Observing the surface of Venus with VIRTIS on Venus Express

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The M channel of VIRTIS will allow the first systematic mapping of the surface and of the near-surface atmosphere of Venus in the near infrared wavelengths range. This will be done using the atmospheric windows located at 1.10, 1.18 μm and if possible additionally using the window at 1.02 μm (Wattson and Rothman 1986, Kamp et al. 1988, Moroz 2002). The latter is unfortunately right at the low end of the wavelength range of the IR channel and at the upper end of the VIS channel. Therefore, the usability of this window is unclear until first data from Venus are obtained. The atmospheric windows will allow measuring the thermal emission of the surface as was demonstrated by Galileo/NIMS (Carlson et al. 1991) and Cassini/VIMS (Baines et al. 2000). While the atmospheric windows show no or little CO_2absorption the radiance from the surface is still affected by scattering in the clouds. This effect varies based on the optical thickness of the clouds. We have developed a quicklook processing procedure which allows deriving surface emissivity variations from nighttime observations correcting for the atmospheric effects. We will present the first version of this algorithm. During

the mission the algorithm will be refined based on the data returned from the different instruments on Venus Express. The final goal is to derive maps of the absolute surface emissivity. Based on these data two main science tasks for the surface analysis will be pursued: Classification of the surface composition, and study the interaction between low atmosphere and surface.

Furthermore the mapping of the variability of the surface temperature can be a direct indicator for active volcanism. Therefore VIRTIS will be the first instrument to routinely monitor the surface of Venus for volcanic activity.

The data VIRTIS can provide on the surface of Venus has never been obtained before in a systematic way. While the flybys of Galileo and Cassini have shown that the principle of using atmospheric windows to study surface variations is sound, VIRTIS will for the first time do a systematic surveyor of a large percentage of the surface of Venus. This dataset will be highly complementary to the existing data from surface investigation using radar and from the in-situ measurements at the landing sites. An integration of these datasets will significantly improve our understanding of the evolution of the surface of Venus.