

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

Anonymous Referee #2

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Overview:

The manuscript “Global inverse modeling of CH₄ sources and sinks: An overview of methods” by Houweling et al. provides an analysis of the current status of the application of inverse modeling techniques to methane flux estimation, along with a discussion of both their history and their future potential. This paper is a useful documentation and provides some clear ideas for the future. I recommend publication after a few minor changes.

Section 3: Perhaps some mention (here or elsewhere) of the fact that the tropospheric chlorine sink of methane is often not included in inversions. Although relatively small, this will have had some effect on the inversion results that you show in Figure 1.

Page 13, lines 3-5: The authors write that SF₆ “provides an important constraint on

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inter-hemispheric exchange”. This should be explained a little further. Do the authors mean that the SF₆ observations should be used actively within an inversion in some way, in order to contain the inter-hemispheric transport? Or as in Monteil et al., (2013) in order to improve the advection parameterisation before an inversion is undertaken?

Page 15, line 5: The authors state that: “Measurements of the vertical profile of CH₄ may further improve the separation between surface sources and atmospheric sinks.” This statement should be expanded upon, as it is not clear how this would be true given the long lifetime of methane.

Technical corrections:

Page 16, line 14: “To make” -> “making”

Page 16, line 16: “from” -> “for”

Figure 3: The use of a blue-red colorbar in this figure implies positive and negative contributions. You should consider changing to non-diverging colors.

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