

Interactive comment on “Chemical Transport Model Simulations of Organic Aerosol in Southern California: Model Evaluation and Gasoline and Diesel Source Contributions” by Shantanu H. Jathar et al.

Anonymous Referee #2

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This manuscript incorporated new experimentally derived inputs to improve the simulation of OA in southern California in the CMAQ model. The authors focused primarily on treatments of intermediate volatility organic compounds (IVOC) from gasoline and diesel sources, implementing updated estimates of emissions and updated parameterizations of SOA formation. They evaluated the simulated results against measurements during the CalNex campaign. Overall, the authors found the updated model performed well at reproducing the (CSN) observed bulk OA concentrations at several locations in S. California. The updated model significantly underestimated OA concentrations when compared to HR-AMS measurements at Pasadena. However,

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the updated model showed significant improvement at reproducing the OA composition and IVOC compositions at Pasadena. Model simulations showed that gasoline sources contribute about much more OA than diesel sources do due to the former's much larger SOA production. They showed that this conclusion is robust, even when the uncertainty in diesel IVOC emissions is considered.

In my view, this paper represents a good step in improving model representation of SOA formation under the VBS framework. Many current models use VBS, but the inputs to these models are highly uncertain, particularly for IVOC emissions and chemistry. I think the authors did a nice job at incorporating as much new experimentally-derived inputs as possible into their VBS model. The result is a updated, useful, and at least partially validated, model that the community can continue to build on.

I recommend publication after minor revision.

Comments:

Abstract: "The updated model, despite substantial differences in emissions and chemistry, performs similar to a recently released research version of CMAQ." This sentence is unclear. What is the "research version of CMAQ"? I assume it is the CMAQ used by Woody et al., without updated treatments to IVOC?

Figure 3: Are there CSN measurements at Pasadena that can be compared to the HR-AMS measurements? Also, why not compare model results to PMF analysis of the AMS measurement? I see this is done as a campaign average in Figure 4. But perhaps doing this comparison in Figure 3b would shed light on why the high concentration days were more severely underestimated by the model. Might be worth a try.

Minor comments: There seems to be problems with the insertion of some citations (e.g., page 5, line 31 'ENREF_20').

Figure S3: The caption should read "Comparison of campaign-averaged predictions of the VBS model of Woody et al. (2016) and VBS-IVOC model".

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