Gemini Captures Close Encounter of Jupiter's Red Spots

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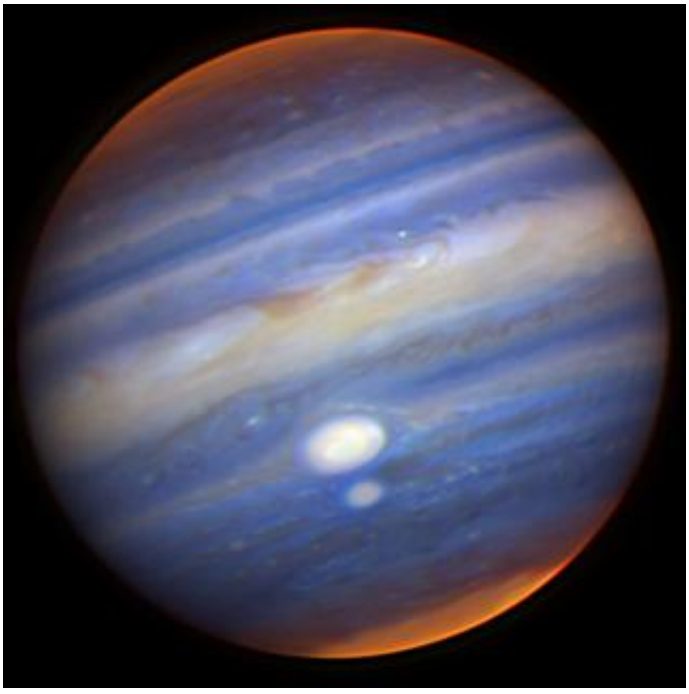

In this colour composite image, white indicates cloud features at relatively high altitudes; blue indicates lower cloud structures; and red represents still deeper cloud features. The two Red Spots appear more white than red, because their tops hover high above the surrounding clouds. Also prominent is the polar stratospheric haze, which makes Jupiter bright near the pole (unlike the other orange/red features in this image, the polar haze is high in Jupiter's atmosphere). Other tiny white spots are regions of high cloud, like towering thunderheads. In visible light Jupiter looks orangish, but in the near-infrared the blue colour is due to strong absorption features. The blue mid-level clouds are also closest to what one would see in a visual light image.

A high-resolution image just released by the Gemini Observatory shows two giant red spots brushing past one another in Jupiter's southern hemisphere.

The image was obtained in near infrared light using adaptive optics which removed most of the distortions caused by turbulence in Earth's atmosphere. The result is a view from the ground that rivals images from space.

"It was tricky getting this picture," said Gemini astronomer Chad Trujillo who helped lead the effort to capture the image. "Since we used adaptive optics we needed a star-like object nearby to guide on, so we had to find a time when Jupiter's moon Io would appear close enough to Jupiter and the red spots would be optimally placed on Jupiter's disk. Fortunately it all worked out on the evening of July 13th and we were able to capture this relatively rare set of circumstances," said Trujillo.

Professor Steve Miller of University College London is a keen Jupiter-watcher and said The latest images from Gemini are truly amazing in the detail that they show of these two major storm systems on Jupiter. It is now clear that they are lined up more or less "on top" of each other, with the smaller storm further south, closer to the South Pole.

Both red spots are massive storm systems. The larger one, known for a long time as the Great Red Spot, lies about 8 kilometres (5 miles) above the neighbouring cloud tops and is the largest hurricane known in the solar system. The smaller storm (officially called Oval BA, but informally known as Red Spot Junior) is another hurricane-like system. Since it appears nearly as bright as the Great Red Spot in near-infrared images, Red Spot Junior may be at a similar height in the Jovian atmosphere as the Great Red Spot.

Prof Miller added We have known for some time that the Great Red

Spot is at least three hundred and fifty years old. But the last decade has quite literally seen the birth of another enormous storm - known affectionately as Red Spot Junior - so large that it would completely engulf the Earth. This storm has formed by the merger of three smaller storms. When Red Spot Junior was first noticed it was lagging behind the Great Red Spot by about 90 degrees of Jovian longitude. Since Jupiter takes ten hours to rotate on its axis - a Jovian day is 9 hours 54 minutes - you could say that Red Spot Junior was two and a half hours behind the Great Red Spot.

But the latest Gemini images show that Junior has caught up with the Great Red Spot, and it will overtake it over the coming weeks and months. That is clear proof of the way that different parts of Jupiter's atmosphere are rotating at very different speeds, generating huge wind-shears.

Red Spot Junior is roughly half the size of its famous cousin, but its winds blow just as strong. This mighty new storm formed between 1998 and 2000 from the merger of three long-enduring white ovals, each a similar storm system at a smaller scale, which had been observed for at least 60 years. But it was not until February 27th of this year that Philippine amateur astronomer Christopher Go discovered that the colour of the newly formed white oval had turned brick red. Astronomers were witnessing the birth of a new red spot.

No one is certain why this white oval turned red. However, University of Hawaii astronomer Toby Owen supports a hypothesis developed by New Mexico State University astronomer Rita Beebe, who suggests that the merger of the three white ovals led to an intensified storm system. This made it strong enough to dredge up reddish material from deeper depths in the atmosphere. As this material wells up in the middle of the spot, it becomes contained (or protected) from escape by the strong circulating currents at the spot's edges. "What's frustrating is that we don't know

what that reddish material is," Owen said. "But it appears the ability to dredge it up depends on the size of these oval storm systems."

Another popular hypothesis contends that the material dredged up from below Jupiter's visible clouds climbs to an altitude where the Sun's ultraviolet light chemically alters it to give it a reddish hue.

Each red spot is rotating with Jupiter at slightly different rates and over time, like passing cars on a highway, the two spots change relative positions causing periodic close passages like this. However, this is the first such passage since the new, smaller red spot intensified and turned red. A recent optical image from the Hubble Space Telescope was obtained in April of this year when the two spots were still separated by a considerable distance.

Full-Resolution JPEG | 164kb

Source: PPARC