

***Interactive comment on “Improved water vapour spectroscopy in the 4174–4300 cm<sup>-1</sup> region and its impact on SCIAMACHY HDO/H<sub>2</sub>O measurements” by R. A. Scheepmaker et al.***

**Anonymous Referee #1**

Received and published: 16 January 2013

General Comments : In general, the paper is scientifically interesting and well structured, and it should be published after some minor revisions. It shows how the spectroscopy improvement of water vapour lines in the shortwave infrared region changes the HDO, H<sub>2</sub>O and HDO/H<sub>2</sub>O ratio measurements from ground-based measurements and the SCIAMACHY observations. However, I have some remarks:

First, the authors construct a new line list of spectral parameters from FTS spectra obtained by Jenouvrier et al (2007). In consequence, I'd appreciate a few more sentences about the experimental setup. Details are not necessary, but a quick presenta-

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tion would be appreciated. The same remark can be made for the retrieval algorithm from Butz et al (2011).

Second, it is not clear for me why the authors keep fixed the self broadening coefficient. They specify that this approximation can change the  $\delta D$  retrieval up to 0.4%. It is weak, but not negligible. I would suggest to explain the choice of factor 5.

Finally, in the conclusion the authors present some perspectives for further studies. The Jenouvrier et al (2007) spectra cover the 4200–6600 cm<sup>-1</sup> spectral range. So, I can suggest for future works to extend this study to the Band 2 (5800–6400 cm<sup>-1</sup>) and Band 3 (4800–5200 cm<sup>-1</sup>) of TANSO-FTS instrument. Moreover, some previous studies (such as Worden et al (2007)) highlight errors in the water vapour spectroscopic parameters, in particular HDO lines intensity, in the thermal infrared. This spectral range is measured by lots of instruments such as TES, IASI, TANSO-FTS Band 4. . . Thus, it would be very interesting to extend this work in the thermal infrared where the water vapour sensitivity is higher.

Technical comments :

-Fig. 1, I think it would be interesting to distinguish the HDO and H<sub>2</sub>O lines in the top panel. For instance, you can use 2 different colors similarly to the Fig. 4.

-Fig.2, the plot of black squares should be modified by red and blue squares and crosses to be consistent with the Fig. 3.

-Fig 4, the panel A is not really readable.

-For clarity, you have to use the same colors for the lines: actually, Hitran08 is blue in Fig. 4, but green in Fig. 6 and 7, updated line list is black in Fig. 4, but blue in Fig.6 and 7.

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

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