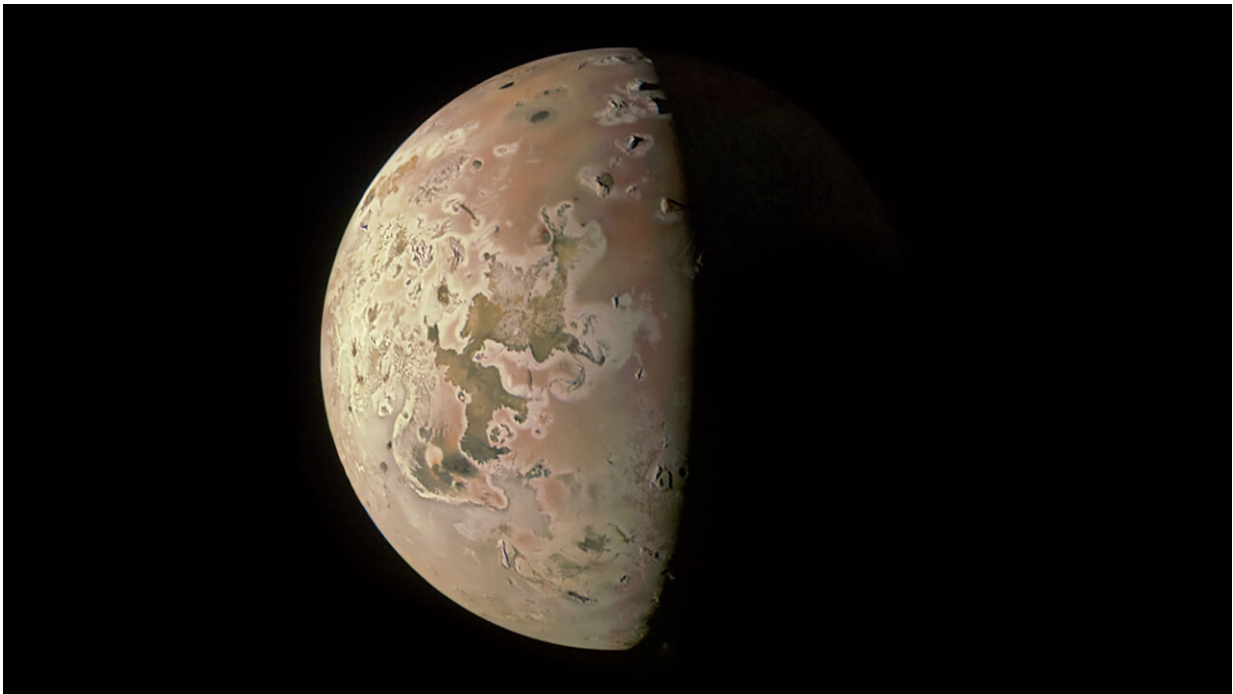


NASA's Juno to get close look at Jupiter's volcanic moon Io on Dec. 30

December 29 2023



This image revealing the north polar region of the Jovian moon Io was taken on October 15 by NASA's Juno. Three of the mountain peaks visible in the upper part of image, near the day-night dividing line, were observed here for the first time. Credit: Image data: NASA/JPL-Caltech/SwRI/MSSS, Image processing by Ted Stryk

NASA's Juno spacecraft will on Saturday, Dec. 30, make the closest flyby of Jupiter's moon Io that any spacecraft has made in over 20 years.

Coming within roughly 930 miles (1,500 kilometers) from the surface of the most volcanic world in our solar system, the pass is expected to allow Juno instruments to generate a firehose of data.

