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Interactive comment on "Simulation of the evolution of biomass burning organic aerosol with different volatility basis set schemes in PMCAMx-SRv1.0" *by* Georgia N. Theodoritsi et al.

Anonymous Referee #1

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This study tested the performance of a new VBS parameterization in the chemical transport model PMCAMx-SR on simulating biomass burning organic aerosol (bbOA) in the U.S. The results show that the model performs differently depending on the season, indicating further needs to quantify the emissions and reactions of IVOCs from specific biomass burning sources. The paper is generally well written, and can be helpful to improve the bbOA simulation in the U.S. I would recommend it for publication if the following concerns can be well addressed.

General comments:

1. The biomass burning emissions in this study include prescribed burning, agricultural

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burning and wildfire, while the tested VBS parameterization by Ciarelli et al. (2017) is constrained based on biomass burning in residential stove. Since the different biomass fuel types and burning conditions could largely influence the OA formation, is there any explanation about the potential bias? Could it be a reason the new VBS parameterization performs worse in the wildfire dominated season?

2. The model evaluation section lacks necessary technical details, making it a little difficult to follow. Do the 161 STN sites and 162 IMPROVE sites measure only PM2.5 or also OA? In L403 it refers to "daily average PM2.5", but the analysis is for OA. Please clarify it. Is there any information about the OA measuring methods? In addition, besides the Table 2 it will be more straightforward to add a map showing the spatial distribution of the mean bias for each site.

3. For the structure of the manuscript, it makes more sense to evaluate the model performance first, and then predict the bbOA and discuss where the differences of two VBS schemes come from. I would suggest moving the section 6 before current 4 and 5.

Specific comments:

L28, "were mixed" is not clear, better to specifically refer to the seasonal differences.

L53, the references here could be more updated.

L78, the term "VBS" is already defined in L66.

L92, the "PM2.5 OA" needs to be defined. It seems not necessary to add "PM2.5".

L96, is the "overprediction of bbOA" based on comparison with source apportionment of measurements? Since most of the source apportionment studies do not separate the bbSOA, do you mean bbPOA?

L143, the "2.5 times" may need some references.

L267, the bbPOA level 0.02 ug/m3 is quite low, even lower than the difference of two

models in bbPOA (0.1 ug/m3) in L265. If they refer to average in different time period or scale, it needs to be clarified.

L674, the format of Table 1 needs to be updated. Please use the standard three-line table.

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