Atmos. Chem. Phys. Discuss., 10, C601–C603, 2010
www.atmos-chem-phys-discuss.net/10/C601/2010/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Observed and simulated global distribution and budget of atmospheric C_2-C_5 alkanes" *by* A. Pozzer et al.

Anonymous Referee #2

Received and published: 14 March 2010

This work compares updated global model simulation of C2-C5 alkanes with measurements from the NOAA network of sampling flasks. The authors focus on the ability of the model to capture the seasonal and latitudinal variability of these species when considering different emissions inventories. This study is valuable as these inventories under consideration are widely used, and the use of several years of flask observations is an appropriate means of evaluating the model estimates. Overall, the manuscript needs to more quantitatively address many of the comparisons in order to sharpen some of the conclusions that currently are embedded within the work but not well highlighted by the analysis or abstract.

Major comments:

1. In most places, the comparison of the model performance with respect to the ob-

servations is very casual and qualitative, and I believe this hurts the authors abilities to draw conclusions from their work. For example, consider the first few lines of section 4.4, which state that "it is difficult to clearly establish which simulation reproduces the observed mixing ratios better, due to the different performance of the model simulations at different locations." What is the correlation? What is the bias? What is the component of the disagreement that comes from magnitude vs seasonal offset? For which comparisons are the differences statistically significant, or does the error in the observations and the variability of the model make the population means indistinguishable? These are the types of basic quantitative statistical questions the authors need to include in their analysis. Such metric would help further establish this and other conclusions, such as "Overall, for many stations, simulation "E2" better represents the obser ved mixing ratios than "E1". This is evident at some locations (for example MHD)." How many stations? What is meant by "better"? How much better is E2 than E1?

2. Emissions are blamed for nearly all of the discrepancy between the observations and the model, even when considering only a single inventory. How did the authors rule out the impact of meteorology, chemical mechanism, model resolutions, and chemical sinks/loss rates? I'm not going to say that I necessarily dispute their claim that emissions are to blame, but they need to make the case clear.

3. The abstract should mention the results and conclusions regarding the different emissions inventories used, as that strikes me as the most valuable outcome of this work. They should also mention the possible missing ocean source of C4-C5.

Minor comments

1. I would find it very helpful if the authors could present the details of their various simulations in a table that showed: the emissions of each species for each run (S1, E1, E2) and the source of the emissions for that run (i.e., EDGARv2, EDGARv3, Jacob 2002). It would minimize the amount of repetition currently in the text when explaining these facts and make it easier for the reader to follow along.

2. It is rarely good style to have paragraphs that consist of only one or two sentences. This work is full of such paragraphs, most of which should be merged with surrounding material.

3. Missing punctuation in line 13, p618.

4. Line 22, p618, references to KPP. I believe the KPP gnu public license requires a specific set of articles to be cited, which are not.

5. Line 14, p619. The authors refer to the work of Jockel 2006 for analysis of the model's OH distribution. Has the models performance for OH changed at all given the modifications made since the previous comparison?

6. Line 1-3, page 624: does this imply that results for ethane and propane are independent of the emissions of the C4-C5 species, which are different in E1 and E2?

7. Line 4, page 624: I didn't see any explanation of the seasonal cycle in Sect 1.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 615, 2010.