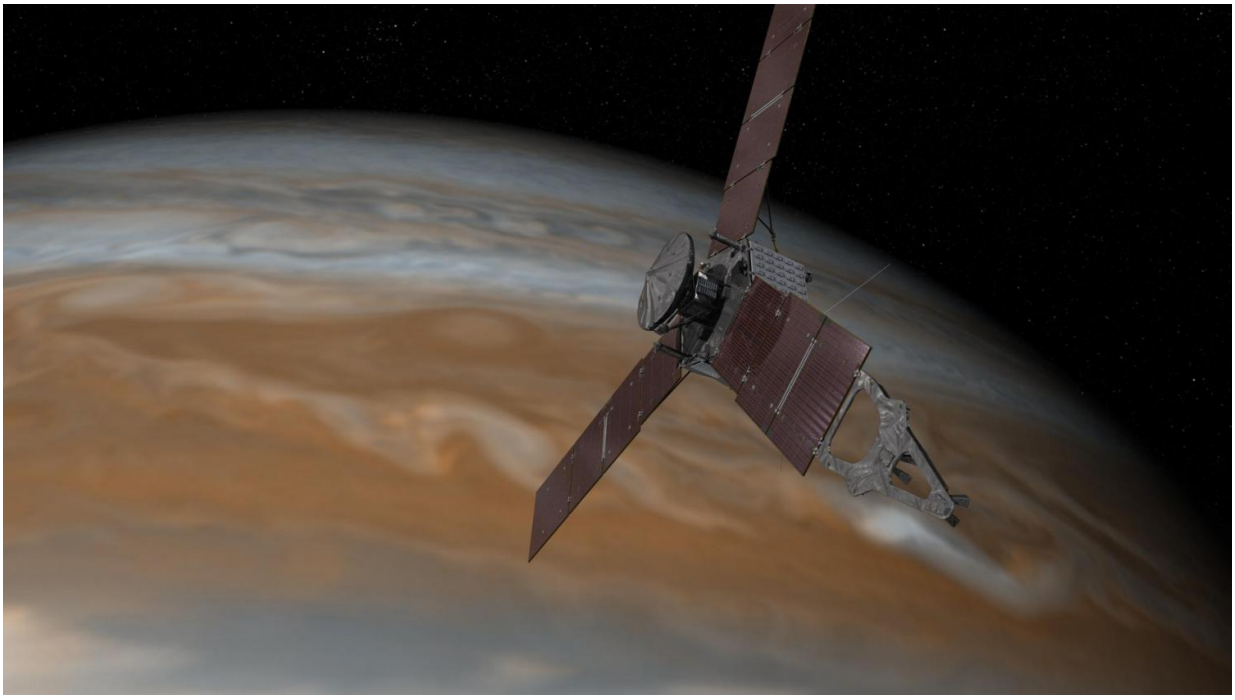
Juno spacecraft in safe mode for latest Jupiter flyby

October 19 2016, by Dwayne Brown



This artist's rendering shows NASA's Juno spacecraft making one of its close passes over Jupiter. This artist's rendering shows NASA's Juno spacecraft making one of its close passes over Jupiter. Credit: NASA/JPL-Caltech

NASA's Juno spacecraft entered safe mode Tuesday, Oct. 18 at about 10:47 p.m. PDT (Oct. 19 at 1:47 a.m. EDT). Early indications are a software performance monitor induced a reboot of the spacecraft's onboard computer. The spacecraft acted as expected during the

