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High spatial Resolution mapping of Venus Mesospheric Winds by infrared heterodyne Spectroscopy of CO_2

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We present wind measurements in the Venusian upper mesosphere / lower thermosphere by means of infrared heterodyne spectroscopy of CO_2 features at 959.3917 cm^{-1}. Observations are carried out using the Cologne Tuneable Heterodyne Infrared Spectrometer (THIS) from May 25^{th} to June 6th 2007 shortly before Venus superior conjunction at the McMath-Pierce solar telescope on Kitt Peak in Arizona.

Providing high spectral resolution winds can be retrieved from Doppler-shifts of CO_2 non-thermal emission from the upper mesosphere. The sub-solar to anti-solar flow (SS-AS flow) and the retrograde superrotating zonal circulation (RSZ) are targeted and observations are carried out systematically on the day-side of the planet which is illuminated appr. 50%. The mesospheric region is of special interest because it is the not very well understood transitions zone form the RSZ dominated troposphere and the SS-AS flow dominated thermosphere.

Measurements are part of the coordinated ground-based observing campaign to support VenusExpress from May 25^{th} to June 9^{th}. Complementary ground based observing methods probing wind velocities at different altitudes in the atmosphere of Venus provide the possibility to get a vertical wind profile. E.g. Doppler shifts of CO_2 lines at visible wavelength together with reflected solar Frauenhofer lines probe dynamics at the cloud tops and a few kilometer above while interferometric CO millimeter observations provide information about the lower mesosphere and sub-millimeter spectral line observations are pointing to a region between 95 and 105km. The presented mid-IR measurements probe an altitude of 100-120km.