

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

Anonymous Referee #2

Received and published: 8 May 2010

The manuscript describes a modeling study, which is an extension of a previous paper from the same group, concerning the impact of organic aerosols (both primary and secondary) from marine sources on air quality of coastal areas. The paper is interesting but has some issues that need to be addressed prior to publication to ACP. It presents potentially interesting results, but more in depth analysis is necessary, as mentioned below.

General comments:

- The modeling domain used is not appropriate for a study of the marine organic source. Less than 10% of it is dominated by the ocean, with the rest of it laying over continental US. Since this study aims to analyze the organic aerosol sources, the organic aerosol transport and their influence on coastal areas, a larger oceanic domain is necessary.

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Having the boundary conditions so close to the area of interest, and assuming that the boundary conditions have zero marine organic aerosols, makes the results fragile. Large range transport of the (mostly water insoluble, thus not so effectively removed) aerosols might augment their amount reaching coastal cities. In addition, about two thirds of the model domain (the east part) is never mentioned.

- No discussion is ever made on the meteorological conditions prevailing in the area of interest. From figure 1 it is evident that there is a sharp decrease of marine organics when moving from areas above sea to areas above land. However, this figure is a three month average. When studying air quality, the average is of little importance; episodic events, where winds coming from the ocean, transporting organics above the coastal cities, are more interesting. The frequency of such events is also something that has to be mentioned. In addition, when marine winds dominate, they tend to transport local pollution inland, which can be beneficial in air quality, given the fact that the marine organics calculated are low. All these important issues are absent from the manuscript.

- It would be very useful to present an open ocean comparison with measurements, if data are available.

Specific comments:

- Sentence 1 of the introduction requires some references (more than one).

- Page 6261: “Marine monoterpenes were not included in bottom-up simulations due to extremely low emission rates from diatoms (~100 times lower compared to isoprene)” and “Marine monoterpenes are included in the top-down approach due to reported ambient concentrations comparable to phytoplankton-produced isoprene” are controversial. If both claims are correct, then the major source of marine monoterpenes is missing from the bottom-up approach. One simple guess could be that phytoplankton species other than diatoms produce much more monoterpenes.

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- MSA is not included in the calculations, although it is one of the most important marine organic aerosol components. A discussion on how this is expected to influence the results should be added.
- Page 6268, line 2 “air quality of coastal areas”: The study was performed at coastal California. Although the results are expected to be qualitatively similar with other coastal areas, they might differ considerably quantitatively. The authors cannot use their results to support such a general conclusion.
- Figure S2 does not deserve to be in the supplementary material. In an air quality study (as the title of the paper implies) this should be the most important figure of the paper. The measurements should also appear on that same figure for comparison with the model.

Technical corrections:

- Colomb et al (page 6261, line 12) is misspelled.
- A map showing the locations discussed throughout the text should be added.
- Sciare et al (page 6267, line 3) is misspelled.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 6257, 2010.