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Interactive comment on "Updating sea spray aerosol emissions in the Community Multiscale Air Quality (CMAQ) model version 5.0.2" *by* B. Gantt et al.

Anonymous Referee #2

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This paper describes an update to the SSA emission algorithms for the widely used open access CMAQ model and compares model simulations of atmospheric particle distributions to 3 observational datasets. The authors summarize existing models and use observations to evaluate various model approaches and identify a specific approach for updating the CMAQ model. There are a few points that the authors should consider before the paper should be published in GMD.

1. The abstract mentions gas-particle partitioning of nitrate "potentially affecting the predicted nitrogen deposition in sensitive ecosystems". This is an interesting point but it is not one that shows up much in the following text. It should either be discussed more in the manuscript or removed from the abstract.

2. The authors note that global SSA emission estimates differ by 2 orders of magnitude but they give no indication of what drives these differences and where the CMAQ model falls within that range of estimates. Is the difference all due to open ocean emissions (which is not the subject of this paper) or do coastal emission play a role in the difference reported for global totals? A comparison with other model results for coastal U.S. (or coastal regions in general) would be useful.

3. In order to give some confidence that the model predictions should agree with the observations, some information on the accuracy of these measurements is needed. Do the two local datasets agree with the national dataset? There are considerable artifacts associated with analysis of filter samples, such as volatilization of some chemical species, that should be mentioned. How do the known observational uncertainties impact the use of these observations to evaluate model performance?

4. Throughout the paper, comparison of model and observed is simply indicated as an under (or over) estimate without showing if there is a significant difference or even if it is a relatively small or large difference. It would be useful to provide something beyond just under or over estimate.

5. The focus of the paper is on an updated emission model but there are no flux measurements to evaluate these emissions. The authors should make it clear that they are evaluating an emission model, not with emissions, but with ambient concentrations that are controlled by emissions, deposition, transport, and chemistry. The manuscript should provide some background on how well we know each of these other processes and show how that impacts this model evaluation. For example, are the uncertainties in deposition of the same order as the uncertainties in emissions? Could using a different deposition approach change the results and lead you to choose a different emissions approach for the updated model?

page 3923, line 10: “domian” should be “domain”

Interactive comment on Geosci. Model Dev. Discuss., 8, 3905, 2015.