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Atmospheric Measurement Techniques Discussions



# *Interactive comment on* "MIPAS database: new $HNO_3$ line parameters at 7.6 µm validated with MIPAS satellite measurements" *by* A. Perrin et al.

**Anonymous Referee #1**

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This paper presents a new linelist for the 7.6 um region in which three previously-missing bands are now included. The paper compares two different HNO3 linelists (HITRAN_2012/MIPAS-OLD and MIPAS-2015) and two different experimental datasets: MIPAS atmospheric spectra, and laboratory spectra of pure HNO3. Results shows a big improvement in MIPAS-2015 compared with MIPAS-OLD in terms of the quality of the spectral fits and the consistency of the retrievals from the 7.6 and 11 um bands.

Since most linelist users tend to use the latest version of HITRAN, and don't have access to the MIPAS linelists, it would be helpful if the relationship between MIPAS-OLD and HITRAN 2012 HNO3 were explained in a little more detail. The authors assert that the MIPAS-OLD HNO3 linelist is identical to that in HITRAN 2012. But

when I read the Rothman et al. [2013] paper describing the HITRAN_2012 linelist, it talks only about the addition of 15N lines of HNO3 in the 11 micron region.

An usual feature of this work is the use of MIPAS atmospheric emission spectra (rather than lab spectra) to scale the 7.6 um line intensities to enforce consistency between HNO3 retrievals performed using the 7.6 and 11.0 um regions. The danger with using atmospheric spectra is that some inadequately characterized absorber (e.g. ClNO3) may be biasing the MIPAS HNO3 retrieval differently at 7.6 and 11 um. So I think that the authors need to explain in a little more detail their rationale for preferring MIPAS atmospheric spectra over lab spectra for this purpose.

Page 11646, line 17-19: At altitudes higher than ~35-40 km tangent altitude, atmospheric H2O absorption lines are very narrow, and therefore not a major impediment to the retrieval of HNO3 at 5.8 or 7.6 um, at least from high resolution spectra. At lower resolution the H2O will be more problematic at 5.8 um, but CH4 will be problematic at 7.6 um. So the authors words don't satisfactorily explain why the 7.6 um band is the focus of this study, rather than the stronger 5.8 um band.

Page 11648: line 9: 20012 –> 2012

Page 11662, Table 3: Surprised to see *fewer* lines of the v3/v4 bands in the new linelist than in the old one, despite a 20/25 times lower Smin threshold.

Page 11663, Table 4: I don't understand why the Rmean for "This Work" is 0.95 and not 1.00. This implies that the laboratory FTIR spectra are not consistent with MIPAS atmospheric spectra.

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Interactive comment on Atmos. Meas. Tech. Discuss., 8, 11643, 2015.