Interactive comment on “Comparison of HDO measurements from Envisat/MIPAS with observations by Odin/SMR and SCISAT/ACE-FTS” by S. Lossow et al.

Anonymous Referee #3
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General Comments:

This paper compares HDO measurements from MIPAS, SMR, and ACE-FTS. The paper is generally well written and I have only a few comments:

My most serious concern is related to Figure 5. The 18 km results shown on Figure 5 are puzzling. As an example, for MIPAS vs. SMR for SON it appears that the error bars for the MIPAS results are much larger than for the SMR results. If this is the case, then the best fit line through these points should be much steeper (almost vertical) than is shown. Similarly, I think the slope for SMR vs. ACE for MAM at this altitude looks too steep given the error bars shown. Please check these calculations. My guess is that the error bars are correct and the slopes are wrong, so any changes here would affect Figure 6 as well.

Response: There was actually a mistake in the plotting of the error bars; the directions were mixed up. At 18 km the SMR data set exhibits largest errors (see Fig. 3), however in Fig. 5 they are evidently smaller than those of ACE-FTS and MIPAS. This has been fixed.

Specific Comments:

1699 line 13: “The comparisons at 18km are influenced by scatter resulting in linear fits that deviate from the ideal case.” Scatter should not, per se, cause the linear fits to deviate from a slope=1. The formal error in the slope due to scatter can be calculated, but it is probably small. If it is significant then it would be good to show the error bar from this on Figure 6.

Response: Completely right! The word “scatter” is actually somewhat misplaced in this context. Therefore the text has been reworded.

My main disappointment is that coincident H2O measurements from these instruments are never shown. I can understand that this is probably material for a separate paper, but especially in the relation to the discussion on Figure 7 it would be very helpful to know whether instrumental differences in HDO near the hygropause are in any way related to geophysical differences in H2O in these datasets.

Response: As a first step we want to characterise the quality of HDO itself. Therefore we have intentionally left out any H2O data and isotopic ratios. This will certainly be topic of a future study.

In the summary there is some discussion about whether differences in the line broadening explain differences between SMR and the other 2 instruments. While differences in the line broadening may explain the bias, can they also explain the differences in the linear slopes away from 1?

Response: Yes, they can. Spectroscopic errors are of multiplicative nature which cause a deviation of the linear slope away from 1.

Some more detail on the averaging would be helpful. Is the data for 3 month averages first averaged by month, then the months averaged into seasons? Or is data just taken from all 3 months and then lumped together into a single bin?

Response: It is a single step averaging process using all data within a given season. The corresponding text has been expanded.

1679: line 10: “Despite that the latitudinal structures observed by both instruments fit.” I’m not sure what this means.

Response: It was supposed to refer to sentence before. The text has been reworded.

1698 line 6: “In 15 km also a good consistency can be found ...” would be better phrased: “At 15 km MIPAS and ACE-FTS also show good consistency”.

Response: Done.