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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Three years of greenhouse gascolumn-averaged dry air mole fractionsretrieved from satellite – Part 1:Carbon dioxide" *by* O. Schneising et al.

**O. Schneising et al.**

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**Author's answers to interactive comments of anonymous referee number 2 on paper Schneising et al., Atmos. Chem. Phys. Discuss., 8, 5477–5536, 2008**

First of all we would like to thank the referee for the comments. Below we give answers to all these comments which will all be considered for the revised version of the manuscript.

Answers to general comments:

Double negatives: The comment will be considered.

Introduction: We will aim at shortening the introduction.

Smoothing: We will add information how the smoothing has been done.

Use of different color scales: The figures will be changed taking the comment into account.

Answers to specific comments:

Surface elevation related errors: The requested information will be added.

Aerosol related errors: We will add an extended error analysis related to aerosols and thin (cirrus) clouds aiming at better quantifying aerosol and (residual) cloud related errors.

Errors due to $CO_2$ profile variability: The referee is right. This comment will be considered for the revised version of the paper.

1.5% scaling: We also find a low bias relative to the two FTS, e.g., 1.7% relative to the Park Falls FTS (see Fig. 9), not only relative to CarbonTracker. The Park Falls FTS data have (also) been scaled relative to highly accurate and precise aircraft $CO_2$ measurements based on flask sampling. There are several possible causes for a relatively small overall bias, e.g., errors of the spectroscopic data (e.g., line intensity errors) but also the assumed aerosol scenario. We use a single aerosol scenario with



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a relatively high aerosol optical depth (higher than a global average). This is also expected to contribute to a small overall offset.

$XCO_2$ anomaly: If anonalies are show the mean of all the data shown has been subtracted. For each figure (map) a separate mean has been calculated which is the mean of all the data shown (this mean is a single number for each figure/map not dependent on e.g., latitude). Anomalies are shown in Fig. 9 (to focus on the time dependence; the absolute difference between the data sets is however also given), and Figs. 14-15 (to focus on the spatial pattern). For all other figures absolute values are shown to enable the reader to also estimate systematic differences.

Upper limit of relative accuracy: The comment will be considered for the revised version of the paper.

Spatial correlations: The paper contains several figures which enable a rough estimate of the spatial correlation. As can be seen the spatial pattern agree reasonably well at a resolution of approximately 7 degrees. There are however also significant differences which need further study in the future. In that context we will also consider a quantification of the spatial correlations as suggested by the referee.

Cloud free sampling bias: The comment of the referee will be considered for the revised version of the paper.

Anthropogenic $CO_2$: For the revised version of the paper we will add more details on this aspect including a discussion of aerosol related errors and sampling aspects (please see our detailed answers to the comments made by the third referee, Houweling et al., 2008). We will also add that elevated $CO_2$ can be observed over



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several other anthropogenic source regions such as the eastcoast of the US, parts of China and Japan (e.g., around Tokyo). Taking the comments of all three referees into account and that at this stage we can provide evidence that we can detect the regional anthropogenic $CO_2$ but can strictly speaking not proof this (due to the difficulty of accurately quantifying the error of the highly averaged data) we will replace “can be detected” by a less strong statement.

References:

Houweling et al., 2008, ACPD, 8, S2530-S2534.

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 5477, 2008.