

Interactive
Comment

Interactive comment on “Three years of greenhouse gas column-averaged dry air mole fractions retrieved from satellite – Part 2: Methane” by O. Schneising et al.

Anonymous Referee #1

Received and published: 6 August 2008

General Comments

This manuscript presents a multi-year methane dataset retrieved from SCIAMACHY using the WFM-DOAS algorithm. Overall, the manuscript is generally well-written and shows some interesting results.

However, it should be noted that recent improvements in near infrared methane spectroscopy (Frankenberg et al, ACPD, 2008) and additionally water vapour line lists (cf. Frankenberg et al., GRL paper in press) has had a significant impact on the similar IMAP-DOAS retrievals. The high levels of methane previously reported over the tropics by Frankenberg et al (2005) are now considered to be lower than initially observed

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by SCIAMACHY.

It is important that the authors dedicate a (small) section to discuss these significant results and the potential implications for the WFM-DOAS retrievals. Whilst the reprocessing of the entire SCIAMACHY data set (using the new spectroscopic data) is obviously impractical for this manuscript, it is necessary for the authors to speculate (and therefore inform the reader) how future methane retrievals might significantly differ from the results presented here.

The manuscript should be accepted for publication only after (a) the methane and water vapour spectroscopy improvements, and their potential impact, have been discussed and (b) the minor comments listed below have been implemented.

Specific Comments:

Define acronyms (e.g., WFM-DOAS and IMAP-DOAS) the first time they are introduced.

Introduction:

Do the ground-based FTS use the same spectral fitting windows as those used in the SCIAMACHY retrievals? If not, could differences in the accuracy of the spectral line parameters between the different fitting regimes account for some of the bias?

Page 8279, Line 6:

Style, 'equator' should be capitalized.

Page 8279, Lines 13-19:

Extremely long sentence; considered sentence break.

Page 8282, Line 21:

Grammar. Replace 'could be' with 'is'.

Section 3.3

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Which is the main criterion for cloud identification, the use of the PMDs or the use of the a priori O2 column? Also, why are two methods necessary?

Page 8287, Line 10:

Style. Please correctly format the Berk et al. reference.

Page 8288, Lines 11-16:

Repetitive. The FTS comparison is already mentioned in the Introduction section.

Page 8289:

Please include the affiliation of J. O. Kaplan.

Page 8289, Lines 5-15:

I find this section slightly messy. Please revise. I think it might be clearer if the figure descriptions were listed as bullet points. Also, pay close attention to the actual figure ordering (and revise accordingly) as Figure 4 is not discussed until the following page.

Pages 8921-8292:

To make comparisons with figures from the Bergamaschi et al. (2007) paper significantly easier, please expand Figures 6, 7 and 8 to also include a top row of plots showing the retrieved methane column VMRs.

Page 8293, Lines 9:

Typo. Correct 'time periode' to 'time period'.

Page 8293, Lines 26:

Style. Correct '2 percent' to '2%'.

Conclusions:

Why 'For the first time'? Haven't Frankenberg et al (2006) already shown a two year

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(2003-4) methane dataset from SCIAMACHY?

Conclusions:

Style. List the two main conclusions of the TM5-4DVAR analysis as bullet points (for impact).

Figure 3:

Revise. Please make all three plots of equal size.

Figure 9:

The x-axes on the bottom set of plots ranges from -150 to 150 ppb, yet the differences never go beyond 100 ppb. The x-axes could therefore be reduced to -100 to 100 ppb (or even -75 to 75 ppb) to therefore more clearly show the SCIAMACHY and TM5 model differences.

Figure 16 caption:

Style (use of commas). Consider adjusting 4th sentence to:

'The top panel shows that the standard deviation, especially at two detector pixels (pixel number 894 and 895 of channel 6) which are located where the strongest methane absorption occurs, is considerably higher in 2005 (blue) compared to 2003 (red) and 2004 (green) indicating a possible degradation of these detector pixels especially in terms of larger noise.'

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 8273, 2008.

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