EPSC Abstracts,
Vol. 4, EPSC2009-720, 2009
European Planetary Science Congress,

Morphology and droplet sizes of the upper clouds of Venus

W. J. Markiewicz (1), E. Petrova (2), D. Titov (1), N. Ignatiev (2), S.S. Limaye (3), R. Moissl (1), H. U. Keller (1), T. Roatsch (4), K.D. Matz (4)

(1) Max Planck Institute for Solar System Research, Katlenburg-Lindau, Germany, Markiewicz@mps.mpg.de, (2) Space Research Institute (IKI), Moscow, Russia, (3) Space Science and Engineering, University of Wisconsin, Madison, WI, USA, (4) Institute of Planetary Research, German Aerospace Center (DLR), Berlin, Germany

Abstract

The Venus Monitoring Camera (VMC) on Venus Express (VEX) spacecraft has been observing the upper cloud layer through its four channels since April 2006. The VMC channels are in the UV, visible and near IR, with centre wavelengths at 365, 513, 965 and 1010 nanometres respectively. To date thousands of images have been acquired showing global views as well as close up images with resolution down to 200 meter per pixel. The VMC UV wavelength corresponds to the spectral feature of a, so far unidentified, absorber. In particular this subset of the VMC data shows great variety of morphologies. On global scales these include equatorial belts, bright polar bands and polar caps. The observed small scale features change their appearance from mottled clouds and convective cells at low latitudes to streaky patterns at middle and high latitudes. The large scale features are observed to evolve on time scales as short as hours to days.

We have modelled the VMC data in all channels to infer the physical properties of the upper clouds as well as the haze which in most cases lies above the clouds. Our preliminary results indicate that i) the phase dependence of brightness measured at small phase angles points to the presence of submicron particles in the upper cloud layer in many places, ii) the optical thickness of this haze varies and grows to the south pole by several times, iii) the phase gradient of the normalized brightness measured in the 20°-50° phase range suggests the presence of large, up to 4 μm in radius, spherical particles (droplets) located in clouds in the regions of dark UV features at middle latitudes, iv) the size of these droplets decreases to 1 μm at higher latitudes, v) at phase angles < 30° and not in the UV dark regions, the phase behavior of the visible brightness agree with the model of 1 μm cloud particles, while the near IR profiles suggest the cloud particles a bit larger in size. Probably, this is caused by the altitude gradient of particles sizes, since with IR channel we probe the clouds somewhat deeper than at the UV wavelength, vi) the UV contrasts can be caused not only by the absorption variations in clouds but also by the variations in size of cloud particles. Simultaneous variations in both parameters are possible.