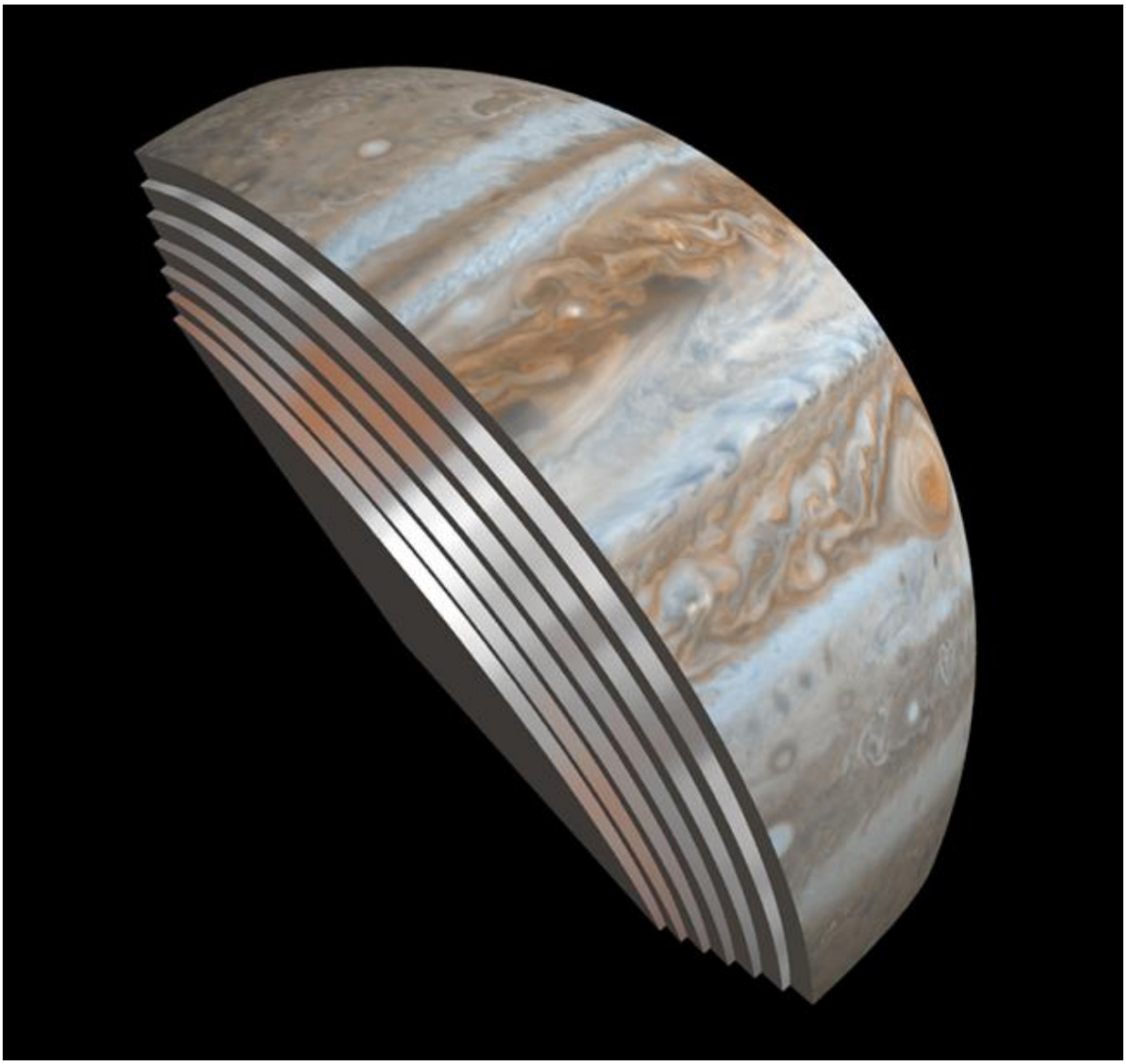
transition into safe mode, restarted successfully and is healthy. High-rate data has been restored, and the spacecraft is conducting flight software diagnostics. All instruments are off, and the planned science data collection for today's close flyby of Jupiter (perijove 2), did not occur.

"At the time safe mode was entered, the spacecraft was more than 13 hours from its closest approach to Jupiter," said Rick Nybakken, Juno project manager from NASA's Jet Propulsion Laboratory in Pasadena, Calif. "We were still quite a ways from the planet's more intense radiation belts and magnetic fields. The spacecraft is healthy and we are working our standard recovery procedure."

The spacecraft is designed to enter safe mode if its onboard computer perceives conditions are not as expected. In this case, the safe mode turned off instruments and a few non-critical spacecraft components, and it confirmed the spacecraft was pointed toward the sun to ensure the solar arrays received power.

Mission managers are continuing to study an unrelated issue with the performance of a pair of valves that are part of the spacecraft's propulsion system. Last week the decision was made to postpone a burn of the spacecraft's main engine that would have reduced Juno's orbital period from 53.4 to 14 days.

The next close flyby is scheduled on Dec. 11, with all science instruments on.



