PRESS RELEASE

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Venus Express discovers hydroxyl in the atmosphere of Venus through its nightglow emission

Based on the article "First detection of hydroxyl in the atmosphere of Venus" by Piccioni et al.

To be published in *Astronomy & Astrophysics Letters*, 2008, volume 483-3, pp. L29.

Using observations from the Venus Express spacecraft, an international team of astronomers presents the first detection of hydroxyl (OH) in the atmosphere of Venus through its nightglow emission. Observing atmospheric airglow is a major tool for inferring the composition and chemistry of the upper planetary atmospheres. These results will be published in *Astronomy & Astrophysics*.

Astronomy & Astrophysics is publishing the first detection with the Venus Express spacecraft of hydroxyl (OH) in the atmosphere of Venus. The OH "radical" is a very special and reactive molecule, which is unusual in conventional chemistry because of its reactivity. Using the VIRTIS instrument onboard Venus Express, an international team of astronomers [1] observed the light emission from the night side of Venus's atmosphere and detected the presence of the OH radical in the spectra. The Venus Express spacecraft has been orbiting Venus for more than two years and has already provided planetologists with a handful of new results [2].

Just like the Earth, the atmosphere of Venus emits a very weak light caused by various processes occurring in the upper atmosphere. On Earth, this weak emission of light, known as airglow, was discovered in 1868. It is also referred to as nightglow because it can only be seen during the night. In the daytime, it is hidden by the much stronger light because of sunlight scattering. Observing atmospheric airglow is a major tool for inferring the composition and chemistry of the upper atmospheres of planets. For example, in Earth's atmosphere, the airglow from the OH radical, which was detected in 1948, was later found to play an important role in purging the atmosphere of pollutants harmful to the biosphere. Theoretical studies show that the hydroxyl airglow also plays an important role in the chemistry of Mars' atmosphere, but it has not yet been detected.

On Venus, airglow emissions have already been observed coming from nitrogen monoxide (NO) and oxygen dioxide (O_2). The VIRTIS team now reports measurements of four airglow emission lines: two from OH at 1.44 and 2.80 microns and two from O_2 at 1.27 and 1.58 microns. Figure 1 illustrates these detections. Except for the O_2 emission line at 1.27 micron, which has already been observed on Venus, all three of the other emission lines have never been observed before, neither on Venus nor on another planet besides Earth [3].

These new observations are the most direct information found yet of three key components of Venus's upper atmosphere: hydrogen, hydroxyl, ozone (O_3), and possibly perhydroxyl (HO_2).

