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Observations of Venus by VIRTIS on Venus Express

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VIRTIS is one of the instrument payload for the ESA mission Venus Express and it consists of two channels: VIRTIS-M, an imaging spectrometer with moderate spectral resolution in the range from 0.25 microns to 5 microns and VIRTIS-H, an high spectral resolution spectrometer in the range from 2 to 5um having its field of view within the field of view of -M. The resolution of VIRTIS-M is 2nm from 0.25 to 1 micron and 10 nm from 1 to 5 microns. The resolution of VIRTIS-H is about 2nm. Among the main scientific objectives of VIRTIS at Venus are: study of the lower atmosphere composition below the clouds and its variations (CO, OCS, SO2, H2O); study of the cloud structure, composition, and scattering properties; cloud tracking in the UV (˜70 km, day side) and IR (˜50 km, night side); measurements of the temperature field with subsequent determination of the zonal wind in the altitude range 60-100km (night side); lightning search (night side); mesospheric sounding; search for variations related to surface/atmosphere interaction, dynamics, meteorology, and volcanism; temperature mapping of the surface, search for hot spots related to volcanic activity; search for seismic waves from propagation of acoustic waves amplified in the mesosphere. After about one year in orbit, the VIRTIS observations of Venus started to address all of these topics and they provide information on various levels into the atmosphere. The atmosphere above the cloud are observed both on day and night side, in solar reflection and thermal emission. Limb observations gives access to mesospheric CO2 and CO emissions, through fluorescence observations : non-LTE modelling of CO2 and CO bands constrains the physical parameters of these layers. Spectroscopy of the 4-5 micron range with VIRTIS-M and -H channels gives access to thermal structure retrieval and cloud structure at the 60-90 km altitude levels. The deeper atmospheric windows, limited by CO2 and H2O bands are accessible only in thermal emission on the night side. The sounded levels at 2.3, 1.7 microns are limited respectively to 30-20 km altitude, when at shorter wavelength (1.18, 1.10, 1.01, 0.9 and 0.85 microns), the hot surface of Venus is seen through the scattering clouds. A review of the main

results achieved by VIRTIS is given in this paper while a more detailed description is demanded to the specific talks in the relevant field.