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**Interactive
comment**

Interactive comment on "Can we detect regional methane anomalies? A comparison between three observing systems" *by* Cindy Cressot et al.

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I think the main issue with this paper is the fact that it does not clarify well enough the concepts of signal and, in particular, noise. As such it is not clear why is SURFREF is the signal? If you are defining the fluxes from SURFREF as the signal does this mean this is a pseudo-data experiment, or if it is a real data experiment, isn't SURFREF expected to have the same short comings as the SURF inversion? Please also expand on how noise is defined, and why GOSAT has less noise than SURF and these two have less noise than IASI?

Another issue is the fact that too few details are provided in the method section. Please consider expanding on the following issues: - The driving meteorology is nudged to what? - Why is only OH loss considered and not the stratosphere, soil and Cl in the

marine boundary layer? - Is the uncertainty in MCF emissions considered? - The fact that surface observations are not used in the inversions with GOSAT and IASI should be made clear earlier in the paper. - Are there also no long-term trends in the anthropogenic emissions? - Review spatial and temporal correlations assumed in the prior - PBSURF inversion should be introduced earlier and the differences with respect to REFSURF made clearer. - Treatment of input data (e.g. discarding non-background conditions, treatment of flask pairs, more on the model data mismatch). - Please expand a bit more on how the monte carlo ensemble works and explain if you calculate fluxes or only error statistics.

In general I found the way much of the results were given in tables quite difficult to understand particularly for the regional spatial scale. This could be substituted in the following ways: - Maps for each observation system for each temporal scale showing the detection rates at regional spatial scale. - A map for each the observation system showing the time scale at which best detection rates were found. - I think it would be a great contribution to provide maps that delineate the regions of spatial agregation that provide the best detection rates for chosen observing system - Finally, with respect to the seasonal time scale, I think it would be useful if you could provide a plot seasonal cycle (month vs flux) estimated with each of the observing systems for each spatial scale as well as an estimate on how much the OH is contributing to the seasonal cycle?

Finally, please expand more at the section were you compare with Bergamaschi 2013.

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