Atmos. Chem. Phys. Discuss., 11, C11496–C11498, 2011
www.atmos-chem-phys-discuss.net/11/C11496/2011/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Assessing filtering of mountaintop CO_2 mixing ratios for application to inverse models of biosphere-atmosphere carbon exchange" *by* B.-G. J. Brooks et al.

Anonymous Referee #1

Received and published: 6 November 2011

General Comments: This paper investigates on different filtering mechanisms which can be used to identify regionally representative observations to be utilized in the inverse models. This is highly important especially in case of measurements from a complex terrain such as mountain top. Hence the topic is scientifically relevant and the inverse modelers can benefit from this area of research. However I have a serious concern about authors' choice on model simulations (a global model- CarbonTracker) to construct the filters although they are aware about the deficiency of global models to represent complex regions- i.e mainly transport (this is later discussed in Section 5). I would consider this as a major drawback of this paper, but I appreciate the attempt (via filtering methods) to exclude observations that are difficult to model and are not region-

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ally representative in order to improve the regional flux estimates. I suggest authors to comment on high-resolution modeling efforts towards this direction. Also I strongly recommend including a comparison of model simulations and observations with different filters; then one can assess the potential of different filters (to judge whether filter is over or less selective). Besides these I do suggest authors to work a bit on the readability of the paper (sentences are sometimes rather long and difficult to follow); also the sections 2.1 and 2.2 can be shortened (many repetitions). With all these recommendations/suggestions/comments incorporated, the paper can be published in ACP.

Specific Comments:

Section1: comment on high-resolution modeling efforts especially for complex terrain. See Pillai et al., 2011 and van der Molen and Dolman, 2007.

Section 1 and 2: mainly here is my comment about the readability of the paper

Section 3: Could you please clarify or explain a bit more on how these filters do account for synoptic variability? In case of synoptic events, I would assume that 1 ppm standard deviation criteria would not work. Please comment.

Section 3 and 4: The filters based on a global model with a typical resolution of 1o $\times$ 1o can very well exclude observations which contain lots of important and regionally relevant atmospheric information. This is simply because of the transport model deficiency due to its coarse resolutions. Then the filter is over selective and avoids most of the observations (the atmospheric "wealth"). This is a serious issue.

Technical Comments:

pp 25330: please rephrase the sentence – "Our goal in this study is . . . . . .carbon cycle inversion models."

pp 25342: please indicate clearly – "The 0–4 subset. . ."- you may have to write 0:00–4:00 LT

ACPD

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Figure legends are missing for Fig. 3 and 8.

Suggested References:

Pillai, D., Gerbig, C., Ahmadov, R., Rödenbeck, C., Kretschmer, R., Koch, T., Thompson, R., Neininger, B., and Lavrié, J. V.: High-resolution simulations of atmospheric CO2 over complex terrain – representing the Ochsenkopf mountain tall tower, Atmos. Chem. Phys., 11, 7445-7464, doi:10.5194/acp-11-7445-2011, 2011.

van der Molen, M. K. and Dolman, A. J.: Regional carbon fluxes and the effect of topography on the variability of atmospheric CO2, J. Geophys. Res.-Atmos., 112, D01104, doi:01110.01029/02006JD007649, 2007.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 25327, 2011.