

Interactive comment on “How a European network may help estimating methane emissions at the French national scale” by Isabelle Pison et al.

Anonymous Referee #1

Received and published: 17 November 2017

1 General comments

Pison et al. present an inversion framework for estimating country scale methane emissions of France using ground-based atmospheric mixing ratio measurements. Both spatial and sectorial patterns of methane fluxes are optimized in separate inversions and compared with bottom-up and another set of CH₄ inversion emissions. The manuscript is clearly written. The method is well explained and results are nicely presented.

The focus here is to identify CH₄ emissions on a country scale, which is highly pertinent for the emission reports submitted by nations to UNFCCC. The other nice aspect of this research is the selective use of posterior information— that is, only when there is

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an actual constraint provided by the observations. Otherwise, bottom-up emissions are left unchanged. This method is more appealing for reporting purposes as it does not sacrifice ill-constrained regions to adjust the background concentrations. In wake of concurrent debate of whether atmospheric measurement constraints should be used along with national bottom-up emissions in policy reports, the analysis and results presented here are relevant to the scientific community. I recommend publication of this manuscript in ACP after minor corrections.

2 Specific Comments

My only issue with this research is the lack of a spin-down period, which would have provided sufficient observational constraint for the last month of the inversion. It can be argued that as the emissions are seen by the observations within a week, due to small spatial scales, lack of spin-down should have a small impact on the emission estimates. However, the last week emissions would still be ill-constrained. In Figure 8, the large discrepancy among the inversions of this study and Bergamaschi et al. (2017) for the month of December further suggests that a lack of spin-down might be affecting the posterior emissions.

3 Technical corrections/suggestions

Page 3:

Line 6: “statistical information or to uncertainties” => “statistical information or due to uncertainties”

Page 10:

Line 7: “ 2010 by Bousquet et al. 2006 are used” is confusing to the reader. Consider writing “concentrations fields optimized using the inversions setup of Bousquet et al. 2006 are used”

Page 13:

Line 25: Consider replacing the term “seen by the inversions” with something like “constrained by observations (in the inversions)”.

Page 14:

Line 30: “artefact due to” => “artefact of”

Page 17:

Line 1: “data, or to” => “data, or due to” ;

Line 5: “a view in terms of correcting the spatial distribution” => “to correct the spatial distribution”;

Line 11: “regions about” => “regions of about”.

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