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Atmospheric Chemistry and Physics Discussions

Interactive comment on "C_3-C_5 alkanes in the atmosphere: concentration, seasonal cycle and contribution to the atmospheric budgets of acetone and acetaldehyde" *by* A. Pozzer et al.

Anonymous Referee #1

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I share the concern of scientific significance of this paper by the other reviewer. My review is more critical because of that concern.

The paper describes the simulations of C3-C5 alkanes in the atmospheric chemistry general circulation model, EMAC. The model simulations are compared mainly with NOAA ESRL observations and the comparisons are shown for a few sites. The productions of acetone and acetaldehyde are then computed from alkane oxidation. The analysis and modeling are straightforward and described clearly. After reading the paper, I find it difficult to grasp any significant finding from this work. We do not know if the EDGAR inventory (v3.2 or v2) is any better or worse than other emissions, or

how productions of acetone and acetaldehyde from alkane oxidation compare to other sources of these compounds. If this paper only describes EMAC simulation and comparison results without providing any new finding in either emissions or modeling, I do not think it can be published in ACP.

Specific comments:

1. P. 1944, line 6-11. Why use EDGAR v 3.2 emissions for propane and EDGAR v2 for butanes and pentanes? Is EDGAR v3.2 is better than EDGAR v2? Which year is EDGAR v2 for? Both EDGAR v2 and v3.2 emissions should be added in Table 1 for comparison. Which version of EDGAR emissions did Jacob et al. criticize (line 19)?

2. P. 1944. From this study, do we know which emission inventories are better?

3. P. 1945, line 8-10. It is not difficult for the model to simulate seasonal cycles of C3-C5. How well is OH simulated in the model? If OH is low, the model can simulate the correct seasonal cycles with small emissions.

4. P. 1946, section 2.3. This section should be placed after showing the model comparisons.

5. P. 1947, line 4. What about the comparisons at other ESRL sites?

6. P. 1947, line 25. If no final conclusion was drawn from this comparison, what is the purpose of showing this figure?

7. P. 1948, line 10. The simulated butane is clearly too high at 40-70 N. Does it mean that the emissions in the model are too high or OH is too low?

8. Figures 9 and 10. The model pentanes are clearly too high at 76S. What are the sources of pentanes that far south? The lifetime is short enough and the location is far away from sources that pentane mixing ratios should be very low.

9. Figure 12. The finding by Singh et al. (2001) is that the latitudinal gradient of observed acetone is very small in the tropics. The large NH-SH difference in acetone

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production in the figure clearly cannot explain the observations. Why are the comparisons in Figure 13 only in the NH? If comparisons are shown for the SH, we will probably see that acetone in the model is much lower than in the observations and the oxidation of alkanes does not make the model comparison better. Is there a selection of showing only "good" model comparisons in the NH and not showing the "bad" comparison in the SH? If there is, it is disconcerting.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 1939, 2009.

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