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Atmospheric Chemistry and Physics Discussions

# *Interactive comment on* "The ground-based FTIR network's potential for investigating the atmospheric water cycle" *by* M. Schneider et al.

**M. Schneider et al.**

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Dear David Griffith,

thank you for your comment, which we will address in the following:

(1) Recommendation of a summary of FTIR errors (random and systematic):

We agree and will add this information in form of a table. Furthermore, we will add some error bars to Figs. 1 and 2.

(2) Model and measurement are not validated. The referee states that the agreement between two un-validated data sets does not prove they are both correct:

We compare up to 13 years of measurements made on about 1250 different days. We



show that for this long-term time series the modelled delD change between day 1 and day 2, between day 2 and day 3, between day 3 and day 4, . . . between day 1249 and day 1250 well agrees with the corresponding measured delD change.

Theoretically, both the modelled and the measured day-to-day scatter could be correlated random errors. However, model and measurement provide independent data set (please see also the reply to Matthew Johnson) and there is no reason for a correlation between the respective random uncertainties.

It is extremely unlikely (statistically almost impossible) that the measured and modelled delD scatter for such a large number of individual days is by accident. The only reasonable explanation of the good correlation in the day-to-day scatter is that both – measurement and model – agree with the real atmospheric day-to-day variability.

In this context the nudging of the model is the key. Only the nudging allows for a comparison of model and measurement on a daily time scale. The comparison of individual days makes our study very reliable. Without nudging we would have to limit on statistical comparisons, i.e., on a comparison of mean and standard deviation. Such a comparison would be much less informative and an agreement of mean and standard deviation of an un-validated measurement and model would in deed be no proof for the good quality of the data.

(3) What is the term f_I in Eq. (1):

The term f_I is the time series of the Indices (AO and AMO for Kiruna and NAO and TNA for Izaña). It is fitted to the measured and modelled time series together with the other terms according to Eq. (1). We will think about adding an additional Figure in Section 4.5. with the time series of the upper tropospheric delD measured in Izaña and the NAO in order to make clear what is meant by f_I.

(4) Thanks for all the technical, typographical, and grammatical comments:

They will be considered when preparing the revised version of the manuscript. Just a

comment to the data plotted in Fig. 13: Some of the data are off axis which allows using the same scales for all panels of Figs. 11 and 13.

Best regards, Matthias Schneider (on behalf of all co-authors)

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Interactive comment on Atmos. Chem. Phys. Discuss., 9, 26199, 2009.