

Interactive comment on “First retrieval of global water vapour column amounts from SCIAMACHY measurements” by S. Noël et al.

S. Noël et al.

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General remark:

We thank the referee for his helpful comments. Answers to the specific questions are given below.

Specifics:

3. Due to the limited amount and quality of available SCIAMACHY data products only the results for one day of data have been presented in the paper. It is agreed that this is only a small basis for showing the feasibility of a retrieval method. However, the main intention of the paper is to show that global water vapour columns can be retrieved from SCIAMACHY with an acceptable quality, and we think that this is possible with the data presented. This is supported by retrievals

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- performed for other days (mentioned in the paper but not shown) which give similar results.
4. The model calculations used by both retrieval methods of course determine absolute radiances (computed at high spectral resolution and then folded to the instrument resolution/slit function). In the retrieval, all broad band contributions to the radiance are approximated by a low-order polynomial, so only the differential information is used (typical for DOAS). Specifically, saturation of absorption lines is handled by both algorithms (in a different way). The revised version of the paper will contain the results of a small sensitivity study showing that the influence of different background atmospheres (incl. different shapes of water vapour profiles) is quite small. An insufficiently known instrument slit function would have a systematic effect on the retrieval results and could be (partly) a reason for the observed systematic offset of about 10% to SSM/I and ECMWF data. Residual contamination by clouds also might contribute to this offset, as well as errors in the spectral data base. This will be mentioned in the revised version of the paper.
 5. Although both retrieval methods use HITRAN/SCIATRAN results, the methods themselves (and thus the way how these data are used) differ significantly. In this sense, different “formulas” are fitted to the SCIAMACHY data, and therefore it is not surprising that the residuals differ.
 6. The sensitivity analysis for the WFM-DOAS method presented in the revised version of the paper contains the influence of different aerosol loading. However, it is agreed that more measurement data are needed to assess this in detail. Therefore, this will be subject to further studies.
 7. As mentioned before, the revised version of the paper will contain the results of a sensitivity study. This includes the sensitivity to different model atmospheres and surface albedo.

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8. As described in the revised version of the paper, both retrieval algorithms include a constant 10% systematic offset. This offset has been estimated from the correlation between SCIAMACHY and SSM/I data. Possible reasons for this offset are discussed in the revised paper. Considering this offset, the agreement between SCIAMACHY and both SSM/I and ECMWF data is indeed best for water vapour columns between 2 and 5 g/cm². Smaller columns are typically underestimated, larger columns overestimated by SCIAMACHY. This may indicate that the assumed systematic offset depends on the water vapour concentration, but this needs to be investigated in further studies.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 5659, 2003.

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