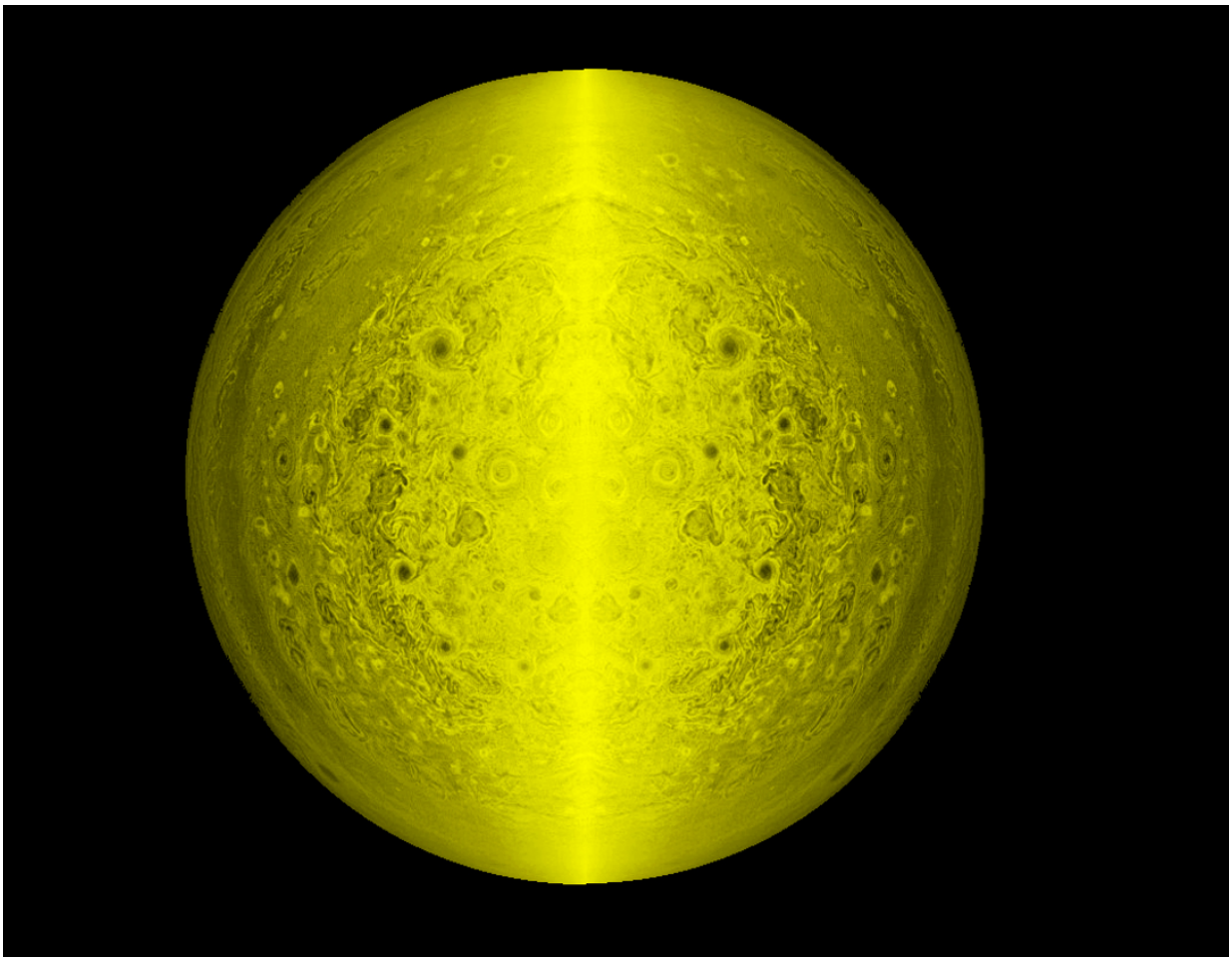
This composite image depicts Jupiter's cloud formations as seen through the eyes of Juno's Microwave Radiometer (MWR) instrument as compared to the top layer, a Cassini Imaging Science Subsystem image of the planet. Credit: NASA/JPL-Caltech/SwRI/GSFC

The Juno science team continues to analyze returns from the first close flyby on Aug. 27. Revelations from that flyby include that Jupiter's

magnetic fields and aurora are bigger and more powerful than originally thought. Juno's Microwave Radiometer instrument (MWR) also provided data that give mission scientists their first glimpse below the planet's swirling cloud deck. The radiometer instrument can peer about 215 to 250 miles (350 to 400 kilometers) below Jupiter's clouds.

"With the MWR data, it is as if we took an onion and began to peel the layers off to see the structure and processes going on below," said Bolton. "We are seeing that those beautiful belts and bands of orange and white we see at Jupiter's cloud tops extend in some version as far down as our instruments can see, but seem to change with each layer."

The JunoCam public outreach camera also was operating during the Aug. 27 flyby. The raw images from that flyby (and all future flybys) were made available on the JunoCam website (www.missionjuno.swri.edu/junocam) for the public to not only peruse but to process into final image products. JunoCam is the first outreach camera to venture beyond the asteroid belt.



