A Study of the Jovian Atmospheric Structure using SWS and CAM-CVF

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Abstract

The spectrum of Jupiter between 2.5 and 45 μm extends over a very large dynamical range (100 000). It is characterized by a reflected solar component which dominates at short wavelengths and a thermal component which strongly increases beyond 4 μm. The solar component gives access to the albedo and the altitude of the NH_3 cloud around 0.5 bar. The thermal radiation probes different altitude ranges, from the deep troposphere at several bars (at 5 μm) up to the lower stratosphere at the mbar level (in the CH_4 emission at 7.7 μm) or even the upper stratosphere at the μbar level (in the CH_4 emission at 3.3 μm, in the H_3^+ lines around 4 μm, and in the H_2O lines around 40 μm).

We are using two sets of ISO data to retrieve the Jovian atmospheric structure and its spatial variations: the SWS grating spectra, recorded between 2.3 and 16.5 μm at the center and between 2.3 and 45 μm at the poles (R=1500), and the CAM-CVF images recorded between 2.3 and 11 μm (R=50). The comparison of the 3 SWS spectra should provide information on the latitudinal variations of the thermal stratospheric profile, from the analysis of the CH_4 emission bands (Encrenaz et al, 1996), and on the vertical distributions of several species: NH_3, PH_3, hydrocarbons - including the recently detected CH_3C_2H - and possibly stratospheric H_2O (Feuchtgruber et al, 1997) and CO_2 (Lellouch et al, 1997). The CAM-CVF images provide a new information about the spatial structure of the NH_3 cloud and the temperature field in the lower stratosphere. The reduction of these data is in progress.

References

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