

Interactive comment on “Mineral dust modelling with MADE3 in EMAC v2.54” by Christof G. Beer et al.

Anonymous Referee #1

Received and published: 9 June 2020

The manuscript present a series of sensitivity tests with the aerosol component in the EMAC model, by using observational data from the SALTRACE campaign and from the AERONET network as a benchmark. In particular the authors declare their main aim of evaluating the model performance when using prescribed, monthly aerosol fields, rather than an online dust emission scheme. Secondly, they also evaluate the effects of model resolution and prescription of dust size distribution at emission. The scope of this study is relevant and the work is generally well organized and well presented. In my opinion there's a couple of issues that need to be addressed, and a few aspects to be clarified.

I would expect the AeroCom dust climatology and the monthly average dust fields generated by EMAC with Tegen dust emission scheme to have some (possibly significant)

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differences. Therefore the comparison might reflect those differences as well, and in fact it might as well tell us more about a combination of information e.g. the 2000 climatology bearing some resemblance to the average climatology or with the meteorological conditions during SALTRACE, or that the Tegen-EMAC model yielding better results than the AeroCom average, etc. A more direct comparison to assess the effect of time averaging would be to use the monthly average dust fields generated by EMAC with Tegen dust emission scheme, as an offline prescribed dust field instead of the AeroCom one.

I would recommend a more “varied” pool of references, and in general an introduction and discussion that relate more extensively to the existing literature.

Can you comment on the optical properties you use? It would be relevant here to show something about your mass extinction efficiency at least.

(p. 4, 21-22) Do you write time-integrated or instantaneous variables as output?

(p.7, 5-) It would be good to provide the mass median diameter (or show a plot) for the two modes at emissions in the main case and in the sensitivity study, so that we can make sense of the information more clearly in relation to relevant existing literature.

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2020-82>, 2020.

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