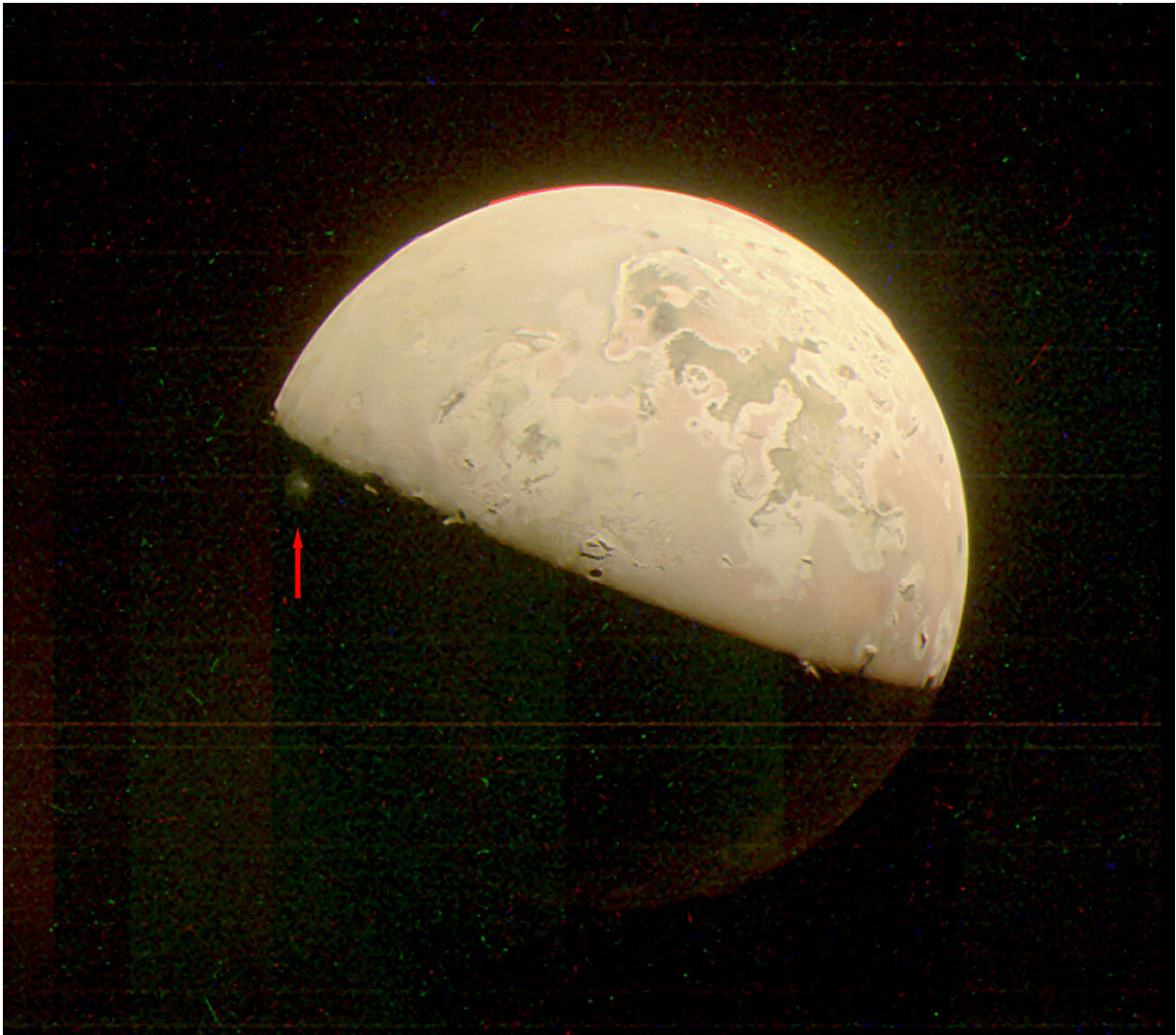
"By combining data from this flyby with our previous observations, the Juno science team is studying how Io's volcanoes vary," said Juno's principal investigator, Scott Bolton of the Southwest Research Institute in San Antonio, Texas. "We are looking for how often they erupt, how bright and hot they are, how the shape of the lava flow changes, and how Io's activity is connected to the flow of charged particles in Jupiter's magnetosphere."

