

## ***Interactive comment on “The impact of marine organics on the air quality of the western United States” by B. Gantt et al.***

**Anonymous Referee #1**

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This paper provides an interesting look at the influence of natural sources on air quality in urban locations. If marine organics influence the PM<sub>2.5</sub> concentrations in cities that are out of compliance, new standards may have to be enforced. Since the contribution is small, the regulations might not change. In addition, it may be hard to define coastal cities depending on how large they are and how much they are influenced by onshore winds and other factors.

Overall evaluation: This is a short study of the modeled changes to OC and O<sub>3</sub> concentrations compared to observations, primarily in California. The study uses state-of-the-art models and emissions and compares to available quantitative measurements and qualitatively to related literature. The conclusions that the marine sources are negligible in the polluted non-attainment regions of California seems predictable (based on

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observations), so the results are not surprising. In some ways, it seems the hypothesis that was tested (based on the title...“the impact of...”) had what is usually perceived to be a negative result (i.e. a negative impact). While I can provide intellectual support for the necessity of publishing results even if negative, as written these results might be of more interest to a more focused journal like JAWMA. If not, then I would request that the authors address the following issues in order to make the context and impact of their results clear to the more broad audience of ACP. In my opinion, the authors lose an opportunity by not identifying an outcome of the modeling that goes beyond the observed fact that levels of marine OC are much smaller than OC in populated coastal/urban areas; perhaps there is something that the interaction in coastal areas causes? A title focused on an interesting positive outcome (rather than the lack of “impact”) would then be advisable.

For example, interesting questions that come up while reading this paper are: how far inland do the marine aerosols contribute to the PM<sub>2.5</sub> and OC<sub>2.5</sub> levels? Is this level higher or lower than the upwind background in a continental region? Is this higher or lower than the contribution of a forested area? Does the different chemical composition of these particles have a different impact on the heterogeneous chemistry in urban areas? Is California a good example? Would there be a different answer in Oregon or Canada with less coastal population? And how will a coastal area be defined for future air quality standards and models?

Abstract: What is defined as a coastal city? Interesting conclusion that marine organics are impacting air quality in coastal cities and should be included in air quality models. L2: change “to” to “on”

Introduction: Explain why isoprene and monoterpenes were chosen as the main ocean emitted VOCs. Do the coastal cities with larger wave breaking have a different contribution of organics from marine sources? Does the percent contribution to PM<sub>2.5</sub> from marine aerosols change with distance from the coast? Explain how are the organic aerosols from bubble bursting transported to the coastal areas. Does topography af-

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fect concentrations?

Method: Explain the importance of choosing the summertime. Do you think the results would be different during a different time of year? 2.2: Explain if emissions from diatoms are representative of emissions from all marine species and the potential differences in emissions.

Results: 3.1: How will the new air quality models incorporate the difference in the contribution from marine aerosols based on the amount of onshore wind? Why is there consistent disagreement between the model and observations? This supports the negative correlations shown in this paper, but what can be done to increase the correlations and better represent the measurements? 3.2: Why is the largest change off the coast of Northern California?

Conclusion: How far inland does the onshore flow bring the marine aerosols?

Table 1: Further explain why all of the correlations at the point Reyes site are not strong. In the text, explain why the correlation of the bottom up and top down are not that much higher than the baseline. Table 2: None of the correlations are great. Why are the Ventura simulations so different from Oceanside? What impact does location and coastal topography have? Figure 1: Do the marine organics really contribute to surface OC2.5 all the way across California and into Arizona and Nevada? Would this be different for a different season? It might help to show only the Pacific Coast and less of the rest of the country. That way, more of the change in percent between the coasts and inland areas can be seen. Figure 2: It might help to make 0 a different color so that it is more obvious what is impacted and what is not. Are the grey regions not involved in the study? What is off the coast of Northern California that is producing such high concentrations of marine organics? Figure 3: Might consider making the letters (a&Ard) larger because they are not very apparent in the figure.

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