THE SOLAR SYSTEM'S wildest storms

Severe weather creates havoc on Earth but it's positively serene compared to storms on our neighbouring worlds

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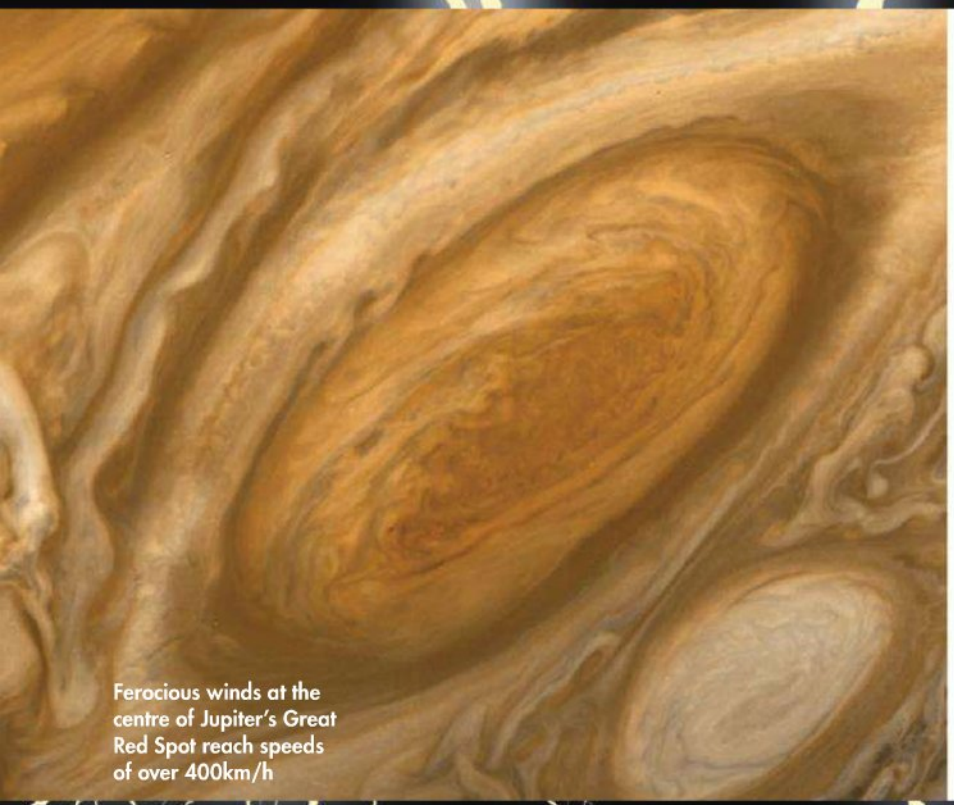


Ferocious winds at the centre of Jupiter's Great Red Spot reach speeds of over 400km/h

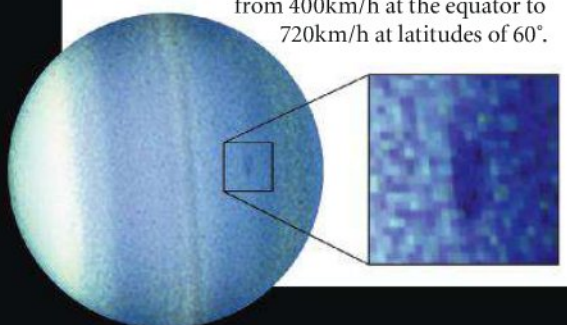
Jupiter's great storms

The giant planets are in a class of their own when it comes to storms – and Jupiter is king of the lot, with the largest atmosphere in the Solar System. This hydrogen gas planet, 143,000km in diameter, is in constant turmoil. The Jovian atmosphere is alive with activity, stratifying into dark belts and lighter zones, in which the winds travel in opposite directions. Jupiter also boasts spots, vortices and eddies.

Ninety per cent of vortices over 2,000km in diameter are anticyclones – areas of high pressure. These are confined to the zones and show up as white spots or ovals. Their wind speeds are around 360km/h. The most famous of these anticyclones is also the longest-lived storm in the Solar System: the Great Red Spot, with average wind speeds of over 400km/h. The first recorded sighting of this monstrous storm, which is three times larger than Earth, was by Heinrich Schwabe in 1831, though it is probably older than that. It may well swallow up smaller systems over time. Despite its name, the Great Red Spot has been both darker and lighter in the past, ranging from brown to salmon pink.

Uranus's dark materials

Beneath the seemingly featureless surface of Uranus lurks something sinister. The ice giant, composed of hydrogen, helium, methane and ammonia, shows dark vortices measuring 1,700km by 3,000km (pictured). These appeared around the time of Uranus's spring equinox, when the Sun was nearly above its equator. Since 2006, Hubble has spotted these as well as storms that circle the planet. Winds on Uranus range from 400km/h at the equator to 720km/h at latitudes of 60°.



Neptune's supersonic, anticyclonic storm

Neptune's most prominent feature is the Great Dark Spot; an anticyclonic storm around 13,000km by 6,600km in size. It was first spotted in 1989 by Voyager 2, which also spotted a smaller dark spot with clouds, dubbed 'the Wizard's Eye'. The Great Dark Spot can proudly boast the fastest winds in the entire Solar System: up to 2,400km/h, which is twice the speed of sound on Earth. The Great Dark Spot lasted a few years, finally disappearing in 1994. But then another one appeared in the planet's northern latitudes. Along with the spots, Voyager captured a cloud patch, nicknamed 'Scooter' because it zipped around faster than the Great Dark Spot.