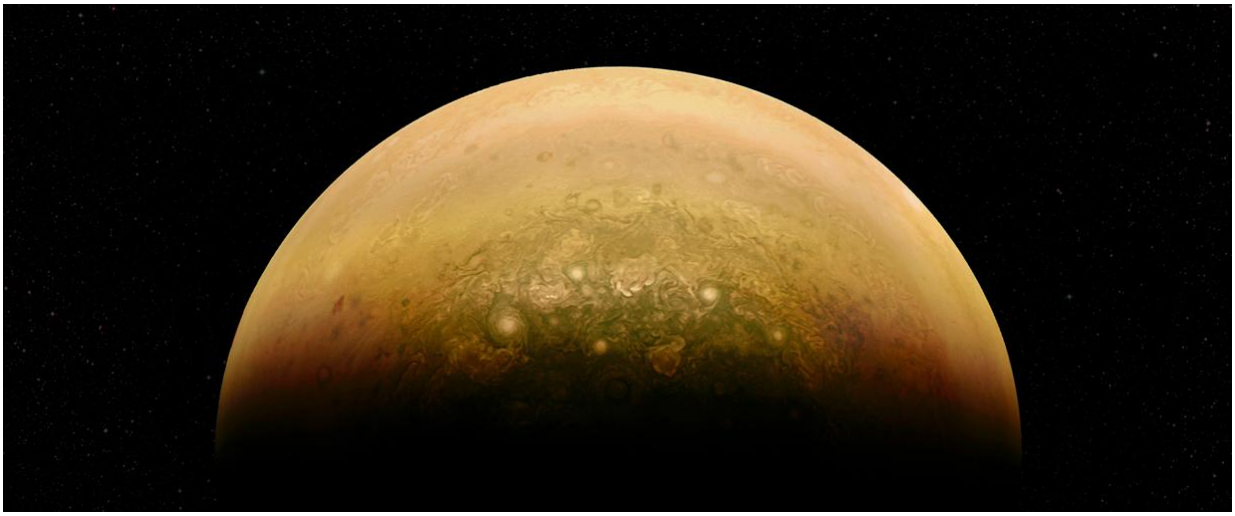
A smiley face can be seen in this image of Jupiter created by a citizen scientist (Randy Ahn) using data from Juno's JunoCam instrument. In JunoCam's view, Jupiter is only half-lit, so Ahn copied and flipped the half-smile to make a full smile out of Jupiter's swirling atmosphere. Credit: NASA/JPL-Caltech/SwRI/MSSS/Randy Ahn

"JunoCam has a small operations team and no image processing team, so we took a leap of faith that the public would step up and help us generate images of Jupiter from the raw data," said Candy Hansen, JunoCam imaging scientist from the Planetary Science Institute in Tucson, Arizona. "All sorts of people are coming to the JunoCam site and

providing their own aesthetic. We have volunteers from all over the world, and they are doing beautiful work. So far all our expectations for JunoCam have not only been met but are being exceeded, and we're just getting started."

The final image products include straightforward images of the solar system's largest world, but also some with a certain artistic license, including a variation on Vincent Van Gogh's Starry Night painting and even a "smiley face" made from an image of Jupiter's south pole. These amateur-generated JunoCam images are not only being used to help interest the media and public in this mission to the most massive planet in the solar system, but are engaging Juno's science team as well.

"The amateurs are giving us a different perspective on how to process images," said Hansen. "They are experimenting with different color enhancements, different highlights or annotations than we would normally expect. They are identifying storms tracked from Earth to connect our images to the historical record. This is citizen science at its best."



This image of the sunlit part of Jupiter and its swirling atmosphere was created by a citizen scientist (Alex Mai) using data from Juno's JunoCam instrument. Credit: NASA/JPL-Caltech/SwRI/MSSS/Alex Mai

The Juno spacecraft launched on Aug. 5, 2011, from Cape Canaveral, Florida, and arrived at Jupiter on July 4, 2016. During its mission of exploration, Juno soars low over the planet's cloud tops—as close as about 2,600 miles (4,100 kilometers). During these flybys, Juno will probe beneath the obscuring cloud cover of Jupiter and study its auroras to learn more about the planet's origins, structure, atmosphere and magnetosphere.

Juno's name comes from Roman mythology. The mythical god Jupiter drew a veil of clouds around himself to hide his mischief, and his wife—the goddess Juno—was able to peer through the clouds and reveal Jupiter's true nature.

Provided by NASA