



Large scale atmospheric waves in the Venus mesosphere as seen by the VeRa Radio Science instrument on Venus Express

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Atmospheric waves on all spatial scales play a crucial role in the redistribution of energy, momentum, and atmospheric constituent in planetary atmosphere and are thought to be involved in the development and maintenance of the atmospheric superrotation on Venus.

The Venus Express Radio-Science Experiment VeRa sounded the Venus neutral atmosphere and ionosphere in Earth occultation geometry using the spacecraft radio subsystem at two coherent frequencies. Radial profiles of neutral number density, covering the altitude range 40–90 km, are then converted to vertical profiles of temperature and pressure, assuming hydrostatic equilibrium.

The extensive VeRa data set enables us to study global scale atmospheric wave phenomena like thermal tides in the mesosphere and troposphere. A pronounced local time dependency of the temperature is found in the mesosphere at different altitude levels. Wave-2 structures dominate the low latitude range in the upper mesosphere while the higher latitudes show a strong wave-1 structure at the top of the cloud layer. The investigation of these wave structures provides valuable information about the energy transport in the atmosphere.