

## ***Interactive comment on “Water vapour total columns from SCIAMACHY spectra in the 2.36 $\mu\text{m}$ window” by H. Schrijver et al.***

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The authors thank the referee for his/her willingness to review the paper and his/her positive comments.

Answer to specific comments:

- p.1466, you could add "..., particularly a reduction in the bias" to the end of the sentence "...improved agreement between...".

This suggestion will be followed.

- A sample spectral fit could be shown.

We felt that such a figure would not be very illustrative, because of the large number

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of dead and very noisy detector pixels, that would disturb the figure. We have appended an example to this comment with the bad pixels blinded which may give some impression of the fit quality.

- a comparison with a completely independent measurement would have been preferable over a comparison with ECMWF, whose profile shape is used in the retrieval.

We agree that completely independent measurements would have been preferable for comparison. But in view of the natural variations of water vapour one needs measurements that are strictly collocated in time and location. It has turned out that for example radio sonde measurements rarely meet this requirement.

On the other hand, only the shape of the ECMWF profiles (that is, relative values) is used in the retrieval. The total column is free to assume any value. Concerns about potential dependence of the retrieval result on the assumed water vapour profile were one of the reasons to include section 4.1, where this issue is addressed.

- Figure 1 shows that there is an over-response of >20% to the lowest layers. This is unusually large and may deserve a comment. There may be cancelling errors with the under-response above 800 mb, provided that water vapour amounts below and above 800 mb are strongly correlated.

This is related to the previous comment. The ‘total column averaging kernel’ expresses the sensitivity of the total column with respect to differences between the assumed profile and the real profile. For example, if the water partial column would be 10% higher in the lowest layer, with all other partial columns unchanged, the estimated total column would change by 12% of the partial column instead of the correct 10%. But if all layers would increase by 10%, there would be no effect because the assumed relative profile would be correct. Cf. Gloudemans et al. Atmos. Chem. Phys. 8, 3999 (2008), section 4.1.

An illustration of this effect is found in section 4.1 of this paper where the effect of a few

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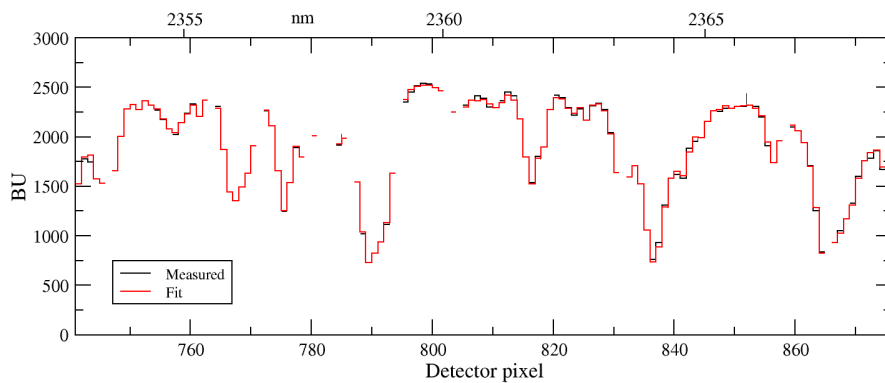
deviating profiles is shown. It shows that it is of importance to assume water vapour profiles that are as close as possible to reality. It is thought that ECMWF profiles are a sufficiently good approximation in most cases.

The technical corrections will be incorporated.

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Interactive comment on Atmos. Meas. Tech. Discuss., 2, 1453, 2009.

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**Fig. 1.** Example of measured spectrum and fit. Dead and bad detector pixels have been blinded. The modelled spectrum is also shown for most bad pixels, but for some pixels it is absent for technical reasons.

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