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Atmospheric Measurement Techniques Discussions

Interactive comment on "Improved water vapour spectroscopy in the 4174–4300 cm^{-1} region and its impact on SCIAMACHY HDO/H_2O measurements" *by* R. A. Scheepmaker et al.

Anonymous Referee #2

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From existing laboratory measurements and two different spectroscopic databases, the authors build a new line list for water vapour. They investigate the impact of this new line list on atmospheric observations

The paper is of high quality and should be published after some minor revisions.

Comments: 1/ The new line list is provided as supplementary data. The authors state that that the format is the HITRAN one, however this is not totally true as the information on the assignment of the lines is missing. As this new line list is based on a combination of two initial lists it is not trivial to just replace the hitran08 data by those new data.

The authors should also provide the missing columns to be totally compatible with the HITRAN format.

2/Missing lines : Since (a) Jenouvrier et al reported more lines than Hitran in the same spectral range, (b) with the higher sensitivity towards H2O of the atmospheric observations, have the authors checked that some residuals might come from missing lines in the line lists. This is mostly true for low intensity lines.

3/high residuals in Fig 1 (commented on p8545, lines 10sq):I do not understand why the fact to cut the complete range into 4 pieces introduce noise at the limits. Could the authors explain. What is the need of this cutting ? why not select widely overlapping ranges if the cutting is absolutely needed ? The authors state that this is not a big problem as the limits were chosen where no strong water lines lie, however it seems to me that the strong lines will never be a problem but low intensity ones might. Moreover the 4212-4248 cm-1 region which is used in the following contains such a limit, was it wise ?

4/ factor of 5 between self and pressure broadening. I am surprised of such a factor, certainly for water which is a very complex molecule regarding its spectroscopy. Would it be possible to consider the self broadening parameters from the HItran/Jenouvrier datbases and only fit the pressure broadening. Would then the ratio of 5 still be observed ?

5/ in the line list, all isotopologues are present. Did you consider them separatedly in the fit of H2O (as done for HDO) ? In the same order of idea : would it be possible to consider 2 (or more for the other isotopologues) correction factors to correct for the 'concentration' of H2O/HDO/... in the Jenouvrier sample spectrum (described on p 8543, lines 10-20).

6/ Figure 4 :Top panel is not readable Panels B,C, D: is it not misleading to compare results using the new list and that of Jenouvrier below 4200 cm-1, since Jenouvrier did not produce any data in this region (dixit p 8544, lines10-18). The positive residual at

AMTD

5, C3552–C3554, 2013

about 4185 cm-1: could it be a missing H2O line, not present in the HItran database, or a line from another species ?

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 8539, 2012.