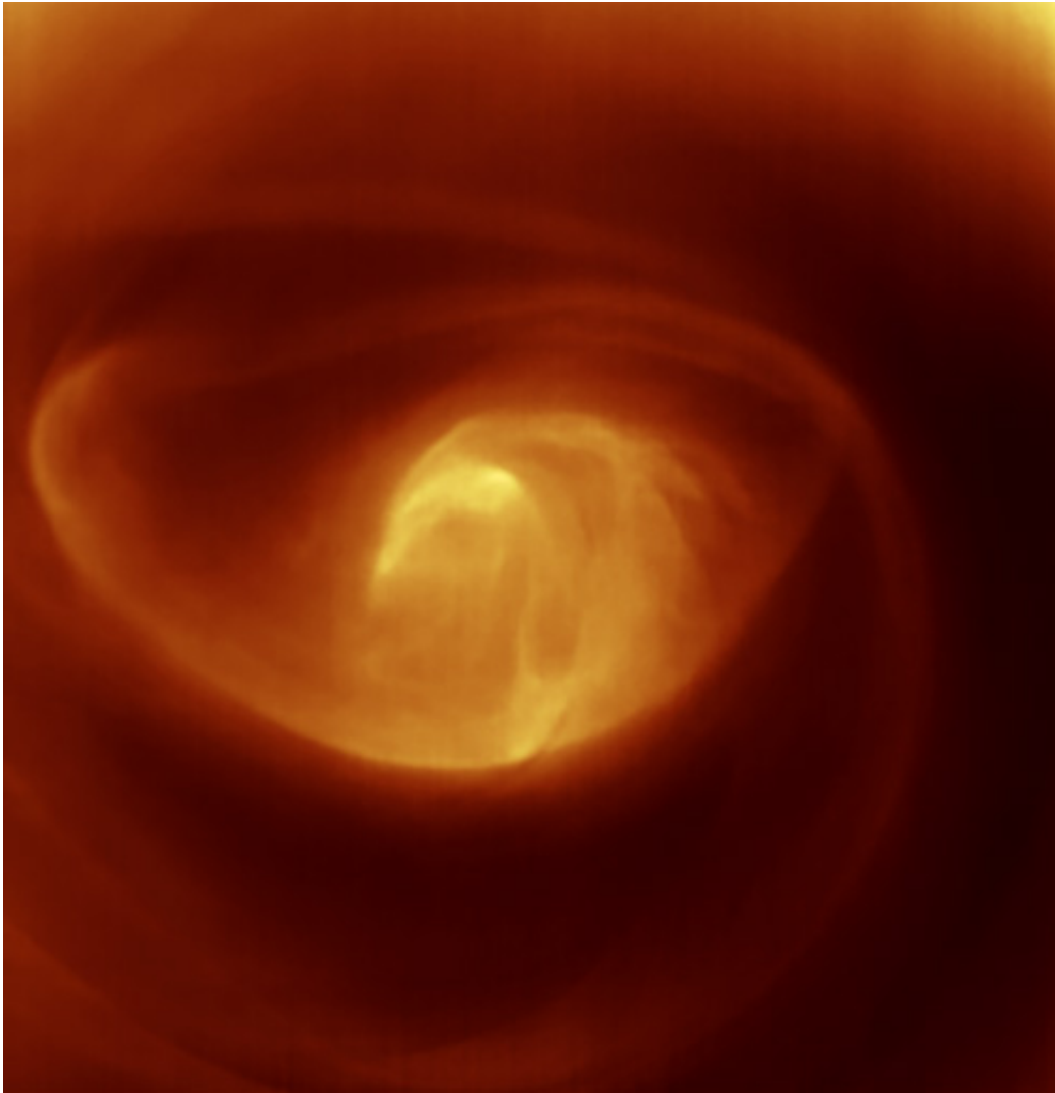


Image: Venus Express snaps swirling vortex

January 20 2015



Credit: ESA/VIRTIS/INAF-IASF/Obs. de Paris-LESIA/Univ. Oxford

This ghostly puff of smoke is actually a mass of swirling gas and cloud at

Venus' south pole, as seen by the Visible and Infrared Thermal Imaging Spectrometer (VIRTIS) aboard ESA's Venus Express spacecraft.

