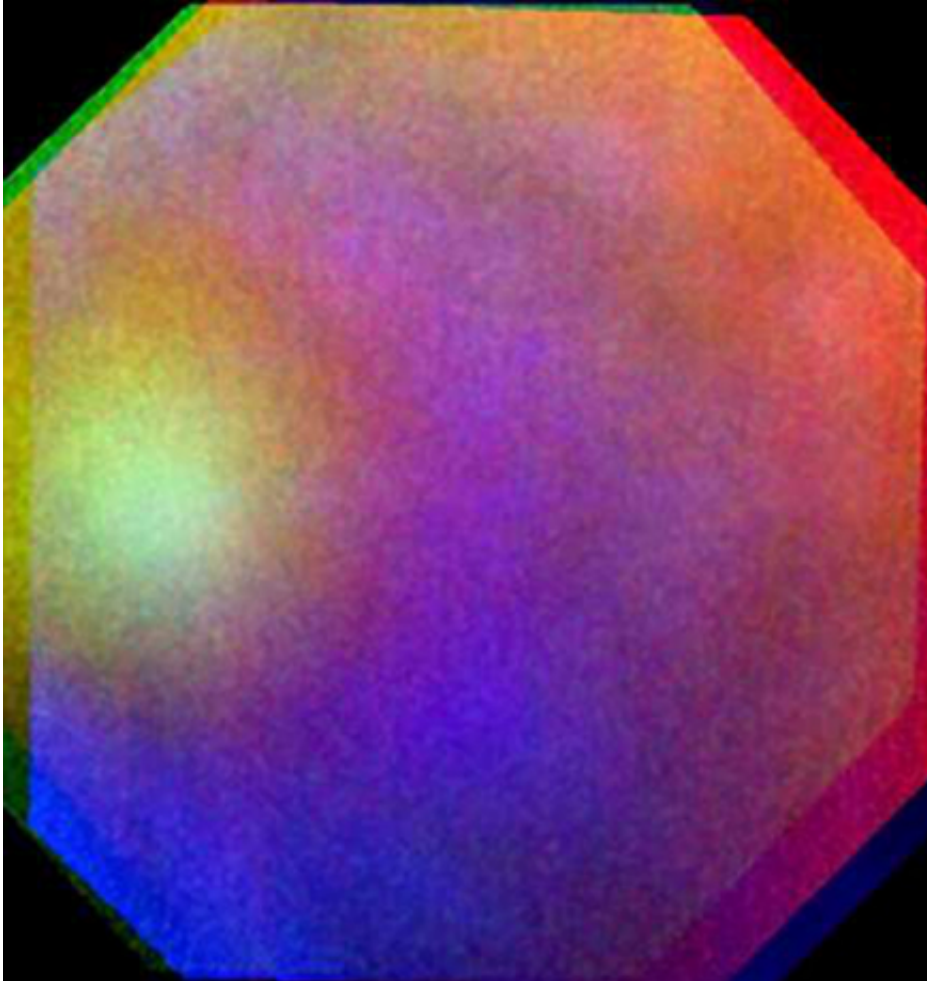


Venus Express spies rainbow-like 'glories'

March 11 2014



False colour composite of a 'glory' seen on Venus on 24 July 2011. The image is composed of three images at ultraviolet, visible, and near-infrared wavelengths from the Venus Monitoring Camera. The images were taken 10 seconds apart and, due to the motion of the spacecraft, do not overlap perfectly. The glory is 1200 km across, as seen from the spacecraft, 6000 km away. Credit: ESA/MPS/DLR/IDA

(Phys.org) —A rainbow-like feature known as a 'glory' has been seen by ESA's Venus Express orbiter in the atmosphere of our nearest neighbour – the first time one has been fully imaged on another planet.

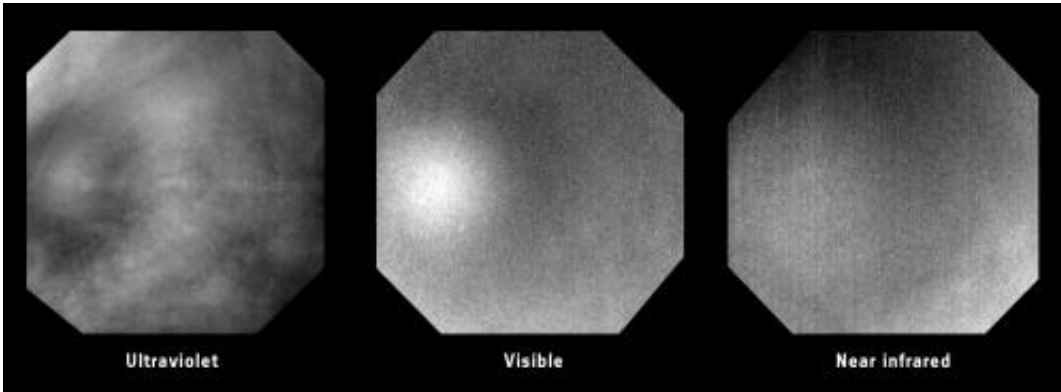
Rainbows and glories occur when sunlight shines on [cloud droplets](#) – [water particles](#) in the case of Earth. While rainbows arch across wide swathes of the sky, glories are typically much smaller and comprise a series of coloured concentric rings centred on a bright core.

