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## ***Interactive comment on “Modelling of sea salt pollution over Europe: key uncertainties and comparison with observations” by S. Tsyro et al.***

### **Anonymous Referee #2**

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The manuscript presents the results of the regional atmosphere model EMEP simulating the distribution of sea-salt for the period 2004 to 2007. Model results are compared to measurements of the sodium concentration in air and in precipitation. The model is capable to reproduce the concentrations with reasonable accuracy, although the results exhibit a systematic bias. The simulations are accompanied by a number of sensitivity tests and an extensive discussion of the performance of sea-salt source functions. In general, the paper is well written and the topic of sufficient interest to warrant publication in ACP, however, the conclusions are thin compared to the number of simulations performed.

Specific comments: Title: I wouldn't refer to “sea salt “ as “pollution”.

Chapter4 “Measurements”: The magnitude of air mass concentrations depends cru-

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cially on the upper cut-off and, because sea salt exhibits near ground a strong vertical gradient, on the altitude where measurements are taken. Thus, please, describe the measurement data used for comparison to model data more detailed. The EMEP sampler has no well-defined upper cut-off. Nevertheless, is it possible to give an average percentage of total aerosol mass of particles larger than 10 microm?

Page 161, last par: In order to test the performance of the wet removal scheme, it would be interesting to analyze the agreement between air concentration measurements and model results by separating the days with and without precipitation.

Chapter 8.2: The horizontal resolution of the two meteorological models, EMEP and SILAM, differ by more than a factor of two. This might influence significantly the wind statistics and subsequently the sea salt source strength and hampers the interpretation of this model comparison. EMEP and SILAM use aerosol schemes of different complexity. Can the authors judge whether the more complex scheme produces results that are more realistic? I miss the results, which justified this chapter.

Chapter 9 “Conclusions”: The EMEP model simulates too high air concentrations and too low concentrations in precipitation. The article does not offer a satisfying explanation. Given that the amount of sea salt removed is mainly controlled by the source strength whereas the concentration in air is controlled by the residence time, would it help to enhance both the source strength and the removal rates? Some discrepancies might arise from the fact that the measurements have no clear upper cut-off and the vertical resolution is pretty coarse. Vertical soundings of sea salt concentrations in air show a strong vertical gradient near the surface, however, the lowest model grid-box is 90 m thick. Please, comment.

Typos Page 161, 1st sentence: "The model overestimates the measured Na air concentrations in all years, but the underestimation decreases" under- or overestimation?

Page 165, ln 23: "than" not "that"

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Page 172, the sentences in line 12 “sea spray production could be a factor of 2 greater in surf zone compared to the open ocean“ and line 17 “Also, Gong et al. (2002) showed that surf zone sea spray flux was much smaller compared to that for an open ocean“ are contradictory; In 17 “spray” not “spay”

Page 178, In 25: “processes” not “prosesses”

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 11143, 2011.

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