

Comparison of Doppler wind measurements in Venus atmosphere on Fraunhofer and CO₂ lines.

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Abstract

Solar light gets scattered at haze top level in Venus mesosphere, in the visible range (67-km altitude), while CO₂ absorption occurs almost 7 km higher in the mesosphere, which corresponds to a difference of about 2 pressure scale heights.

We present Doppler velocity measurements performed with the long slit high resolution spectrometer MTR ($R > 100000$) of the Solar telescope THEMIS (Teide Observatory). A first test run was lead in late 2007 [1] during an international ground based support to the Venus Express mission [2].

Here, we analyse the data obtained during a 6-day run performed in May 2008, in 4 narrow spectral ranges (10 Å intervals for each) centred around 3 Fraunhofer lines (Mg 5172 Å, Fe 5550 Å, Na 5890 Å) and a CO₂ band at 8691 Å. The planet was scanned from west to east in order to produce velocity maps.

First, we particularly unambiguously put into light a peculiar velocity bias described by [3] but never unambiguously identified, which is due to the apparent solar diameter as seen from Venus. After correction of this effect, the mean zonal wind velocity maps were estimated at both levels and compared to the wind estimates obtained by cloud tracking with the Venus Express orbiter.



Figure 1: Europlanet logo

References

- [1] Gaulme, P. et al. (2008) PSS 56, 1335-1343
- [2] PSS 56 (2008), Editors Lellouch, E and Witasse, O.
- [3] Young, A. (1975), Icarus 24, 1-10