Venus comes to life at wavelengths invisible to human eyes

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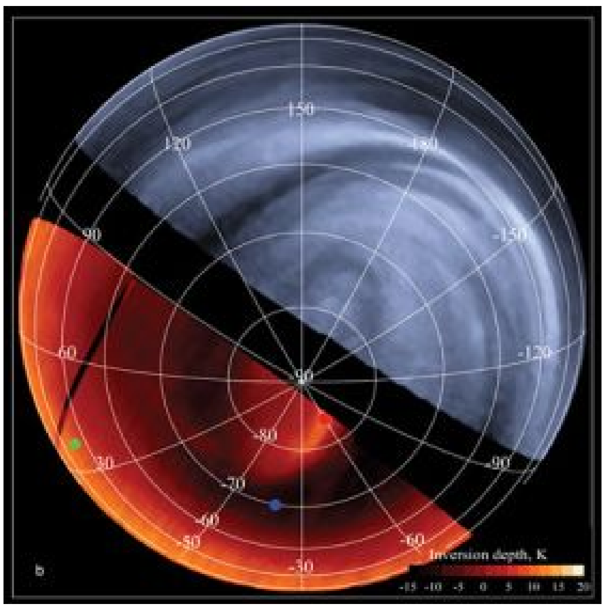

Using Venus Express, it is possible to compare what the planet looks like at different wavelengths, giving scientists a powerful tool with which to study this planet's turbulent atmosphere. The lower left shows a differential temperature map (not absolute values) of the venusian cloud tops, derived from the Visible and Infrared Thermal Imaging Spectrometer, VIRTIS, on the planet's night-side. The darker the region, the colder the cloud tops. To the upper right is an ultraviolet image of the venusian day side, captured by the Venus Monitoring Camera, VMC, simultaneously with the night-side infrared image. The ultraviolet reveals the structure of the clouds and the dynamical conditions in the atmosphere, whereas the infrared provides information on the temperature and altitude of the cloud tops. Credits: VMC ultraviolet image: ESA/MPS/DLR/IDA VIRTIS infrared image: ESA/VIRTIS/INAF-IASF/Obs. de Paris-LESIA

(PhysOrg.com) -- A pale yellow-green dot to the human eye, Earth's twin planet comes to life in the ultraviolet and the infrared. New images taken by instruments on board ESA's Venus Express provide insight into the turbulent atmosphere of our neighbouring planet.

Using Venus Express, it is possible to compare what the planet looks like in different wavelengths, giving scientists a powerful tool to study the physical conditions and dynamics of the planet's atmosphere.

Observed in the ultraviolet, Venus shows numerous high-contrast features. The cause is the inhomogeneous distribution of a mysterious chemical in the atmosphere that absorbs ultraviolet light, creating the bright and dark zones.

The ultraviolet reveals the structure of the clouds and the dynamical conditions in the atmosphere, whereas the infrared provides information on the temperature and altitude of the cloud tops.

With data from Venus Express, scientists have learnt that the equatorial areas on Venus that appear dark in ultraviolet light are regions of relatively high temperature, where intense convection brings up dark material from below. In contrast, the bright regions at mid-latitudes are areas where the temperature in the atmosphere decreases with depth. The temperature reaches a minimum at the cloud tops suppressing vertical mixing. This annulus of cold air, nicknamed the 'cold collar', appears as a bright band in the ultraviolet images.

Observations in the infrared have been used to map the altitude of the cloud tops. Surprisingly, the clouds in both the dark tropics and the bright mid-latitudes are located at about the same height of about 72 km.

At 60° south, the cloud tops start to sink, reaching a minimum of about 64 km, and form a huge hurricane at the pole.

Infrared image overlaid on ultraviolet images bring the giant hurricane's eye at the planet's south pole to life. Its centre is displaced from the pole and the whole structure measures about 2000 km across, rotating around the pole in about 2.5 days.

This study, carried out by D. Titov and colleagues, has revealed that variable temperature and dynamical conditions at the Venus cloud tops are the cause of the global ultraviolet pattern.

But the exact chemical species that creates the high-contrast zones still remains elusive, and the search is on.

Provided by European Space Agency

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