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Atmospheric correction for VIRTIS VEX images of surface thermal emissions

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Spectral window regions close to 1 micron allow for the transfer of thermal radiation from the surface through the atmosphere of Venus. Results of radiative transfer modeling are used to invert VIRTIS images at 1.02 micron for thermal emission of the surface. Local atmospheric transmittance is derived from the VIRTIS band at 1.31 micron. Statistical analysis of VIRTIS Data allows to empirically find parameters to correct for scattering in the clouds. Thermal emission is dominated by surface temperature which is a function of surface altitude. Comparison of brightness temperature of atmospherically corrected surface emissions with Magellan altimetry indicates extinction in the lowest atmosphere to increase towards the surface. Actual temperature, scattering and absorption properties are not very well known in this layer, and no further correction for these properties is attempted. Instead local deviations of brightness are analyzed by stacking/mosaicking of images and comparison with Magellan SAR images. Tessera terrain frequently is less bright and several lava streams in the lada area show increased brightness. While this might indicate anomalous surface temperature it is unlikely that such temperature not in equilibrium with the average atmosphere persists as observed on timescales longer than days. Surface emissions are expected to be correlated with FeO content of surface material.In conclusion this might indicate tessera terrain to be more felsic and late stage volcanism to be more mafic than the bulk of venusian plains. There are however some reasons to assume that errors in Magellan altimetry become obvious in comparison with VIRTIS images and that tessera terrain more likely induces a systematic offset than other morphological settings.