

Interactive comment on “Quantifying sources of Brazil’s CH₄ emissions between 2010 and 2018 from satellite data” by Rachel L. Tunnicliffe et al.

Anonymous Referee #1

Received and published: 14 July 2020

General comments.

The authors presented an inverse modeling study of Brazil’s methane emissions using observations by GOSAT satellite. Their estimate of anthropogenic emissions matches with Brazil’s national inventory, while estimated emissions from wetlands are smaller than those by several other studies. To check the validity of the results and to quantify the impact of uncertainties in the inputs, the authors implemented a number of sensitivity studies. Although the study doesn’t use the ground-based observations inside the target region in the inversion, the results are supported by sensitivity tests. Discussions point out a large uncertainty of wetland emissions and the spread of different estimates, which has to be investigated further in the future. Paper is well written and can be accepted after minor revisions reflecting the review comments.

Printer-friendly version

Discussion paper



Detailed comments.

Line 50-56, Authors try to show that there is a wide range of estimates. To make that point it's better to group together the estimates for same regions/categories. It is not clear how big is the difference between studies when the target area is different. Another study using aircraft observations by Beck et al. (2013) could also be mentioned.

Line 53-54 Janardanan et al (2019) used global inversion, not regional. The correct publication year is 2020, not 2019.

Line 270-275 The discussion implies that there is a bias in boundary conditions (taken from global models). Is there any bias between those global models and data at RPB?

Line 290-295 Figures 8 and A5 show the observation and model time series, while it is difficult to understand the sign of mean mismatch between observed and simulated concentrations. It would be useful to add monthly mean data to make differences easier to see.

Line 355 The reasons for different models to give diverging results could be low number of GOSAT observations in wet season over the western Amazon basin. The full physics algorithm retrievals are likely to produce less data than proxy retrievals in partly cloudy conditions.

Line 359 Most global inversions add a latitude-dependent offset to XCH₄ in a way proposed by Bergamaschi et al (2009). So, it is better to note that offset is added differently here.

Line 365-370 High tropical wetland emissions are needed in global models to fit the observations. When there are observations downwind of Amazon basin such as aircraft data used by Wilson et al. (2016), discarding those estimates as improbable needs to be done with some caution.

References

[Printer-friendly version](#)

[Discussion paper](#)



Beck, V., Gerbig, C., Koch, T., Bela, M. M., Longo, K. M., Freitas, S. R., Kaplan, J. O., Prigent, C., Bergamaschi, P., and Heimann, M.: WRF-Chem simulations in the Amazon region during wet and dry season transitions: evaluation of methane models and wetland inundation maps, *Atmos. Chem. Phys.*, 13, 7961–7982, <https://doi.org/10.5194/acp-13-7961-2013>, 2013.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, <https://doi.org/10.5194/acp-2020-438>, 2020.

ACPD

Interactive
comment

Printer-friendly version

Discussion paper

