Radiative transfer models for VIRTIS observations on Venus Express

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Observations with VIRTIS imaging spectrometer on Venus have begun at the orbit insertion of Venus Express in May 2006. The many science objectives concern the surface characteristics, the deep atmosphere composition, the cloud and temperature structure of the mesosphere and the upper atmosphere emissions (Drossart et al, PSS 2007, Piccioni et al., Nature 2007, Drossart et al., Nature 2007). All these studies are strongly dependent on accurate radiative transfer modeling with very different range of models, which will be reviewed. The standard inversion for temperature structure retrieval is used in the CO_2 4.3 micron band. Atmospheric structure in the altitude range from 60 to 90 km is obtained, and spatial mapping over the South polar vortex has been obtained with an extensive 3D thermal structure retrieval. Deep atmosphere sounding on the night side for surface observations in the 1 to 1.3 micron windows, as well as composition measurements in 1.7 and 2.3 micron windows is strongly dependent on the accuracy of spectral data bases : high temperature database are needed for CO_2 and H_2O, with far wings parameters to correctly fit the observations. Finally upper atmosphere retrieval also depends on state of the art non-LTE models for CO_2 in day side fluorescence observations at 4.3 micron, as well as O_2 emission night side observations at 1.27 micron. Recent advances in the models will be presented, as well as future needs for more accurate data interpretation in the course of the Venus Express mission.