



The Structure of the Venus neutral atmosphere from the Radio Science Experiment VeRa

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The Venus Express Radio Science Experiment (VeRa) uses one-way radio signals at X-band and S-band for the sounding of the Venus neutral atmosphere and ionosphere. An Ultrastable Oscillator (USO) provides a high quality onboard frequency reference source for this dual-frequency one-way radio link; instrumentation in the ground stations on Earth is used to record amplitude, phase and polarization of the received signals. Simultaneous, coherent measurements at the two wavelengths allow separation of dispersive media effects from the classical Doppler shift. The signal frequencies were recorded at the ground station receivers with both the Closed Loop and the Open Loop techniques allowing to sound and access the neutral atmosphere from an altitude ~ 100 km down to altitudes below the cloud deck.

In the first year of observation two occultation seasons took place in the time periods 11.07.2006 - 30.08.2006 and 22.11.2006 – 31.01.2007. A total number of 42 occultation experiments were conducted. The polar orbit of Venus Express provides the opportunity to study the atmosphere at all planetocentric latitudes, but only small changes in longitudes and local time. Although atmospheric effects result from integrated effects over long distances along the ray path, Abel inversion of the observations yields a vertical resolution of 0.5-1km, limited by diffraction. Special attention will be given to day-night variations of the atmospheric structure within an occultation season, the temperature distribution at high polar latitudes in both hemispheres (collar

region) and signal absorption effects caused by the H₂SO₄ vapor.