



A new method for ground based measurements of stratospheric winds by high-resolution infrared heterodyne spectroscopy

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Infrared heterodyne spectroscopy offers the capability of very high spectral resolving power (greater than 10^7) combined with high sensitivity. This high spectral resolution enables unique high sensitivity studies of the physical and chemical processes in planetary atmospheres through measurement of fully resolved lineshapes of transitions of molecular species like CO_2 or O_3 . The Cologne Tunable Heterodyne Infrared Spectrometer (THIS) offers for the first time the possibility to study the whole mid-IR (7-14 μm) by heterodyne techniques. Dynamics in atmospheres of Mars and Venus have been already successfully studied with THIS by observing molecular lines Doppler-shifted due to winds. An accuracy of better than 10 m/s has been achieved. Results from such measurements with sufficiently high spatial resolution are especially useful for validation of GCMs (General Circulation Models) and an improved understanding of the current state and evolution of planetary atmospheres.

Within a current project we adopted this technique to telluric absorption lines of ozone at a wavelength of 9.17 microns to determine wind velocities in the stratosphere of our planet. Observations were accomplished from Cologne in January 2010 and wind velocities will be presented at the conference.