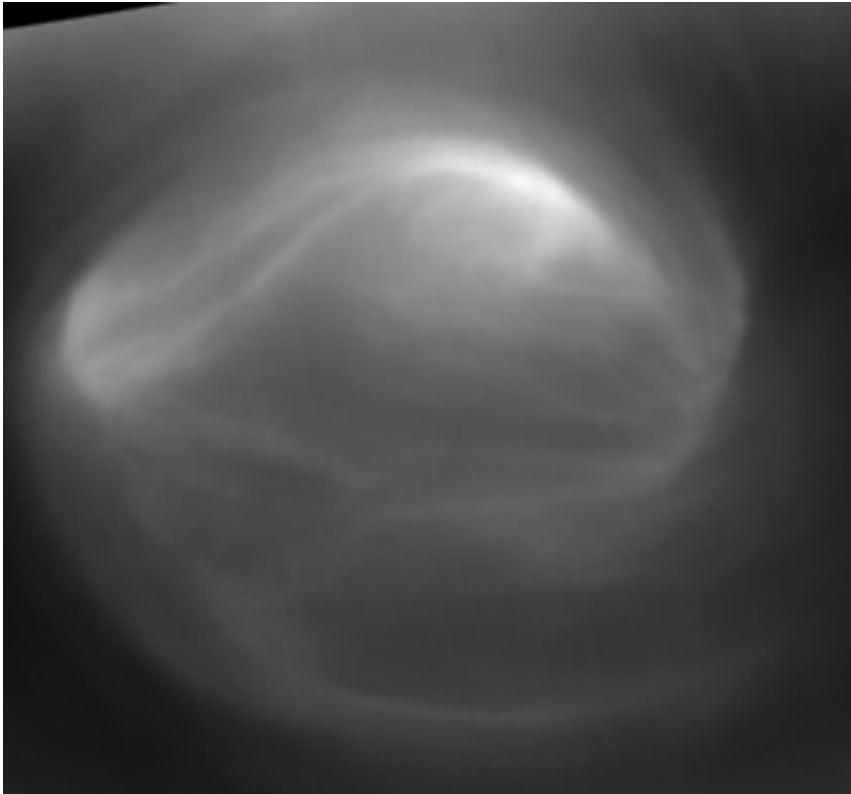
Venus has a very choppy and fast-moving atmosphere – although [wind speeds](#) are sluggish at the surface, they reach dizzying speeds of around 400 km/h at the [altitude](#) of the cloud tops, some 70 km above the surface. At this altitude, Venus' atmosphere spins round some 60 times faster than the planet itself. This is very rapid; even Earth's fastest winds move at most about 30% of our planet's rotation speed. Quick-moving Venusian winds can complete a full lap of the planet in just four Earth days.

Polar vortices form because heated air from equatorial latitudes rises and spirals towards the poles, carried by the fast winds. As the air converges on the pole and then sinks, it creates a [vortex](#) much like that found above the plughole of a bath. In 1979, the Pioneer Venus orbiter spotted a huge hourglass-shaped depression in the clouds, some 2000 km across, at the centre of the north polar vortex. However, other than brief glimpses from the Pioneer Venus and Mariner 10 missions in the 1970s, Venus' [south pole](#) had not been seen in detail until ESA's Venus Express first entered orbit in April 2006.

One of Venus Express' first discoveries, made during its very first orbit, was confirming the existence of a huge atmospheric vortex circulation at the south pole with a shape matching the one glimpsed at the north pole.

This south polar vortex is a turbulent mix of warming and cooling gases, all surrounded by a 'collar' of cool air. Follow-up Venus Express observations in 2007, including this image, showed that the core of the vortex changes shape on a daily basis. Just four hours after this image the vortex looked very different and a day later it had morphed into a squashed shape unrecognisable from the eye-like structure here.

A video of the vortex, made from 10 images taken over a period of five hours, can be seen below. The vortex rotates with a period of around 44 hours.



The dynamic nature of the South polar vortex can be seen in this video sequence, composed of images obtained on 7 April 2007. The video is composed of a series of ten images taken over a period of five hours at half-hourly intervals, at a wavelength of 3.9 micrometres. The vortex is rotating with a period of about 44 hours. In video, the point of view of the observer has been rotated at the same rate so that the vortex appears stationary in the centre of the image. These images were obtained as part of the ‘VIRTIS movie’ sequence, previously reported on 7 May 2007. This movie shows that the vortex is very complex, with atmospheric gases flowing in different directions at different altitudes. The bright region at the top-centre appears to be the most active region and its brightness suggests that it is where atmospheric gases are flowing downward. Extending leftward from this point is an ‘S’-shaped feature which is seen frequently in the polar vortex. A very similar feature was observed at the

northern polar vortex in 1979 by Pioneer Venus. Credit: ESA/VIRTIS/INAF-IASF/Obs. de Paris-LESIA/Univ. of Oxford

The swirling region shown in this VIRTIS image is about 60 km above the planet's surface. Venus' south pole is located just up and to the left of the image centre, slightly above the wispy 'eye' itself.

This image was obtained on 7 April 2007 at a wavelength of 5.02 micrometres. It shows thermal-infrared emission from the [cloud tops](#); brighter regions like the 'eye' of the vortex are at lower altitude and therefore hotter.

Provided by European Space Agency

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