

Interactive comment on “Consistent regional fluxes of CH₄ and CO₂ inferred from GOSAT proxy XCH₄:XCO₂ retrievals, 2010–2014” by Liang Feng et al.

Anonymous Referee #2

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General comments

The paper provides another valuable development in the direction of using XCH₄/XCO₂ ratio in the inversion of both the CO₂ and CH₄ fluxes. This paper is one the first few papers on the subject, another one was published by Pandey et al, (2016). In this paper a longer analysis period is used, allowing for more extensive validation. Ability of the XCH₄/XCO₂ ratio to constrain fluxes of CO₂ and CH₄ and improve match with independent observations constitute most appealing and encouraging result of this study. The paper is well written and deserves publication with only minor corrections.

Specific comments

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Larger tropical CH₄ fluxes are inferred with GOSAT ratio as compared to surface data inversion. How to prove that the result is robust with respect to biases in retrieval and even retrieval prior concentration profiles? Another possible suspect could be the transport model bias in the stratosphere for either CO₂ or CH₄ or both. Can authors add more discussion on this issue?

L178 The benefit of dividing Transcom regions into 4 relatively equal ones was extensively explored by Patra et al (2005).

Suggestions for technical corrections

L058 Better tell which fluxes are being discussed, suggest to change “fluxes” to “Amazonian fluxes”, the context is ambiguous here.

L094 Suggest correcting “sufficient” to “sufficiently”

L100 Houweling et al 2015 is referred to, but not found in references.

L121 Suggest correcting Pandy to Pandey

L149 When introducing “prior covariance” need to tell which covariance - fluxes or concentrations?

L396 Text “GOSAT data significantly changed the a priori spatial distribution” should be modified towards saying that posterior changes significantly with respect to prior.

L462 Wording “XCH₄ in . . . lower stratosphere” doesn’t sound right.

References

Patra, P.K., M. Ishizawa, S. Maksyutov, T. Nakazawa, and G. Inoue, Role of biomass burning and climate anomalies on land-atmosphere carbon fluxes based on inverse modelling of atmospheric CO₂, *Global Biogeochem. Cycles*, 19, GB3005, doi:10.1029/2004GB002258, 2005

Interactive comment on *Atmos. Chem. Phys. Discuss.*, doi:10.5194/acp-2016-868, 2016.