

Interactive comment on “Intercomparison of atmospheric water vapor soundings from the differential absorption lidar (DIAL) and the solar FTIR system on Mt. Zugspitze” by H. Vogelmann et al.

Anonymous Referee #1

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The paper by Vogelmann et al. tries to examine the accuracy and precision of water vapor differential absorption measurements. This is performed by comparing the retrieved column-integrated water vapor measured using the DIAL technique to almost co-located measurements of FTIR.

The paper provides interesting results which are clearly relevant to the scope of AMT. To the reviewer's knowledge no such comparisons have been published before. The paper is well-structured and the findings are presented in a clear way although in some

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cases - mostly concerning the methods applied - a more detailed presentation would be advantageous. The main criticism is listed below:

1. It is not agreed that the DIAL at Schneefernerhaus is the first and only water vapor DIAL to cover the whole troposphere as stated on page 5413. In particular, airborne DIAL systems operated by NASA, DLR and CNRS have proven to do so for many years. This should be cited in a proper way.
2. As stated by the authors spectroscopic data is very important for highly accurate water vapor measurements. Therefore it is interesting indeed to compare both instruments (DIAL and FTIR) which use spectroscopic data from different spectral regions. However, proof is lacking that the spectral data used for the DIAL (from Ponsardin and Browell) is indeed the best choice. It is strongly recommended to reprocess the DIAL results in Fig. 2 using also other spectroscopic data (i.e. HITRAN 2000 (like the FTIR) and HITRAN 2009) to visualize the differences and quantify the differences. The measurements performed is a unique dataset to do so!
3. The averaging times for the measurements should be given!
4. What exactly is the criterion to exclude the two types of outliers? Please be more specific!
5. The vertical range of the DIAL is not clear to the reader. Why does the measurement range only “approximately” start at 300m? What does exactly constitute the lower and upper range of the DIAL? What is the criterion to end the measurement interval? Fixed altitude, tropopause (how determined?) or noise level?
6. What makes $210^\circ \pm 6^\circ$ the best choice for intercomparison? In line 23 of page 5418 a total number of 9 coincidences (within 18 min, and the corresponding azimuth interval) are stated. This cannot be seen in Fig. 3.
7. The authors state that the water vapor column of the stratosphere is approximately 1% of the total column and postulate a stratospheric contribution to the column starting

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at Mt. Zugspitze of 3%. This argumentation is rather weak since this number obviously is only an upper limit for the mean atmospheric column for the whole globe. The authors should discuss whether this holds true for mid-latitude water vapor as well and possible variations of this ratio during different seasons using for example standard water vapor profiles.

8. For completeness, it is recommended that statistical information is given at what season the data were gathered and in what time interval of the early afternoon.

9. Typo p. 5413 line 8: Table

In summary, it is strongly recommended to publish the paper after having implemented an appropriate response of the authors to the issues listed above.

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 5411, 2010.