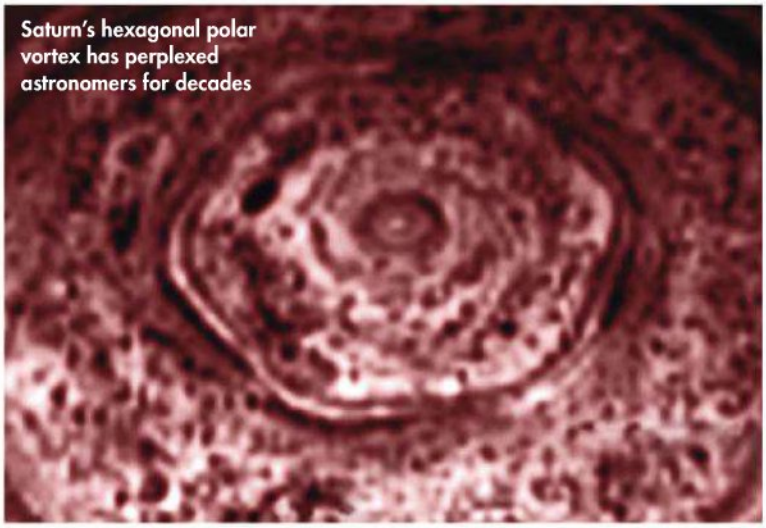
And the winner of the fastest winds in the Solar System goes to... Neptune's Great Dark Spot

Saturn's six-sided storm

Saturn's serene, vanilla-coloured exterior hides powerful forces. The planet has some of the fiercest winds in the Solar System, which can peak at 1,800km/h.

Since 2004, NASA's Cassini probe has been observing lightning and thunderstorms in a mid-latitude region of Saturn called 'storm alley'. In March 2010, astronomers observed an icy, white ammonia 'blizzard' in this region. Cassini's spectrometer found phosphine in the storm – a toxic gas that exists in the deeper layers. It suggests that material had been dredged up from 200km below.

What's more, Saturn boasts the most bizarre atmospheric feature of any planet: a hexagonal-shaped vortex. Both the Cassini and Voyager probes have snapped this long-lived feature, which at 25,000km across could accommodate the Earth inside it four times over. Thermal images show that it extends 100km down. It contrasts markedly with Saturn's south pole, which features a visually unremarkable vortex warmer than its surrounds (the only one of its kind known in the Solar System) and an eyewall – the inner edge of a hurricane. Why this difference, and what makes the northern vortex hexagonal? These mysteries remain but there has been some progress. In 2010, scientists recreated the hexagon in a spinning water tank.



Saturn's hexagonal polar vortex has perplexed astronomers for decades

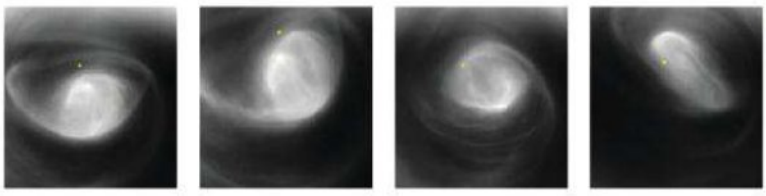
Venus's violent vortices

With surface temperatures of 465°C, acidic clouds and atmospheric pressures a hundred times greater than Earth's, Venus is often described as our planet's evil twin.

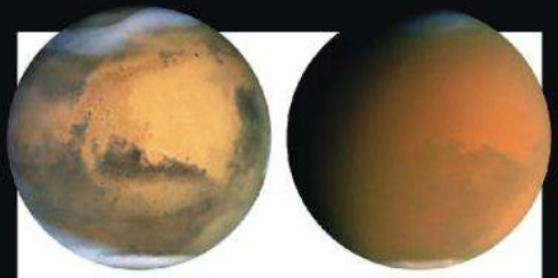
Venus makes a complete rotation every 243 Earth days. But its fastest winds sweep right around the planet every four Earth days. This is known as super-rotation and it's at least partly responsible for Venus's vortices. NASA's Pioneer Venus Mission spotted the north polar vortex in 1979, and in 2006 ESA's Venus Express probe went one better with the discovery of a double-eyed vortex at the south pole. Both vortices are similar in size, having diameters of 2,900km.

Recent observations by Venus Express have shown that the double-eye feature of the south vortex has now disappeared.

At latitudes above 65°, Venus's clouds are pushed by winds of roughly the same speed. Below that, wind speeds vary greatly with height, from 210km/h up to 370km/h.



ESA's Venus Express probe spotted a double-eyed vortex at Venus's south pole



26 June 2001 4 September 2001

Mars's dust storms

Sandstorms in the Sahara Desert can engulf everything, but they're nothing compared to Martian dust storms. These often enshroud the planet. One was spotted taking shape at the end of June 2007, and by mid-July it had covered the entire planet. They also warm the atmosphere, raising its temperature by tens of degrees, and absorb sunlight, very little of which can penetrate to the surface. It's not known why dust storms occur at this scale, but an atmospheric pressure that's one per cent of Earth's can only hold up the smallest grains. The dust on Mars is as fine as cigarette smoke.

Storms on Earth

Every world with an atmosphere experiences storms. Thankfully, storms on Earth aren't as extreme as those of other planets, but they do still cause major devastation. Hurricane Katrina (pictured above) killed nearly 2,000 people in 2005 and was also infamous for being the costliest storm ever, causing over $100 billion worth of damage. But it isn't the largest cyclone in recorded history. That dubious honour goes to Typhoon Tip, which originated in the northwestern Pacific in 1979 before making landfall in southern Japan. It spanned 2,200km and its wind speed was a ferocious 260km/h, peaking at 305km/h for brief periods. Amazingly, only 99 deaths were attributed to it. Cyclones like Typhoon Tip are rare but they demonstrate that, on occasion, Earth can be almost as inhospitable as other planets.

Call that a storm? Earth compared to Jupiter's Great Red Spot

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