

Interactive comment on “A joint data assimilation system (Tan-Tracker) to simultaneously estimate surface CO₂ fluxes and 3-D atmospheric CO₂ concentrations from observations” by X. Tian et al.

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Received and published: 10 March 2014

Dear Editors:

Thank you very much for your kind decision letter on our paper entitled “A Joint Data Assimilation System (Tan-Tracker) to Simultaneously Estimate Surface CO₂ fluxes and 3D Atmospheric CO₂ Concentrations from CO₂ Observations” (acp-2013-715). We are grateful for the helpful comments from you and the reviewers. Joint estimation of CO₂ concentrations and surface fluxes should be the way forward, as the current top-down flux inversion systems are too vulnerable to errors in model transport or errors in

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satellite retrievals (See Chevallier, F., P. I. Palmer, L. Feng, H. Boesch, C. O'Dell, and P. Bousquet, 2014: "Towards robust and consistent regional CO₂ flux estimates from in situ and space-borne measurements of atmospheric CO₂," *Geophys. Res. Lett.*, 41, doi:10.1002/2013GL058772). Two major aspects of this paper: 1) joint estimation of CO₂ concentrations and surface fluxes; and 2) efficient sampling strategy are sufficient for it to be published in ACP. Because of the biosphere-atmosphere CO₂ exchanges are largely affected by the transient weather conditions, advantages of one persistent model for first guest CFs are hard to prove by the current study. We have revised the manuscript based on these comments. The main changes include:

1. The revised manuscript has been checked by two native English-speaking professional editors. For a certificate, please see: <http://www.textcheck.com/certificate/5iFJYF>. 2. We have substantially rewritten the methodology (especially section 2.1) to give a clearer description on our methodology. Our responses to reviewers' comments are detailed in the attached document. Look forward to hearing from you soon. Sincerely Yours,

Xiangjun Tian

Please also note the supplement to this comment:

<http://www.atmos-chem-phys-discuss.net/13/C12784/2014/acpd-13-C12784-2014-supplement.zip>

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 24755, 2013.

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