Glories are only seen when the observer is situated directly between the Sun and the [cloud particles](#) that are reflecting sunlight. On Earth, they are often seen from aeroplanes, surrounding the shadow of the aircraft on the clouds below, or around the shadow of climbers atop misty mountain peaks.

A glory requires two characteristics: the cloud particles are spherical, and therefore most likely [liquid droplets](#), and they are all of a similar size.

The atmosphere of Venus is thought to contain droplets rich in sulphuric acid. By imaging the clouds with the Sun directly behind the Venus Express spacecraft, scientists hoped to spot a glory in order to determine important characteristics of the cloud droplets.

They were successful. The glory in the images here was seen at the Venus cloud tops, 70 km above the planet's surface, on 24 July 2011. It is 1200 km wide as seen from the spacecraft, 6000 km away.

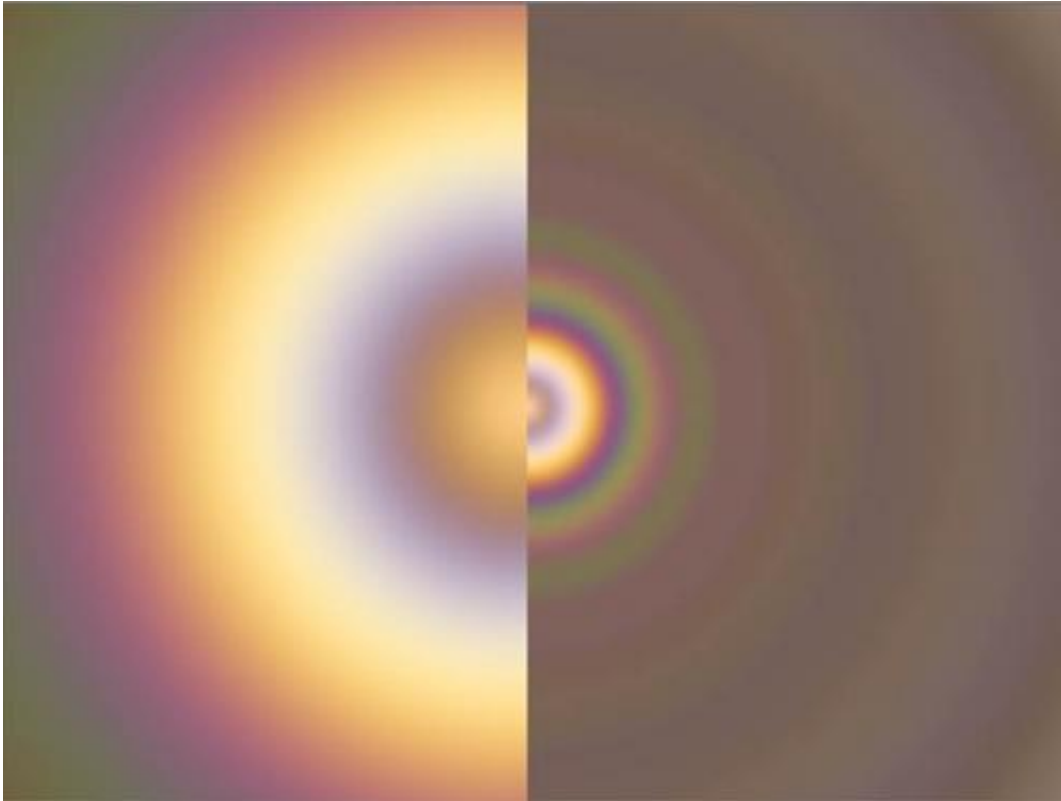


Three images showing the glory at ultraviolet (left,) visible (centre) and near-infrared (right) wavelengths as taken by the Venus Monitoring Camera. The feature was observed on 24 July 2011 and measures 1200 km across, as seen from the spacecraft, 6000 km away. Credit: ESA/MPS/DLR/IDA

From these observations, the cloud particles are estimated to be 1.2 micrometres across, roughly a fiftieth of the width of a human hair.

The fact that the glory is 1200 km wide means that the particles at the cloud tops are uniform on this scale at least.

The variations of brightness of the rings of the observed glory is different than that expected from clouds of only sulphuric acid mixed with water, suggesting that other chemistry may be at play.



Simulated views of the glory phenomena on Venus (left) and Earth (right), without considering any effects of haze or background cloud brightness. Glories occur when sunlight shines on cloud droplets – water particles in the case of Earth, sulphuric acid particles for Venus. The main difference between the appearance of the glory on Venus and on Earth is not because of composition, but rather the particle size. Cloud droplets on Earth are typically between 10 and 40 thousandths of a millimetre in diameter, but on Venus the droplets found at the cloud tops are much smaller, typically no more than 2 thousandths of a millimetre across. Because of this, the coloured fringes are further apart than they would appear on Earth. Credit: C. Wilson/P. Laven

One idea is that the cause is the "UV-absorber", an unknown atmospheric component responsible for mysterious dark markings seen in the [cloud tops](#) of Venus at ultraviolet wavelengths. More investigation is needed to draw a firm conclusion.

More information: "Glory on Venus Cloud Tops and the Unknown UV Absorber," by W.J. Markiewicz et al, is accepted for publication in *Icarus*. [dx.doi.org/10.1016/j.icarus.2014.01.030](https://doi.org/10.1016/j.icarus.2014.01.030)

Provided by European Space Agency

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