Geophysical Research Abstracts,
Vol. 10, EGU2008-A-11015, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-11015
EGU General Assembly 2008

Venus surface properties from the analysis of the spectral slope @ 1.03-1.04 microns

E. Palomba (1), A. Longobardo (1,2), A.Zinzi(1), C. Tsang (3), G. Piccioni (4), J. Helbert (5), VIRTIS-Venus Express Team

(1) IFSI-INAF, Rome Italy, (palomba@ifsi-roma.inaf.it), (2) Università Federico II, Naples, Italy, (3) Atmospheric, Oceanic and Planetary Physics, Clarendon Laboratory, Oxford, UK, (4) IASF-INAF, Rome, Italy, (5) German Aerospace Center (DLR), Berlin-Adlershof, Germany.

The nightside near-infrared spectrum of Venus is opacity-dominated at all wavelengths, but the well known atmospheric windows at 1.0 μm, 1.10 μm, 1.18 μm, and 1.31 μm. The emission in the 1.0 μm window comes principally from the surface, while in the 1.10 μm and 1.18 μm the surface contribution is reduced to 40-50%. The 1.31 μm emission comes from the cloud deck in the low atmosphere of Venus between 50-70 Km.

In this work we analyse the nightside spectra taken by the VIRTIS instrument onboard the Venus Express to characterise some Venus surface properties. VIRTIS consists of two optical heads, VIRTIS-H (High Resolution) and VIRTIS-M (Mapper). The latter has two channels, infrared (1-5 μm) and visible (0.2-1 μm). Our analysis has been performed on the VIRTIS-M data with the support of the Magellan altimetry data. In addition to scattered sunlight removal and limb darkening correction, for every VIRTIS spectrum, we had to perform a fine-tuning for the wavelength vector. Once a corrected dataset has been created we started our analysis on the 1.0 μm window, i.e. the one with the stronger surface contribution in the IR channel To evaluate the surface emissivity and the temperature lapse rate we produced a bidimensional grid (surface emissivities, surface temperatures) of synthetic spectra at a 0.001 μm of spectral resolution, by using a radiative transfer model of the Venus atmosphere. For a dataset of 40 images we found that the best temperature lapse rate is 8.5 K km^{-1}, slightly higher than the previous values given by the Venera probes. Since the slope between the 1.03

and 1.04 μm is strongly dependant from the surface emissivity only, once the temperature is known, we could extract the surface emissivity, pixel by pixel. Our first results show very low emissivity values, in contradiction with the high emissivity required to explain a basaltic material, believed to form the Venusian surface.

The study of the Venus surface emissivity allows, in principle, to search for the “hot pixels”, i.e. pixels with emissivity much larger than expected. These pixels, if grouped and located in volcanic areas, can reveal present volcanic activity. A very preliminary analysis of an early (and small) dataset of VIRTIS doesn’t show any indication of high emissivity areas on Venus.