

Interactive comment on “Evaluation of the volatility basis-set approach for the simulation of organic aerosol formation in the Mexico City metropolitan area” *by* A. P. Tsimpidi et al.

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1. *This paper examines a volatility basis-set approach to the simulation of organic aerosol formation and concentrations in Mexico City. This work is a timely application of an important new development in organic aerosol partitioning between the particulate and vapor phases. The site chose to evaluate this approach is challenging due to incomplete knowledge of the volatility distribution of the primary organic emissions and the complexity of the chemical environment studied. Given that, the paper expresses suitable cautions about the significance and confidence levels that should be applied to the simulation results. A number of assumptions employed in parameterizing the*

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model seem somewhat arbitrary, e.g., the volatility distribution of the emissions, the rate parameters employed to models some of the reactions, and the percentage of mass that is added to a class upon oxidation. An analysis of the sensitivity to these assumptions would be appropriate. The authors do explore the model sensitivity to the volatility basis set that is assumed for the emissions by performing 3 simulations with different assumed volatility basis-sets. While this is far from a comprehensive sensitivity analysis and further analysis of the parameters employed in the model is clearly needed, the paper develops sufficient new insights into the origins and evolution of the Mexico City organic aerosol that the additional analysis can reasonable be left for future work.

Our choices of the volatility distributions for emissions, aging rate constants, and IVOC emissions are all based on the few available laboratory and emission measurements (please see references in Shrivastava et al., 2008). While these parameters are clearly uncertain we do not think that they are arbitrary. The sensitivity of the volatility basis set to the aging rate constants and the IVOC emissions has been explored in previous work by our group (Shrivastava et al., 2008; Lane et al., 2008a). We have chosen therefore to focus here our analysis on the sensitivity of our results to the volatility distribution of the emissions, something that had not been sufficiently investigated by previous studies. We do agree with the reviewer that additional sensitivity analysis is always welcome in such modeling applications. We plan to conduct these in future work for Mexico City focusing on the MILAGRO campaign for which there are enough data to evaluate the effect of the aging scheme assumptions on the spatial distribution of the OA concentrations.

2. *While the technical content of the paper seems to be in good order, the graphics need some work and the paper needs to be carefully edited. The major data presentation is in the form of color maps of the region of study. A map of the model domain is also presented in Fig. 3. Unfortunately, either the scale and region covered in the geographical map differs from that shown in the data plots, or the aspect ratio of the data*

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plots is distorted. Moreover, only a few locations are identified in both types of plots; the data map only includes a few specific locations that are in the geographical map, and no geographical boundaries or other features to help the reader orient himself/herself with respect to the map. This should be remedied by incorporating the geographical information into the background of the data plots, and by clearly identifying the model domain in the map. Also, black labels on dark blue on the data plots are not legible – make certain that all information in the data plots is easy to read.

A map of the Mexico City Metropolitan Area showing the geographical locations of the sites used in the colored maps has been added to the manuscript. The color of the labels in the maps has been changed and the geographical scale of the domain has been added. Finally, a table with a brief description of the measurement sites appearing in all color maps has been added to the manuscript.

A few editorial points are:

3. *p. 13697, l. 11: The AMS ... has been the most commonly used over the last few years. (or ... in recent years).*

This has been corrected in the revised manuscript.

4. *p. 13709, l. 19: nand – should be “and”.*

Corrected.

5. *p. 13710, l. 8: insert comma after “average”.*

Corrected.

6. *p. 13710, l. 22: replace “there are less oxidants available” with “less oxidant is available” or “fewer oxidants are available.”*

Corrected.

7. p. 13711, l. 22-25: *The long sentence beginning with “Finally ...” is very difficult to follow.*

This sentence has been rephrased.

8. p. 13713, l. 5: *Replace “thereby” with “therefore.”*

Corrected.

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