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Comment

Interactive comment on “Twelve years of global observation of formaldehyde in the troposphere using GOME and SCIAMACHY sensors” by I. De Smedt et al.

Anonymous Referee #1

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General comments

The authors report on global tropospheric formaldehyde observations using GOME and SCIAMACHY over the period 1996–2007. They proposed the use of a new optimized window for CH₂O retrieval that permits to reduce the impact of important sources of error. A substantial effort has been done to characterize the retrieval. The detailed error estimate provided is of great interest especially in the context of a large development of the use of satellite data in order to provide better assessment of the emissions. As noted by the authors, this work clearly stresses the necessity of validation exercises as well as the need for a detailed comparison of the different formaldehyde retrievals.

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This point is essential for further use of these data. This work is suitable for ACPD publication after the following comments are addressed.

As for a general comment, despite I appreciate the detailed explanations of the method, the paper is certainly too long and some of these explanations are redundant between the sections and may be optimized. Another general comment concerns the statements about the quality of the comparison between the datasets that are often qualitative and the comparison results should be better quantified.

Specific comments

1) p7558 - line 10: the sentence "discussion of differences with previously retrieved datasets" is partly misleading for the reader who will expect to find a detailed comparison between the different retrievals. I would suggest rewording this sentence.

2) p7563 - reference to Fig. 4: Why the examples of CH₂O optical density fits are not given for the overlapping period between GOME and SCIAMACHY? If it is because of the degradation of GOME performances, it could be interesting to also provide this information to the reader.

3) P7563 - caption of Fig. 5: There is an error in the standard deviation values given in the caption. In the text, the authors write that the standard deviation of SCIAMACHY is larger than the GOME one and it is the contrary in the caption.

4) P7563 - lines 14-17: In order to clarify the statement "the standard deviation in the SCIAMACHY slant columns ONLY exceeds GOME one by 30%, as a result...", it would be interesting to add how the standard deviations compared before the degradation of GOME performances.

5) P7566 - lines 21-22: The vertical CH₂O profile shapes that the authors used are provided on a monthly based. Could the authors precise the variability of this profile shape and which the impact would be if a constant profile shape was used?

6) P7566 - lines 24-27: A better quantification of the comparison between the simulated

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and the observed profiles would help to support the statement "fairly good agreement".

7) P7567 - Section 3.4: A detailed quantitative comparison would be valuable for the discussion. Will the comparison results differ if the horizontal resolution of SCIA-MACHY is degraded to match GOME resolution? Moreover, this section is in the middle of the method description. It would make sense to include this paragraph in Section 5 and to develop it with more quantitative results. Concerning the 2 last sentences of this section: do some hypotheses exist to tempt to explain the differences?

8) P7568 - section 4.1: the authors chose to estimate the random error on the slant column using the standard deviation of measured columns. How do this error compare to the direct fitting error of the retrieval?

9) P7569 - line 11: Are the concentration profile or the slant columns of the species considered here fitted in the same time than the CH₂O columns or fixed during the fit? In the former case, the resulting error should be accounted for by the fitting (random) error.

10) P7573 - section 4.4: a reminder of the random error for one pixel (in relative) would help the reader.

11) P7574 - lines 20-21: A better quantification of the "very good agreement" is expected.

Technical corrections

1) p7562 - line 13: Replace "the biggest differences" by "the largest differences".

2) p7565 - line 2: suppress "only" in "W depends only on..."

3) p7570: the lines 5-6 and the lines 15-19 are redundant. The lines 5-6 may be suppressed.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 7555, 2008.

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