Giant Storms Erupt on Jupiter

Jeanna Bryner

TWO giant plumes erupted recently on Jupiter, moving faster than any other Jovian feature and leaving global streaks of red cloud particles in their wake.

New analyses of the March 2007 outbursts suggest internal heat plays a significant role in generating such weather patterns.

The results, detailed in the Jan. 24 issue of the journal *Nature*, shed light on the inner workings of Jupiter's weather. Planetary scientists and meteorologists have puzzled over whether internal heat or sunlight (or both) powers Jupiter's stormy disturbances and jets.



Similar phenomena occurred in 1975 and 1990, but the most recent event has never been observed before with high-resolution modern telescopes.

Jovian outbursts

A team of astronomers monitored the development of the cloud activity in March 2007 using NASA's Hubble Space Telescope, the NASA Infrared Telescope Facility in Hawaii and telescopes in Spain's Canary Islands.

The two plumes erupted at middle northern latitudes, about 39,150 miles (63,000 kilometers) away from each other and raced across the planet at more than 375 mph (600 kph). The astronomers watched as each of the plumes mushroomed from its initial diameter to a whopping 1,245 miles (2,000 kilometers) in about a day.

Slower moving dark patches and bright features were shed in the wake of the plumes. In particular, the systems left behind a turbulent planetary-scale disturbance containing red cloud particles.

The chemical makeup and formation of these red aerosols is a bit of a mystery itself. "Nobody knows what its composition is," said lead study author Agustin Sanchez-Lavega of Universidad del Pais Vasco in Spain, "although in the Jovian atmosphere it is seen in the Great Red Spot and other smaller vortices," he told *SPACE.com*.

Considered the most powerful storm on Jupiter and perhaps in the entire solar system, the Great Red Spot spans twice as wide as our planet and is at least 300 years old.

Weather maker

Using their observations and computer models, the astronomers found the bright plumes formed in Jupiter's deep water clouds and then shot ice particles and water well above the visible clouds.

"The infrared images distinguish the plumes from lower-altitude clouds and show that the plumes are lofting ice particles higher than anyplace else on the planet," said study researcher Glenn Orton of NASA's Jet Propulsion Laboratory in Pasadena, Calif.

The researchers also found that despite the turmoil created as the plumes churned through the jet stream, once the plumes waned, the planet's jet stream remained nearly unchanged. This observation, along with computer models, suggests the jet stream extends more than 62 miles (100 kilometers) below the cloud tops where most sunlight gets absorbed.

Since sunlight is minimal there, the researchers say the results support the idea that Jupiter's jets are powered by internal heat. This hypothesis was first proposed based on 1995 observations made when the Galileo probe descended through Jupiter's upper atmosphere.

That's unlike what happens on Earth, where sunlight drives all weather. But for the outer planets, where the sun's reach can be minimal, a planet's internal heat might play a substantial role. At the extreme, distant Neptune releases twice as much heat as it takes in from sunlight, and it boasts winds reaching 1,500 mph (about 2,400 kph). The release of heat is part of the natural cooling of a planet, a process that begins at birth when a planet is at its hottest.

"All the evidence points to a deep extent for Jupiter's jets and suggest that the internal heat power source plays a significant role in generating the jet," Sanchez-Lavega said.

The astronomers found striking similarities between the March event and the two previous eruptions in 1975 and 1990. All three eruptions occurred with a periodic interval of about 15 to 17 years. In all three events, the plumes always appeared in the jet peak and moved at the same speed. In addition, the disturbances erupted with exactly two plumes each time. Scientists say the Jovian findings could have implications for understanding weather on Earth, where storms are also frequent and jet streams determine large-scale wind patterns.

Source: Internet