Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2017-69-RC2, 2017

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Multi-species inversion and IAGOS airborne data for a better constraint of continental scale fluxes" *by* Fabio Boschetti et al.

Anonymous Referee #2

Received and published: 28 June 2017

The authors present a multi-species inversion system for inferring CO, CO2 and CH4 fluxes from future IAGOS measurements. Their OSSE experiments show that the mutli-species inversion with assumed prior (and observation) error correlations can improve top-down flux estimate, resulting in a smaller posterior uncertainty than the simple approach where prior errors are assumed to be independent. Overall the manuscript is very informative, and their results are meaningful. It can be accepted for publication in ACP after minor revision.

Major comments: 1. While I agree that inclusion of prior error correlations between different emissions can improve observation constraint, and help disentangle sources, improper characterization of the error correlation may result in systematic bias in the posterior estimate. So I suggest a more complicated OSSE is necessary, where per-

Printer-friendly version

Discussion paper

turbations are generated using different correlation parameters to exam how well the system will reproduce the 'true' fluxes, with incorrect correlation coefficients.

2. Discussions are more focused on the domain total. It is interesting to see how well the system will reproduce their spatial distribution.

Minor comments:

1. Line 5, Page 4: "This synergy follows from the fact . . ." Better changed to 'follows the fact. . .' or other phrase.

2. Line 5, Page 14: ". . .have a magnitude of 6-11 Megatons of carbon per year (MtC y-1) in July"

The unit of MtC/yr seems inconsistent with annual total presented in Table 5. I think it should be MtC/a.

3. Line 27, page 14: ".. .for the whole year between the prior and both posterior and the perturbed prior" The sentence is unclear.

4. Figure 1: Please explain why for CH4 fluxes in December, their uncertainty has been significantly reduced, but the differences from the 'true' are not obviously improved.

5. Figure 6: I suggest the authors also provide the prior and posterior error correlation between CO2 fossilfuel emission and biospheric net flux in the main text.

6. Figure 7: check the units for monthly fluxes (in main text as well).

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2017-69, 2017.

Printer-friendly version

Discussion paper