Atmospheric
Chemistry
and Physics
Discussions

Interactive comment on "Stable atmospheric methane in the 2000s: key-role of emissions from natural wetlands" *by* I. Pison et al.

Anonymous Referee #1

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The paper describes the interpretation of observed variations in atmospheric methane concentrations during 1990-2009 using a process-based model and two atmospheric inverse model approaches, paying particular attention to the role of natural wetlands. This is certainly an important and relevant topic for ACP.

After reading the paper I found it difficult to pinpoint what I had learnt. The interpretation of the analysis was insufficient to tease out anything new and the message I am left with is that models and surface data have their own weaknesses that likely compromise in-depth analysis. Unless the authors substantial improve the depth of the analysis presented I find it hard to support the publication of this manuscript in ACP.

All the following comments refer to section 3 of the manuscript. I have not commented

on most typos.

Typo, line 17: "they are considered as good" as what?

Page 9028: The authors describe the broad-scale variations in methane in the last decade of the twentieth century. Here, it would be interesting to hear more about how ORCHIDEE is performing as well as INVANA and INVVAR. More broadly, I didn't feel that the authors characterized the performance of ORCHIDEE in this manuscript, and given its importance in the analysis I strongly suggest this be addressed during the revision stage. It also wasn't clear to this reader, given the sometimes large differences between the models, which one was more consistent with the data.

Page 9028: I wasn't clear of the scientific value of comparing INVANA and INVVAR given their different initial conditions and configuration. If the authors had reported that both methods resulted in the same fluxes that would've possibility said something to the information content of the measurements, but they didn't. How sensitive are both methods to assumed prior data and uncertainties or to measurement uncertainties?

Page 9029: I was left unconvinced whether the data available supported the level of geographical disaggregation that was reported. Methane fluxes from the Amazon basin appears to be a focus of the paper but it wasn't clear from the associated text that the data or the models sufficiently constrained the estimate, e.g., different magnitudes and phases of the seasonal fluxes over a large geographical domain should allow the authors to disprove one or all of them unless the data is not suitable for that purpose. Perhaps it would be useful if the authors showed a Figure that include the location of the data used in the study.

Page 9029: This reader believes it would be interesting to see spatial distributions of methane fluxes over South America to see if there are any similarities between the different bottom-up and top-down estimates.

Figures: All need to be increased in size. Figures 1 and 3, in particular, contain lots of

information that is difficult to read as they are presented.

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