**Atmospheric
Chemistry
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Discussions**

Interactive comment on "The formaldehyde budget as seen by a global-scale multi-constraint and multi-species inversion system" *by* A. Fortems-Cheiney et al.

Anonymous Referee #2

Received and published: 3 May 2012

The manuscript title "The formaldehyde budget as seen by a global-scale multi-constraint and multi-species inversion system" aims to bring a lot of data and computational effort to constraining formaldehyde. The inversion nicely involves multiple species and data sets, which is an improvement on previous studies. I really appreciated the thorough set up of the inversion and the use of extensive independent data. It's a little disappointing though that with all the data and computational machinery, it doesn't seem like we are learning much. Is that right? It would be great to see more analysis and discussion of the results. Other than that, I have a several specific comments that I list below.

p 6911, l14. that seems like an outdated reference

p6911, l23-24: the reference list is representative of previous work, but not exhaustive. I'd suggest adding "eg" in front of it

p 6915, l3: "may be biased"? or just not validated?

section 4: It was very disappointing to see that errors were set arbitrarily. Is this really the best we can do at this point? While many other studies devote a lot of time thinking about this issue, it seems like a step back to set arbitrary errors. I found that unacceptable. At the least there should be some discussion as to why the authors had to resort to setting errors to arbitrary numbers.

section 5.1.1., p6920 What does that 1 month lag mean in the results? why are the emissions wrong? It'd be great to read more insight

section 5.1.2, last paragraph: Again, what does the "significant modification" imply? Do we learn something about HCHO production or precursor emissions?

section 5.2.2, do we conclude that these regions are well constrained and accurate in a priori information or just not well constrained given the data that are available

p6927, l10-15. I don't quite follow here, especially the "amplify difference"

p6928, l14-19: I can't help wondering if CO emission and production offset each other here with respect to other studies

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 6909, 2012.

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