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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A global process-based study of marine CCN trends and variability" *by* E. M. Dunne et al.

Anonymous Referee #2

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Using a global model and statistical analysis, this paper determines the trends in marine CCN concentrations and quantifies the influence of microphysical processes and continental vs. marine aerosol sources. The paper is concise, well written, and covers a topic (marine CCN) of recent scientific debate.

Comments:

Section 3.3: When addressing the influence of continental aerosols, I had three additional questions: 1) Is the marine CCN continental aerosol influence a linear spectrum or are marine areas either pristine or not pristine with some tipping point in between? 2) Does each region have a similar value of low carbonaceous aerosol concentrations when other aerosol components correlate with marine CCN? 3) Is there a trend in the

1990-2004 dataset in which marine regions have become more or less pristine?

Figure 1: I think that a global map of the linear trend in CCN concentration should be added as a part (b) to give spatial context to the Figure 3 CCN plots.

Figure 3: I would suggest combining the left and right columns into one plot with a primary and secondary y-axis to improve comparison of the trends.

Figure 5: Please describe how the accumulation-mode concentrations were normalised.

Figure 6-8: Please put the accumulation mode mass units in concentrations (eg. μg mˆ-3 or ng mˆ-3) more typical of other models and observations.

Additional (supplemental?) figures: After reading about continental aerosol-influenced vs pristine environments, I think that there two additional figures would help inform the reader about the representativeness of the three regions: 1) A series of 4 global maps showing the Pearson coefficients between monthly mean CCN and monthly mean aerosol component mass for each grid cell; 2) I'm not sure of the metric, but I was wondering if it is possible to produce a global map showing the spatial extent of pristine regions predicted by the model?

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 15771, 2014.