

Interactive comment on “Multi-year comparison of stratospheric BrO vertical profiles retrieved from SCIAMACHY limb and ground-based UV-visible measurements” by F. Hendrick et al.

Anonymous Referee #2

Received and published: 6 January 2009

General:

This paper was greatly improved by the inclusion of Figure 2 (not included in the original manuscript).

With regard to the smaller biases in the partial columns as compared to the profiles, two explanations come to mind:

-actual vertical resolution of the ground-based (GB) retrievals is not equal to the calculated one.

-problems with retrieval of profile shape in one or both retrievals (likely the GB data).

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Please provide a reason why measurements from Reunion Island [Theys et al., Atmos. Chem. Phys., 7, 4733-4749, 2007] have been omitted in this study. Note that comparisons at sites with poorer agreement should not be omitted, otherwise the authors may be painting a biased picture of the agreement between SCIAMACHY and GB data.

An estimate of Bry would be a valuable addition to this paper and may be inferred from BrO by the authors since they have a photochemical modeling capability.

The GB averaging kernels for the morning retrievals do not peak at the correct height. With the exception of the 23 km kernel, the rest of them all peak too high by 2-4 km. The evening retrieval does not show this problem except for averaging kernels above 30 km.

A small amount of effort is needed until this paper is acceptable for publication in Atmos. Meas. Tech.

Specific:

Section 2

"a constant surface albedo of 0.3" why not use a surface albedo database? This would account for high surface albedo in high latitude winter, even though the impact of albedo is small.

Why are the a priori standard deviations set at 25 pptv? Does this not seem large considering the natural variability of BrO is much smaller than this?

Justification should be provided as to why the Fleischmann et al. BrO cross-sections are used for SCIAMACHY data analysis while Wilmoth et al. cross-sections are used in the GB retrievals (considering that Sioris et al. already reported that spectral fitting residuals are smaller when Wilmoth et al. cross-sections are used). Since the choice of BrO cross-sections is very important to the conclusion, consistency in this choice between instruments makes the most sense.

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P456, L11: MIPAS doesn't measure BrO

P456, L11: a personal communication is not adequate here. More detail is needed regarding the a priori BrO and the time period of MIPAS measurements. Why not reference Sinnhuber et al., 2005? MIPAS measures CFC-11, but where does the BrO come from?

Section 4

P459 (Eq.1): minor (but not trivial) point: when convolving with averaging kernels, you could take into account the fact that the SCIA measurement is already convolved with its own "3-5 km" averaging kernel.

Section 5

P460, L16: It may be worthwhile to test the impact of changing the coincidence criterion for latitude (e.g. to $\pm 4^\circ$).

P460, L17: What is the temporal criterion: same morning or evening?

Section 6

P461, L18-19: It would be appreciated if you quantify (or illustrate) the mean and standard deviation at one or more heights below 18 km in the unsmoothed SCIAMACHY data to investigate the significance of this observed difference.

Section 7

P464, L25-27: This statement seems to contradict the results on P463, L10-15.

Technical:

Abstract P452, L2: "daily retrieved" -> "retrieved daily"

Section 1 P452, L20: "has been launched" -> "was launched"

P453, L8: "kind of measurements" -> "kind of measurement"

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P453, L15: "In case of bromine" -> "In the case of bromine"

P453, L15-16: list references since not all references from preceding sentence apply.

Section 2 P454, L12-13: "of the scattered solar radiation" -> "of scattered solar radiation"

P454, L17: "accounted for" -> "taken into account."

P454, L21: The reader should be pointed to a more specific website, e.g.: http://www.iup.uni-bremen.de/sciatran/free_downloads/users_guide_sciatran_v2-2.pdf

P454, L24: "the version 3.2 of the retrieval": omit either the 1st "the" or "of the".

P455, L7: a more specific reference is again needed

P455, L10: "ratioed" -> "divided"

P456, L10: refer to: McLinden, C. A., J. C. McConnell, E. Griffioen, and C. T. McElroy (2002), A vector radiative transfer model for the Odin/OSIRIS project, Can. J. Phys., 80, 375-393.

Section 4

P458, L21: start a new paragraph

P459, L1: start a new paragraph discussing GB averaging kernels

Section 5

P461, L20: "8-10 km" -> "10-12 km"

Section 6

P463, L19: remove "indeed"

P463, L23: "higher" -> "larger"

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