

Saturn's famous hexagon towers above cloudtops

As wide as 2 Earths – like nothing seen on any other world – Saturn's hexagon was thought to be a feature of the lower atmosphere, where Saturn's weather happens. Now there's evidence it extends high above the cloudtops.

You can see Saturn's hexagon – an odd six-sided feature – surrounding its circular north polar vortex. Space scientists have been fascinated by the hexagonal feature at Saturn's north pole since the Voyager mission first discovered it in 1981. The hexagon – a jet stream in Saturn's atmosphere, moving at some 320 km/h — was believed to be a feature of Saturn's lower atmosphere, or troposphere, only. Now, however, as the seasons have passed on Saturn, this bizarre hexagon – which is wider than two Earths – appears to have changed. Writing in the peer-reviewed journal *Nature Communications* on September 3, 2018, scientists said they now have evidence that the hexagon extends to about 300 km above Saturn's cloudtops, up into this world's stratosphere, at least during Saturn's northern spring and summer.

The new work is a long-term study, using data from the Cassini spacecraft, which arrived at Saturn in 2004 and began observing the hexagon in 2006. Cassini's mission to Saturn ended in 2017, but scientists are still mining the mission's data (and will be for years to come). **Leigh Fletcher** of the University of Leicester, U.K., lead author of the new study, said:

The edges of this newly-found vortex appear to be hexagonal, precisely matching a famous and bizarre hexagonal cloud pattern we see deeper down in Saturn's atmosphere.

While we did expect to see a vortex of some kind at Saturn's north pole as it grew warmer, its shape is really surprising. Either a hexagon has spawned spontaneously and identically at two different altitudes, one lower in the clouds and one high in the stratosphere, or the hexagon is in fact a towering structure spanning a vertical range of several hundred kilometers.

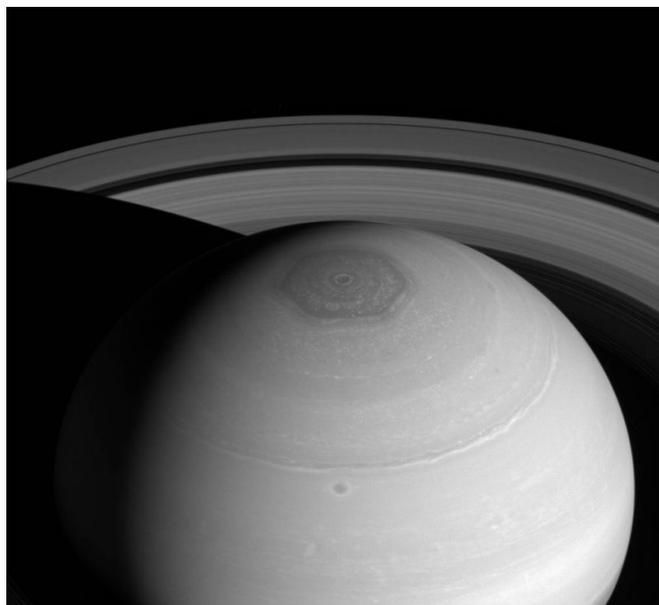
When Cassini arrived at Saturn in 2004, it was summer in that world's southern hemisphere and winter on the northern half of the globe. In the years since, the seasons shifted on Saturn, whose orbit around the Sun and, thereby, seasonal cycle, lasts 30 years. In Cassini's later years at Saturn, as summer approached that world's northern hemisphere, scientists did see a polar vortex at Saturn's north pole. The new work suggests this vortex forms high in the atmosphere too, also sitting hundreds of kilometres above the clouds, in Saturn's stratosphere.

Co-author **Sandrine Guerlet** from Laboratoire de Météorologie Dynamique, France added:

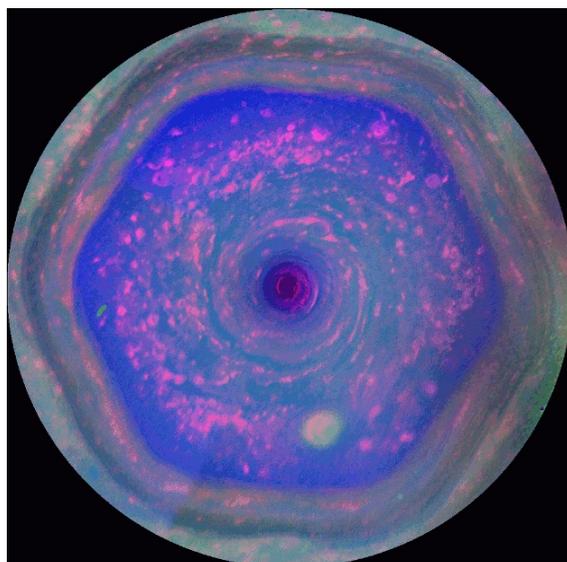
One Saturnian year spans roughly 30 Earth years, so the winters are long. Saturn only began to emerge from the depths of northern winter in 2009, and gradually warmed up as the northern hemisphere approached summertime.

As the polar vortex became more and more visible, we noticed it had hexagonal edges, and realised that we were seeing the pre-existing hexagon at much higher altitudes than previously thought. Just as on Earth, Saturn's troposphere – a lower layer of the atmosphere – is home to most of the planet's weather. The north polar hexagon was thought to reside in Saturn's troposphere and to be, essentially, a weather feature, such as the polar jet stream on Earth.

Could there be a fundamental asymmetry between Saturn's poles?



The Cassini spacecraft captured this image of the ringed planet Saturn on April 2, 2014.



Cassini captured images in 2012 used to create this picture of Saturn's northern polar hexagon.

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