

***Interactive comment on “The role of sea-salt emissions and heterogeneous chemistry in their quality of polluted coastal areas” by E. Athanasopoulou et al.***

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General comment:

(1) "The model is applied for a very short period (1 day) and not in the period when the measurements are available. It is not justified why that particular day was chosen, and anyway the period should be chosen among the days when the measurements were collected."

This is a valid concern. Unfortunately, we have been unable to find a period with the appropriate meteorological conditions, available information for anthropogenic and biogenic emissions, and suitable measurements for the detailed evaluation of the model. Our main concern was to select a simulation period with: -representative wind speed

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values over the area of interest, as wind speed controls SSA emissions -wind direction favorable for the transfer of sea-salt towards the Athens basin. -elevated pollution over Athens To address the above data limitation we collected as much of the available observational data and restricted our comparison of the model predictions to the averages and ranges of these measurements. While we do use the limited observational studies as much as practical for model evaluation, it should be kept in mind, however, that the point of the paper is not the model evaluation itself, but assessing the potential role of sea-salt aerosol. This gap highlights the need for further aerosol observational studies in Greece or similar area, and a more complete routine monitoring effort as well, at areas affected by both natural (marine) and anthropogenic emissions. Measurement sites could be indicated by this and other relevant studies. These points are now explained in the revised manuscript.

Specific comments:

(2) p. 3810 Line 15, "... CL06 is the only parameterisation that covers sub-micron particles."; This is not true, Martensson parameterisation does it and others as well.

Corrected. We wanted to stress that CL06 extends to the smallest particle size, as shown in literature (e.g. figure 1 of O'Dowd and de Leeuw, 2007). We modified the phrase as: "CL06 (Clarke et al., 2006) is the parameterization extending to the smallest particle size (0.01  $\mu\text{m}$  dry particle diameter)"

(3) p. 3811 Line 10, "The reference Vignati et al, 2001 is used in the session of applications at the global scale, but the paper does not address the model application at that scale."

The reference was deleted from that section.

(4) figure 5, "there are discontinuities present in the open-ocean formulation in the figure which are not physically correct, the formulation must be continuous"

One of the two discontinuities occurs at the threshold between the two different pa-

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parameterizations (CL06 and G-M03, indicatively shown together in figure 1 of O'Dowd and de Leeuw, 2007) and is due to the different data sets used. The other discontinuity occurs at the cut-off of the size intervals of the polynomial regressions that fit the CL06 flux and appears for RH higher than 40%. When applying the parameterization for the reference RH value (40%), the plot is continuous and compatible with available figures in literature. To avoid confusion we have added the curve with its continuous form (upper part of figure 5).

(5) figure 8, "I would like to see in figure 8 the entire speciation of PM10 including also EC, OC, this would give a more complete picture of the PM10 composition and also the SSA-derived component concentrations are confronted with the other species as well."

Values presented in figure 9 (used to be figure 8 but due to a figure addition, the figure the referee refers to, is now figure 9) are "The difference in PM10 results between the base-case simulation and the simulation without SSA emissions (expressed as a percentage of the base-case concentrations)" (p. 3819, lines 10-12), thus EC and OC concentration differences are zero. To avoid confusion we have rewritten the figure caption for Figure 9. Figure 7 (i) gives the spatial distribution of the sum of EC and OC species in comparison to the rest 8 spatial plots which show the marine-affected species. The new figure 8 (added in the section showing total aerosol predictions: 5.1) shows the daily variation of aerosol composition over 2 sites, thus gives "the entire speciation of PM10 including also EC, OC"

(6) References: "Shankar et al (2006) is missing in the reference list and Russell et al. 1986 is not mentioned in the text."

Corrected.

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