**Atmospheric
Chemistry
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Discussions**

Interactive
Comment

Interactive comment on "Global carbon monoxide as retrieved from SCIAMACHY by WFM-DOAS" *by* M. Buchwitz et al.

C. Clerbaux (Referee)

catherine.clerbaux@aero.jussieu.fr

Received and published: 14 July 2004

General comments

The paper presents a first attempt to retrieve CO total columns from space-borne measurements provided by the SCIAMACHY instrument onboard ENVISAT. The first part of the manuscript describes the measured nadir spectra obtained in the NIR (channel 8) spectral range, as well as the retrieval algorithm (WFM-DOAS) applied to retrieve the CO columns. The second part of the paper reports a comparison with available CO measurements provided by the MOPITT instrument (operating in the thermal infrared spectral range).

Assessing the quality of data products measured from space requires time, and this paper is a first step-forward to describe what could be expected from the SCIAMACHY CO

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Discussion Paper

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measurements. I found the first part of the paper interesting as it provides a detailed description of the current problems encountered in the analysis of the Level-1 data products (dark signal correction, weak CO signal versus noise, contamination from methane and H2O absorption,...). But, I was not convinced by the second part of the paper, which aims to compare the CO retrievals with the MOPITT data. I recommend to substantially improve Section 6.3. before the paper can be published in ACP. This section provides several Figures with no real discussion of the agreement/discrepancy found when comparing with the MOPITT measurements (e.g. good agreement for high CO content?, over specific locations? etc.).

As MOPITT has already exceeded its expected lifetime, SCIAMACHY CO measurements are expected by the scientific community to complement the 4 years of already available data in order to study the spatial and temporal variability of this important tropospheric compound. This paper and the following interactive discussion comments highlight the difficulty to exploit the NIR channels of SCIAMACHY for the analysis of the CO atmospheric content. The existence of at least two different retrieval algorithms developed by separated teams should help to provide improved CO NIR measurements products, along with a full characterization in terms of vertical sensitivity and error budget.

Specific comments

Abstract
Line 9 : Change to "reasonable agreement". Line 21-23 : I feel uncomfortable with the assessment that the scaling factor (0.5) needed to adjust the SCIAMACHY data to the MOPITT may be due to its higher sensitivity to the lower troposphere. Published results on validation of MOPITT retrievals do not support this assertion.

Section 1
Lines 19-28: I found the description of the capabilities of thermal infrared versus near-infrared instruments quiet unfair as it only points out a weakness of MOPITT-type sen-

sors, i.e. its lower sensitivity to the lowest part of the atmosphere. But the authors forgot to say that these instruments have a MUCH LARGER sensitivity in general, as they use the 1-0 main absorption band for the CO sounding, and not the 2-0 weaker absorption band, and hence should provide more reliable information in the mid-troposphere.

Section 4
There is no reference for the spectroscopic data used in the radiative transfer simulations.

Section 5
Line 10-13: Same comment as before: thermal IR instrument are "highly sensitive for trace concentration changes" and NIR instruments are less sensitive, although their sensitivity is more constant throughout the vertical (see averaging kernel).

Section 6.2
Line 2: I found the description of the cloud contaminated pixels useful but if the WFM-DOAS algorithm is appropriate only for cloud free scenes, and to facilitate the comparison with MOPITT cloud-filtered data, only the cloud-free data should be provided in the plots.

Section 6.3
I found this section the weakest part of the paper and I feel more work is needed before the authors can claim they see a good agreement with the MOPITT data. I would suggest to remove all the plots containing cloud-contaminated data, which should facilitate the comparison with MOPITT data, and to provide Figures only if a description of the agreements/discrepancies is provided in the text. Also, MOPITT provides day and night measurements and only the daytime measurements should be included for the comparison.

Section 7
In general the abstract and the conclusion sections may be improved by re-phrasing some of the sentence to be less optimistic and to point where more work/more data is

needed.

Technical corrections

Add reference to MOPITT validation papers (e.g. Emmons et al., 2004).
Ref Buchwitz 2004 : some wrong hyphenation
Ref Clerbaux C.: Hadju » Hadji

Figure 4 : Why choose 24 January 2004 and not one of the day used to plot fig 5-18?
Figures 5-13: Remove cloud-contaminated data + provide description of each Figure in the text.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 2805, 2004.