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"Ladies and Gentlemen, start your engines!" Analysis codes waiting for the first JIRAM-Juno data of Jupiter hot-spots

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In this contribution, we detail the retrieval scheme that has been developed in the last few years for the analysis of the spectral data expected from the JIRAM experiment on board of the Juno NASA mission [1], beginning from the second half of 2016. Our focus is on the analysis of the thermal radiation in the 5 micron transparency window, in regions of lesser cloud opacity (namely, hot-spots).
Moving from the preliminary analysis presented in Grassi et al., 2010 [2], a retrieval scheme has been developed and implemented as a complete end-to-end processing software. Performances in terms of fit quality and retrieval errors are discussed from tests on simulated spectra. Few examples of usage on VIMS-Cassini flyby data are also presented.
Following the suggestion originally presented in Irwin et al., 1998 [3] for the analysis of the NIMS data, the state vector to be retrieved has been drastically simplified on physically sounding basis, aiming mostly to distinguish between the 'deep' content of minor gaseous component (water, ammonia, phosphine) and their relative humidity or fractional scale height in the upper troposphere. The retrieval code is based on a Bayesian scheme [4], complemented by a Metropolis algorithm plus simulated thermal annealing [5] for most problematic cases.
The key parameters retrievable from JIRAM individual spectra are the ammonia and phosphine deep content, the water vapour relative humidity as well as the total aerosol opacity.
We discuss in extent also the technical aspects related to the forward radiative transfer scheme: completeness of line databases used to generate correlated-k tables, comparison of different schemes for the treatment of aerosol scattering, assumption on clouds radiative properties and issues related to the analysis of dayside data.

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[1] Adriani et al., 2008 doi:10.1089/ast.2007.0167
[2] Grassi et al., 2010, doi: 10.1016/j.pss.2010.05.003
[3] Irwin et al., 1998, doi: 10.1029/98JE00948
[4] Rodgers, 2000, isbn: 9789810227401
[5] Press et al., 1996, isbn: 9780521574396