

Interactive comment on “Calibration of TCCON column-averaged CO₂: the first aircraft campaign over European TCCON sites” by J. Messerschmidt et al.

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Final response to I. Murata (Referee)

We would like to appreciate the constructive suggestions made by the referee for our paper. Following you find the respond to each of his comments.

Major comments:

The major comment of the referee was that the measurements used in the first approach are not independent, as the FTS data are retrieved with the help of the aircraft profiles. He suggests to set the focus on the second approach, in which the standard

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GFIT a priori profiles are used.

1)

The authors are aware of the fact that the measurements are not independent in the first approach, but uncertainties in the a priori profiles can be one of the major sources of uncertainties in the retrieved XCO₂ (Wunch et. al, The Total Carbon Column Observing Network , Phil. Trans. R. Soc. A 2011 369, 2087-2112 , 2011). In order to exclude this potential systematic effect, the FTS data were retrieved first with the help of the aircraft profiles. By comparing this first approach with the second approach, systematic effects of the standard GFIT a priori profiles can be tested. The agreement between both approaches shows that the a priori profiles do not systematically affect the standard TCCON results.

2)

Furthermore the use of the a priori profiles makes our calibration comparable to previous TCCON calibrations, which used the aircraft profiles as a priori profiles as well.

3)

Therefore we would prefer to leave the structure as it is, but I inserted a description about the major sources of uncertainty of the FTS retrieval at the beginning of Section 3.6.

Minor comments:

1) Accuracy of NDIRs in Bialystok and Orleans: For the Bialystok instrumentation, a CO₂ accuracy of 0.02 ppm could be shown by Popa et. al, 2010. The quality of the Orléans data is ensured by flask samples, but no citable publication exists.

2) WMO targets: I changed “WMO target” to “WMO recommendations” and cited the 15th WMO/IAEA Meeting of Experts on Carbon Dioxide, Other Greenhouse Gases and Related Tracers Measurements Techniques, Jena, Germany, 7-10 September 2009

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3) I changed "the standard a priori profiles of the FTS retrieval" to "the standard GFIT a priori CO₂ profile" to be consistent.

4) 0.8 ppm are calculated by $\text{CO}_2 = 400 \text{ ppm} \times 0.2 \%$. I clarified this.

Janina Messerschmidt, 30th September 2011

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