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Atmospheric Measurement Techniques Discussions

# *Interactive comment on* "Empirical validation and proof of added value of MUSICA's tropospheric $\delta$D remote sensing products" *by* M. Schneider et al.

**Anonymous Referee #1**

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The paper presents measurements of water (H216O) and its main isotope HDO, using two different instruments, the ground-based, up looking solar absorption remote sensing spectrometry, and the IASI satellite based, down looking emission spectrometry. The ground-based observations are performed at the NDACC site at Izana on Tenerife island. The retrieval gives for both observation geometries the altitude profile of the trace gases up to about 10 km. Since the retrieval of the final result, the fractionation dD, can be performed in different ways, and depends on several assumptions, the remote sensing observations need to be validated. The remote sensing results are compared to aircraft profiles, which have been performed near Izana up to 6800 m. The comparison of the remote sensing methods with the in-situ aircraft profiles give a good agreement. The uncertainty for dD has been determined to be between



15 and 45 permill. Finally, the geophysical interpretation of the data allows to identify two different moisture transport pathways to the subtropical north eastern Atlantic free troposphere.

Overall the paper is quite interesting, I have only a few comments.

1. It would be great to compare the results to model data. The results in Fig. 12, 13, 14 and 16 can be compared to calculated Rayleigh fractionation curves. This will allow a much better interpretation, and gives the reader the possibility to put the data in context to what might be expected.

2. I would say that the amount of Figures is too large. The same results can be presented using less Figures. This would help the reader to get the main points of the manuscript.

3. I would not use a straight line in Figure 12, a linear relationship between H2O and dD is not expected.

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Interactive comment on Atmos. Meas. Tech. Discuss., 7, 6917, 2014.