A second ultra-close flyby of Io is scheduled for Feb. 3, 2024, in which Juno will again come within about 930 miles (1,500 kilometers) of the surface.

The [spacecraft](#) has been monitoring Io's volcanic activity from distances ranging from about 6,830 miles (11,000 kilometers) to over 62,100 miles (100,000 kilometers), and has provided the first views of the moon's north and south poles. The spacecraft has also performed close flybys of Jupiter's icy moons, Ganymede and Europa.

"With our pair of close flybys in December and February, Juno will investigate the source of Io's massive volcanic activity, whether a magma ocean exists underneath its crust, and the importance of tidal forces from Jupiter, which are relentlessly squeezing this tortured moon," said Bolton.

Now in the third year of its extended mission to investigate the origin of Jupiter, the solar-powered spacecraft will also explore the ring system where some of the gas giant's inner moons reside.



This JunoCam image of Jupiter’s moon Io captures a plume of material ejected from the (unseen) volcano Prometheus. Indicated by the red arrow, the plume is just visible in the darkness below the terminator (the line dividing day and night). The image was taken by NASA’s Juno spacecraft on October 15. Credit: NASA/JPL-Caltech/SwRI/MSSS

Picture this

All three cameras aboard Juno will be active during the Io flyby. The

Jovian Infrared Auroral Mapper (JIRAM), which takes images in infrared, will be collecting the heat signatures emitted by volcanoes and calderas covering the moon's surface. The mission's Stellar Reference Unit (a navigational star camera that has also provided valuable science) will obtain the highest-resolution image of the surface to date. And the JunoCam imager will take visible-light color images.

JunoCam was included on the spacecraft for the public's engagement and was designed to operate for up to eight flybys of Jupiter. The upcoming flyby of Io will be Juno's 57th orbit around Jupiter, where the spacecraft and cameras have endured one of the [solar system](#)'s most punishing radiation environments.

"The cumulative effects of all that radiation has begun to show on JunoCam over the last few orbits," said Ed Hirst, project manager of Juno at NASA's Jet Propulsion Laboratory in Southern California.

"Pictures from the last flyby show a reduction in the imager's dynamic range and the appearance of 'striping' noise. Our engineering team has been working on solutions to alleviate the radiation damage and to keep the imager going."

More Io, please

After several months of study and assessment, the Juno team adjusted the spacecraft's planned future trajectory to add seven new distant Io flybys (for a total of 18) to the extended mission plan. After the close Io pass on Feb. 3, the spacecraft will fly by Io every other orbit, with each orbit growing progressively more distant: The first will be at an altitude of about 10,250 miles (16,500 kilometers) above Io, and the last will be at about 71,450 miles (115,000 kilometers).

The gravitational pull of Io on Juno during the Dec. 30 flyby will reduce the spacecraft's orbit around Jupiter from 38 days to 35 days. Juno's

orbit will drop to 33 days after the Feb. 3 flyby.

After that, Juno's new trajectory will result in Jupiter blocking the sun from the spacecraft for about five minutes at the time when the orbiter is at its closest to the planet, a period called perijove. Although this will be the first time the solar-powered spacecraft has encountered darkness since its flyby of Earth in October 2013, the duration will be too short to affect its overall operation.

With the exception of the Feb. 3 perijove, the spacecraft will encounter solar eclipses like this during every close [flyby](#) of Jupiter from now on through the remainder of its extended mission, which ends in late 2025.

Starting in April 2024, the spacecraft will carry out a series of occultation experiments that use Juno's Gravity Science experiment to probe Jupiter's upper atmospheric makeup, which provides key information on the planet's shape and interior structure.

Provided by NASA

Citation: NASA's Juno to get close look at Jupiter's volcanic moon Io on Dec. 30 (2023, December 29) retrieved 29 April 2024 from <https://phys.org/news/2023-12-nasa-juno-jupiter-volcanic-moon.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--