**Geoscientific
Model Development
Discussions**

Interactive comment on "Simulating emission and chemical evolution of coarse sea-salt particles in the Community Multiscale Air Quality (CMAQ) model" *by* J. T. Kelly et al.

Anonymous Referee #1

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In this manuscript the authors present the sea-salt emission module, as well as an improved coarse particle mode, that they have incorporated in CMAQ. They then applied the coupled MM5-CMAQ modeling system in the Tampa, Florida, USA area to evaluate the performance of the new version of the code with respect to the old one. The paper is well written and clear and potentially publishable.The modules that the authors have developed are scientifically sound. In addition the authors clearly present the assumptions and the limitations of the developed modules. My main concern is in the application of the model and the associated attempt to explain the discrepancies between predictions and observations. Throughout section 4 the authors compare predicted and observed aerosol concentrations and speciation. They forget to mention

all the other relevant processes completely. Of main importance in predicting aerosol concentrations is, in addition to having an accurate aerosol module, to have correct transport, chemistry and deposition modules. The question arises on whether the differences between predictions and observations are due to inaccurate sea-salt emissions and deposition, or other modules in CMAQ need improvement. What is the role of aerosol precursor chemistry in the gas-phase? Is the total HNO3 concentration predicted correctly in absolute values (ppb)? Are ozone, SO2, NOx predicted accurately during the testing period? Figures containing observed vs predicted concentrations of at least some of the above gases will give a feeling on whether chemistry and transport of pollutants is treated adequately by CMAQ. Otherwise either chemistry or transport or both may be partially responsible to the poor performance of the model in reproducing inorganic aerosol concentrations. Of course in the latter case MM5 results should be examined to see whether the correct windfields are reproduced by the mesoscale model.

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