**Atmospheric
Chemistry
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Discussions**

Interactive
Comment

Interactive comment on "Evaluating the performance of pyrogenic and biogenic emission inventories against one decade of space-based formaldehyde columns" *by* T. Stavrakou et al.

Anonymous Referee #2

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Review of T. Stavrakou et al.

General comments.

The authors present a 10-year dataset of HCHO measurements from GOME and SCIA-MACHY and compare them to output from the IMAGESv2 CTM driven by different emission inventories. The subject matter is suitable to ACP. I think this new satellite dataset is a useful contribution to the community. The paper should primarily be viewed as a qualitative overview of this new dataset. Some of the quantitative interpretations are questionable given the acknowledged shortcomings in the retrieval over fire scenes. In particular, the authors point out that the retrieval is biased by up to 40%

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over fires because absorbing aerosols are not considered, but this is then ignored in the subsequent evaluations of bottom-up pyrogenic emission inventories. A revised version should reframe the biomass burning comparisons throughout the manuscript, so that such uncertainties are part of the discussion. I also have some suggestions for reducing the manuscript length. I recommend publication if these comments are addressed.

Specific comments.

I dont see the point of including outdated emission inventories (GEIA, GFEDv1) in the discussion. The paper is overly long for the amount of science presented, and one way to simplify and streamline would be to just focus on MEGAN and GFEDv2. Since both MEGAN and GFEDv2 incorporate improved methodology, and quantity and quality of input data, occasions that GEIA and GFEDv1 happen to do better would seem to be a result of chance and so not really of interest.

16987, L28. How is the shape factor interpolated? By interpolating concentrations at each altitude? The IMAGES horizontal resolution should also be mentioned here.

16988, L17-21. See general comment above. Please discuss how this will affect your subsequent analysis and interpretation. This effect also needs to be acknowledged at later points in the paper during the satellite-model comparisons for biomass burning. A 40% AMF overestimate would yield a corresponding underestimate of the vertical column, leading to spurious agreement / disagreement with bottom-up inventories. It seems that given this issue, the comparison of spatio-temporal distributions between satellite and model should be weighted more heavily than comparisons of column amounts (i.e. correlation vs. bias), at least for areas strongly affected by fires.

16989, L18-19. And the above-mentioned aerosol effect.

16989, L24-25. But higher than that over fires, if the aerosol effect alone is up to 40%.

16991, Section 3.2. The pyrogenic EFs vary with underlying vegetation, yes? This

should be mentioned.

Figures 1, 2. I suggest combining Figures 1 2 into a single 2-panel figure. Also I recommend adding a 3rd panel showing the difference between the two; otherwise it is difficult to compare. But see my other comment about which emission inventories to include.

16993, L1-2. Is this problematic at all for mid-latitude fires?

16993, L14. Point out that neglecting monoterpenes is not likely to have an important effect given the references cited earlier and your subsequent discussion in Section 4.2.

Consider moving some of Sections 3.2 and 3.3 to a Supplemental Information section in the interest of length. There is a lot of detail provided here which seems like pretty standard stuff.

Table 1. Since you have modified the IMAGES mechanism to mimic MCM, it seems redundant to include both the IMAGES and MCM HCHO yields. I suggest removing one of them, and simply stating in the text that the computed yields differ by < X% between the two.

16998, L4. Only slightly? Give approximate amount or bound on the amount.

16999, L20. Recommend "5.1 Contribution of the different emission sources to the total SIMULATED HCHO column"

17000, L20. "Below the Tropics" is confusing. Within the Tropics? South of the Tropics?

17000, L21-22. But also point out that these are for different years so we dont expect them to be identical.

17004, L25-26. A bit more info? How big a region was the MEGAN average computed for?

Figures 10-14. Captions should say Line colors are as in Fig 8, not Fig 10. Also

consider instead restating the color scheme in each caption, as otherwise it is annoying for the reader to have to keep flipping back to the first figure.

17005, L13. Suggest "in the dry season" instead of "in January".

17005, L16. Suggest "IN THE WET SEASON for most of the years."

17005, L18. Please indicate whether by "correlation" you mean R or R2 (I assume R) to avoid ambiguity.

17007, L17-25. Given the acknowledged retrieval bias over fire scenes, do you really want to make the argument that the findings of Fu et al. "are not supported by our comparisons"? If you do, then you need to demonstrate how this statement holds even given the potential retrieval bias.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 16981, 2008.

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