

Interactive comment on “Reviewing the development of a ground-based FTIR water vapour profile analysis” by M. Schneider and F. Hase

Anonymous Referee #2

Received and published: 25 May 2009

The paper summarizes the retrieval of water vapour concentration profiles from the ground-based solar absorption spectrometry, as developed throughout the last years at the Research Center in Karlsruhe. The retrieval of water vapour mixing ratio profiles is very interesting and important. The innovations in both, the retrieval and the inversion, are very important and lead to significantly improved results. The paper should be published, but I suggest a few minor modifications.

1. I am not happy with the title. The paper is not a review paper, it summarizes the work done by the authors throughout the last years. The authors should consider another title.

2. Figure 1, showing the averaging kernels might give a wrong impression. The maximum altitude up to which the H₂O-profile can be retrieved depends strongly on the

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tropopause altitude. Due to the small H₂O-concentration above the tropopause a retrieval of stratospheric H₂O from ground-based FTIR data is impossible. This needs to be discussed in the text, and I strongly suggest to include a line in Figure 1 indicating the tropopause altitude.

3. The AVK depend on the state of the atmosphere itself and it should be discussed how the state of the atmosphere determines the result of the retrieval. This has been shown already in Fig. 2, where the DOF values range from 2 to 2.5 at best, depending on the PWV. It should be proven, that the retrieved results are of the same quality under all conditions, or restrictions should be given depending on the measurement conditions.

4. The Station at Tenerife is rather special because of its high altitude in the subtropical region. This is very little for providing a 'recipe' as stated in the conclusion. It would enhance the value of the publication considerably, if a low altitude station and/or a site at another latitude would also be considered.

5. The argument against the radiosondes about the limited consistency does not hold. First, there has been considerable effort to evaluate the different sensors. Second, the same applies to spectroscopic measurements, where instruments are permanently modified and improved.

6. The observations by FTIR are by no means continuous observations. In fact, they may be more sparse than radiosonde measurements because they depend directly on the weather. It may be possible to get diurnal changes, something sonde data will not yield, but depending on the site weather conditions might prevent measurements for several weeks.

7. Finally, the publication marks a big step forward in the retrieval of H₂O from FTIR measurements and the improvements should be also considered for the retrieval of other species.

Notation: sometime the paper gives $\ln(\text{vmr})$ (Fig 1) sometimes $\log$. Please define and clarify.

Interactive comment on Atmos. Meas. Tech. Discuss., 2, 1221, 2009.