Atmos. Chem. Phys. Discuss., 7, S1096–S1101, 2007
www.atmos-chem-phys-discuss.net/7/S1096/2007/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Assessing the near surface sensitivity of SCIAMACHY atmospheric CO_2 retrieved using (FSI) WFM-DOAS" *by* M. P. Barkley et al.

Anonymous Referee #2

Received and published: 10 April 2007

General comments:

The paper presents very interesting comparisons of CO2 retrieval results using the FSI WFM_DOAS algorithm with various ground-based and in-situ data. The paper is generally well written and provides important insight in the quality of Sciamachy CO2 results. There are, however, a few inconsistencies and unclear items that need to be corrected first. If the authors are able to correct the items listed below, I recommend this manuscript suitable for publication.

Specific comments:

Page 2480, lines 10-12:

Statements like these often create confusion. First, on what is the 1% precision requirement based? Any references? Secondly, accuracy is arguably even more important. Does Sciamachy meet the tough accuarcy requirements needed for for instance flux inversions?

Page 2482, equation:

What is the purpose and effect of the polynomial term?

Page 2483, line 14:

Are operational ECMWF fields used or fields from the reanalysis? Operational fields change when the ECMWF model is upgraded, which could create inconsistencies in the Sciamachy retrievals.

Page 2484, lines 13-16:

Such a simple cut-off could be dangerous. Have you checked retrieval results outside this 340-400 ppmv range to make sure they are likely contaminated?

Page 2484, lines 19-20:

This statement is only true for near infrared satellite retrievals. Ground-based FTS is not necessarily the best validation for infrared CO2 retrievals.

Page 2485, line 19:

I don't consider a bias of 2% (= 7.5 ppmv) to be small.

Page 2486, lines 15-16:

What is exactly meant by consistent? That it is a negative bias? Please, clarify this statement.

Page 2487, lines 3-4:

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EGU

Why are the averaging kernels for the FSI method quite different in shape compared to the averaging kernels presented in the papers by Buchwitz et al. Is this due to the method used or is there something else?

Page 2487, lines 11-16:

First, please rephrase this sentence; it is not very readable in its current formulation. Second, why do the authors use a different a priori assumption in these simulations than is used in the real retrievals. If I understand it correctly, the real retrievals use climatological CO2 profiles from Remedios et al. (2006), while the simulation uses a uniform a priori of 370 ppmv. I think these assumptions are especially important, because the retrieval cannot really change the shape of the CO2 profile.

Page 2487, bottom paragraph:

Why is there clear separation between the diamonds and the black curve for the absolute values and not for the anomalies in Figure 3? The scales are more or less the same, aren't they?

Page 2489, line 28:

I think this should be Figure 6.

Page 2490, lines 4-11:

Please, refer to Figure 7 here.

Page 2491, lines 11-15:

The problem with this is that the biases are different for different locations, effectively creating spatial gradients. This would make the retrievals very hard to use in flux inversions. It is therefore important to understand the reason for these biases and not only focus on the anomalies.

Page 2491, lines 23-25:

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Does this not contradict your simulation results that showed that the amplitude of Scia-machy seasonal cycles is always smaller than at the surface? Are there any reasons to explain this?

Page 2493, lines 19-22:

Please, refer to Figure 13.

Section 6.2:

I am not convinced that using all these different indices contributes to the paper. For instance, why use NDVI when you also compare to EVI, which should be a better vegetation index? I think it would be better to restrict the analysis to some key indices.

Page 2500, lines 14-16:

What is exactly meant here. I don't quite understand this sentence.

Technical corrections:

Page 2483, line 4:

'focuss' should be 'focus'

Page 2484, line 24:

'Tronto' should be 'Toronto'

Page 2485, lines 6-7:

Change to: ... in Washenfelder et el. (2006), ONLY a brief outline of the experimental set-up is given here.

Page 2487, line 28:

Remove the first 'is'

Page 2489, lines 24:

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Remove ’or so’

Page 2493, line 24:

Should ’signal’ be ’seasonal’?

Page 2495, line 9:

Replace ’are’ with ’is’

Page 2495, line 12:

Please, rephrase this sentence. It does not read very well.

Page 2499, line 5:

Remove ’a’

Page 2499, lines 17-19:

Please, rephrase this sentence. It reads a bit awkward in its current form.

Page 2500, line 22:

’compete’ should be ’complete’

Page 2500, line 25:

’need’ should be ’needed’

Page 2501, line 24:

Remove second ’low’

Page 2507, caption of Table 1:

The last SCIAm should be Mscia?

Page 2528:

The print of this figure is very small and basically unreadable.

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Interactive comment on Atmos. Chem. Phys. Discuss., 7, 2477, 2007.

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Interactive Comment