

Interactive comment on “Global inverse modeling of CH₄ sources and sinks: An overview of methods” by Sander Houweling et al.

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Received and published: 11 October 2016

Response to Anonymous Referee 3

We would like to thank the referee for the time and effort spent to help improve our manuscript. The structure of this document is as follows: Referee text's are in *Italic font*, answers are in **Roman**, modifications to the text are in **bold font**.

General comments: The paper presents a comprehensive overview of inverse modeling of methane sources and sinks, describing the state-of-the-art of research in this field, including the 'historical' development, and giving future perspectives. The manuscript will also serve as an instructive introduction to the field. The paper is very well written and is recommended for publication after only few minor revisions.

C1

Specific comments: Page 4, line 27: CH₄ is not absent in the stratosphere, although concentrations are low and a steep vertical gradient exists. Are you referring to CH₄ sources, which are absent in the stratosphere?

The sentence was changed into: "**Low CH₄ mixing ratios in the stratosphere matter, ...**"

Although the authors refer to Rayner et al. (2016) for the notation of variables and terms of the equations, it would be helpful for the reader (and better suit the didactical purpose of the paper) to include the definitions directly in the paper.

We followed the advice of the referee and added this table in a new Appendix B.

Page 8, line 1: Isn't this the 13C analogue of the more general equation 2.

Corrected (well spotted).

Page 17, eq. A1, A3: For consistency subscripts should be used for M.

Done.

Technical comments: Page 5, line 31: ...(as in equation 1). ...the state vector components...

Done.

Page 16, line 1: ... representation of wetland hydrology,...

Done.

Page 16, line 16: from -> for

Done.

Page 18, line 14: Röckmann

Done.

C2

Page 19, line 18: Please check editor name.

Done and corrected.

Page 22, line 30: 2. Inverse modeling of CH4 fluxes...

Corrected.

Page 23, line 24-27: Please check spelling of co-author names

Done and corrected.

Figure 1: It could be helpful to indicate in the graphs whether isotopic information was used.

This was in the figure already (green colors).

Please specify for references 19 and 20 the scenario that was used in this graph.

Done.

Figure 3: ... January (left) and July (right). The middle and bottom panel show ... top panel.

Corrected.

Figure 3: Better not use a divergent color scale because in particular a blue-white-red color scale suggests negative and positive values or deviations from a central value.

Done.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-572, 2016.