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Characterization of the white ovals on the Jupiter's southern hemisphere using the first data by Juno/JIRAM instrument

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The JIRAM, Jovian InfraRed Auroral Mapper, is an imager/spectrometer aboard the NASA/Juno spacecraft. The JIRAM instrument is composed by an IR imager (IMG) and a spectrometer (SPE) [1]. The spectrometer, based on grating diffraction of a pixel size slit, covers the spectral interval 2.0-5.0 μm and has a FOV of 3.52° (across track) sampled by 256 pixels with a square IFOV of 250x250 μrad [1].
JIRAM measurements of the first Juno orbit around Jupiter highlighted the presence of the white ovals belt in the southern hemisphere, between 30°S and 45°S. The spectrometer covers also the spectral range sensitive to the reflected sunlight and since during the first Juno orbit JIRAM was pointing around the terminator, we were able to observe the upper clouds. In particular, the spectral range between 2 and 3 μm is sensitive to the variations of gaseous ammonia, altitude and opacity of NH3 ice cloud [2] and N2H4 haze [4].
For this purpose, an atmospheric radiative transfer (RT) model is required. The implementation of a RT code, which includes multiple scattering, in an inversion algorithm based on the Bayesian approach [5], can provide strong constraints about both the clouds and hazes optical properties and the atmospheric gaseous composition.
Here we report the first results obtained by the analysis of the JIRAM observations acquired during the first Juno perijove after orbit insertion (PJ1). Spectral observations with a spatial resolution never achieved before (around 250 km on the 1 bar level) allow, for the first time, the accurate characterization of clouds and hazes structure inside and outside the ovals. We focused on the latitudinal ovals belt (30-45°S) in the longitudinal region covering the three ovals having higher contrast both at 2 and 5 μm. Moreover, the ammonia gaseous content retrieved in the 2-3 μm spectral range by the procedure above mentioned can be compared with the results obtained on the same spectra in the thermal range (around 5 μm wavelength) using the approach described in [3].

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