# The rich variety in the meteorological phenomena at Jupiter's Great Red Spot revealed

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Credit: NASA

A study conducted by an international team of researchers led by

Agustín Sánchez-Lavega, professor of Physics at the UPV/EHU, reveals the existence of a rich diversity in the atmospheric phenomena confined inside Jupiter's spot as a result of the intense hurricane winds blowing around its periphery at speeds of about 450 km/hour.

The results are published in the *Astronomical Journal*. Jupiter's Great Red Spot, a long-lived, oval-shaped whirlwind measuring 20,000 km, is perhaps one of the most popular atmospheric phenomena in the solar system; according to this study, it contains cumulus clouds of clustered storms produced by the condensation of ammonia vapour, narrow gravity waves similar to those that form on the Earth when the wind blows on mountain summits. Yet calm reigns at its centre where the clouds move by rotating in the opposite direction at maximum speeds of only 25 km/hour.

"These phenomena are confined to a thin layer only 50 km thick, which represents the roof of the clouds of the spot, while inside, the spot probably goes down to a depth of a couple of hundred kilometres," say the researchers. They used the images taken by the JunoCam during its close flyby across the Great Red Spot. These and other aspects of this phenomenon are the focus of the research that the Juno mission will be conducting over the next few years.

The Great Red Spot, observed for the first time with certainty 150 years ago, shows up through the telescope owing to its reddish colour against the white, yellowish, ochre clouds contrasting with the rest of the planet. Despite the numerous studies conducted on the storm, its nature poses a huge challenge for planetary meteorologists.

NASA's Juno space mission, launched for the purpose of studying the deep atmosphere of Jupiter, the planet's interior and its complex magnetic field, went into orbit in July 2016. Among the scientific equipment it has on board is a camera called the JunoCam, designed to

capture images of the planet for the public and for encouraging citizen participation in science. The first images sent back from the environs of Jupiter suggested the potential scientific use of the camera, as it showed details of the atmosphere down to seven kilometers per pixel, a resolution never achieved previously.

Additionally, in another study by the Planetary Sciences Group led by Richard Hueso, the group looked at the impacts of meteorites on the atmosphere of Jupiter detected over the last few years by amateur astronomers around the world. Between 2010 and 2017, five flashes of light lasting barely a second caused by objects of between five and 20 metres in size were captured. Calculations indicate that between 10 and 65 impacts by objects of this size may take place every year on Jupiter, even though it is tricky to spot them.

**More information:** A. Sánchez-Lavega et al. The Rich Dynamics of Jupiter's Great Red Spot from JunoCam: Juno Images, *The Astronomical Journal* (2018). DOI: 10.3847/1538-3881/aada81

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