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Cloud-top altitude from limb views acquired by the Venus Monitoring Camera (VMC) on Venus Express

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A good knowledge of the effective cloud top altitude is essential for interpretation of cloud motions measured from Venus images taken in reflected sunlight at different wavelengths. Ignatiev et al. (2009) reported the first inferences of the cloud top altitude from nadir observations acquired by the Visible Infrared Thermal Imaging Spectrometer (VIRTIS) on Venus Express using the depth of the 1.6μ CO_2 continuum. Their results indicate that the cloud tops are 74 $\pm$ 1 km above the mean surface in low and mid-latitudes and at only 63-69 km in polar latitudes. The nominal cloud top altitude used in most previous analyses of imaging data are generally either 6115 and 6120 km radius, or 62.8 and 67.8 km respectively above the mean surface. The Level 3 map products generated from the VMC data use a cloud altitude of 65 km for all filters.

Given the large number of images acquired from the VMC since the insertion of Venus Express in orbit in April 2006, it is now possible to measure the altitude of the visible cloud top (slant optical depth, [U+F074] slant = 1) from the images. Preliminary results were presented by Limaye et al. (2011) by determination of the [U+F074] slant location in the VMC images and using the observing geometry information to determine the altitude by first determining the image center very precisely. We used star field images from recent orbits to re-assess the pixel size.

Results from the four filters of VMC (365, 513, 965 and 1010 nm central wavelengths) provide an improved value for the visible cloud top altitude using the improved values for the image scale of the four VMC cameras.

References

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