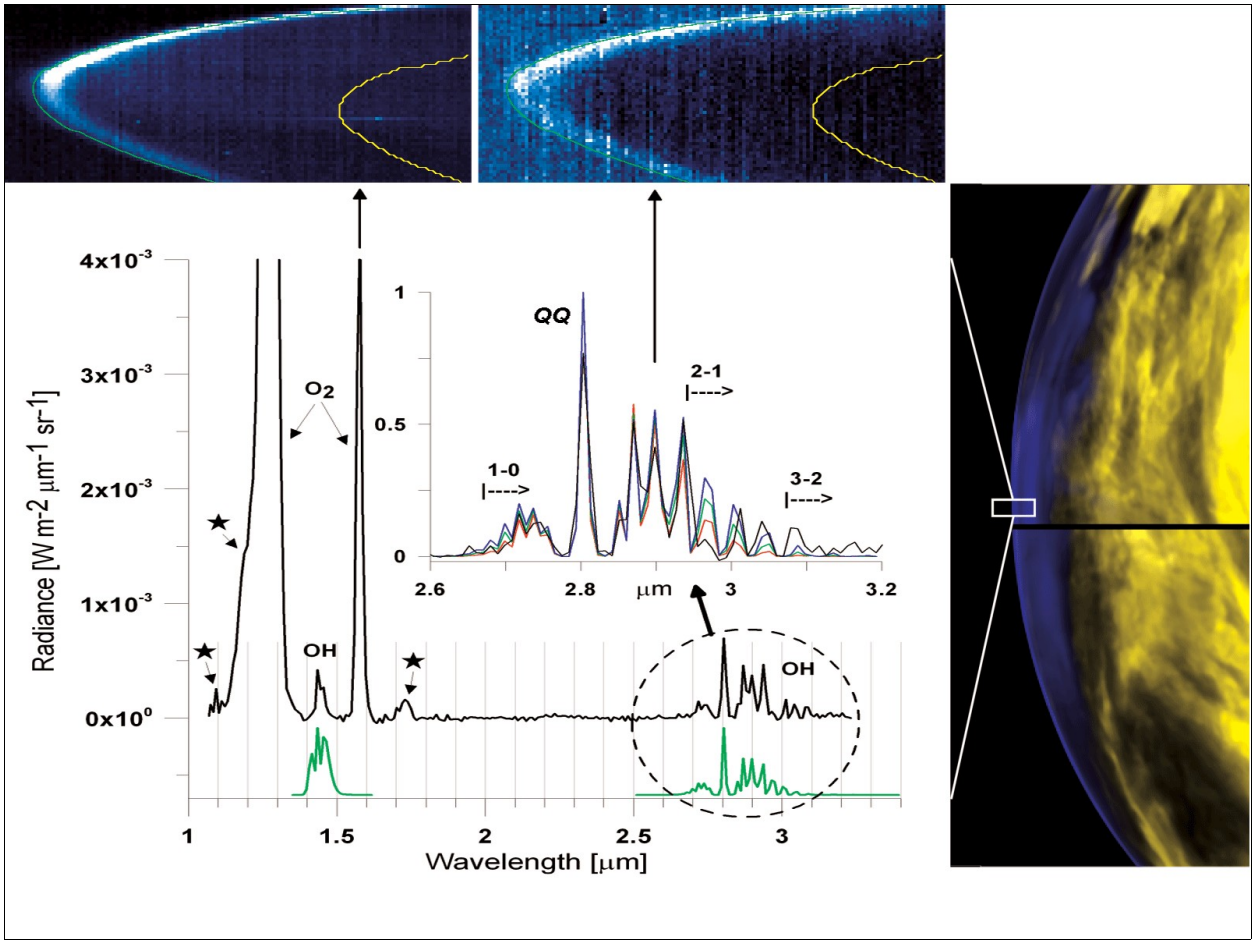

Figure 1. *Nightglow emission from OH and O_2 in the atmosphere of Venus. The spectrum shows the emission lines from OH (at 1.44 and 2.80 microns) and from O_2 (at 1.27 and 1.58 microns). Except for one of the O_2 emission lines, all three other features have never been observed before on another planet besides the Earth.*

[1] The team of astronomers includes G. Piccioni, A. Migliorini, V. Cottini (INAF-IASF, Roma, Italy), P. Drossart, S. Erard (LESIA, CNRS, France), L. Zasova, A. Shakun, N. Ignatiev (IKI, Russia), J-C Gérard (LPAP, Liège, Belgium), F.P. Mills, A. Garcia Munoz (Australian National Univ.), D. Grassi, (INAF-IFSI, Roma, Italy), F.W. Taylor (Oxford Univ., UK), and the VIRTIS-Venus Express Technical Team.

[2] Visit the Venus Express web site.

[3] While never detected before on another planet besides Earth, hydroxyl is frequently observed in the atmosphere of comets.

First detection of hydroxyl in the atmosphere of Venus, by G. Piccioni, P. Drossart, L. Zasova, A. Migliorini, J-C Gérard, F.P. Mills, A. Shakun, A. Garcia Munoz, N. Ignatiev, D. Grassi, V. Cottini, F.W. Taylor, S. Erard, and the VIRTIS-Venus Express Technical Team.
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