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Vertical structure of the Venus cloud tops from the joint analysis of the VeRa and VIRTIS observations onboard Venus Express

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Abstract

The temperature structure of the Venus mesosphere and upper troposphere is studied by two instruments onboard Venus Express. The radio science experiment (VeRa) uses the radio-occultation method [1]. The Visible and Infrared Thermal Imaging Spectrometer (VIRTIS) instrument measures thermal emission spectra in the 4.3 μm CO_2 absorption band from which temperature profiles are retrieved [2]. Comparison of the temperature profiles derived from the two experiments at similar latitudes and local solar time shows systematic discrepancies at 60-70 km (Figure 1). Since the thermal emission spectroscopy is affected by aerosols while the radio-occultation sounding is not, we suggest that the observed difference results from the presence of clouds with a-priori postulated structure in order to analyse the VIRTIS data. Any uncertainty in this aerosol model would cause systematic errors in the VIRTIS temperature retrieval.

Here we make an attempt to derive the aerosol vertical structure at the Venus cloud tops by fitting VIRTIS spectra at the 4.3 μm CO_2 band assuming that the temperature structure is known from the radio-occultation sounding. We assumed exponential cloud model and retrieved the altitude of the level of unit optical depth and the aerosol scale height. A modification of the Spherical Harmonics Discrete Ordinate Method (SHDOM) [3] that takes the gaseous absorption into account [4] is used to calculate VIRTIS synthetic spectra.

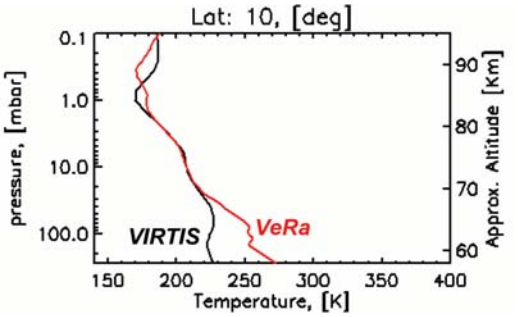

Figure 1: Comparison of the temperature structure of the Venus mesosphere from the VIRTIS (black) and VeRa (red) soundings.

References

[1] Tellmann, S. et al. (2008) *JGR*, 114, 9, E00B36.

[2] Grassi, D. et al. (2008) *JGR*, 113, 2, E00B09.

[3] Evans, K.F. (1998) *AMS*, 32, 429-446.

[4] Titov, D.V. and Haus, R. (1997) *Planet. Space Sci.*, 45, 369-377.