

Interactive comment on “Saharan dust transport and deposition towards the Tropical Northern Atlantic” by K. Schepanski et al.

Anonymous Referee #2

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The idea of this paper is interesting and publishable, however the way the paper is presented right now suggests the paper was produced without sufficient time and energy invested in the paper. The manuscript had substantial issues with differentiating new material from old material. There needs also to be more consideration of how sensitive the results are to the model used, and more analysis needs to be done before we can consider the model reliable for the results presented. In addition, the paper had numerous English problems. Most of these problems may be solvable by editing, although more comparisons to observations may be required (If not done in another previous paper). More details are indicated below.

Section 3: I found this section interesting in its synthesis of information on dust transport, however I think there needs to be a more delineation of what is new in this pa-

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per, compared with what is hypothesized elsewhere. And what is the result of this model versus other models: Are all your arguments consistent with previous arguments? What is new?

In Section 3.1, for example, there is a very nice conceptual model of dust transport put forward in Karympudi et al., 1999 or Westphal et al., 1987, but I see no reference to these papers, or information telling me what is new or different in this paper vs. previous papers. Similarly, in Section 3.6 (and parts of Section 3.3), the conclusions (AOT not related to deposition) are similar to Mahowald et al., 2003, but there is no reference to this paper.

Section 3.2 provides model output: how sensitive is this to model set up? Does the model capture the observed wet deposition to dry deposition ratios? Is the model getting the right size distribution compared to the AERONET or other data? Why should we trust the model?

Section 3.3: for the vertical profiles shown here: similarly there is no comparison of the model to observations (even if for the wrong year, there are some vertical profiles from ACE-2(?) and from GLACE) or indications why we should trust the models vertical profile.

Conclusions: for this set of simulations, you only look at one year, and a few months. Please make sure your conclusions are consistent with the very limited set of model runs you used for the analysis. Please consider how sensitive your results are to the model used, years simulated, etc. Please also consider how your study adds or contrasts with previous studies. There is a little too much claimed in the conclusions, which seem to indicate that the authors are claiming these results are new.

A few technical issues with the presentation:

Alternatively, geostrophic forces may lead to acceleration of the air mass above the nocturnal BL up to super-geostrophic wind speeds, a nocturnal low-level jet (LLJ)

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develops (e.g. Nappo, 1991; Banta et al., 2006; Schepanski et al., 20081) and the elevated air mass with its dust content is transported away from the source area (Kalu, 1979). Geostrophic forces are really false forces—this is from angular momentum conservation. Please be more precise.

In winter months, transported Saharan dust is observed and reproduced by regional model studies near the surface, while in summer the dust layer is elevated. And not captured by the model???

Due to northward shift of the ITD (inner-tropical discontinuity, marking the meeting of dusty desert air and tropical moist air) the BL is deeper during summer which results in a higher upward-mixing of dust (also because of more insolation during the summer, so surface heating is larger)

Finally, the English needs to be substantially improved before publication is possible by careful reading of every sentence. Shown here are a few examples, but the improvements are not limited to these: there were too many issues to list here.

This paper aims to show exemplarily for three single case studies the characteristics as well as the differences of dust transport concerning e.g. direction, height, and amount, and dust deposition² towards the eastern tropical North Atlantic in different seasons.
remove exemplarily

The contribution of dust emitted over the Bodele Depression to the total exported Saharan dust will be determined. Replace determined with estimated.

This aims at the question whether it is possible to derive dust deposition from AOTs based on measurements of space borne instruments like e.g. MODIS or SeaWiFS. :
rephrase this is awkward.

Meteorological and hydrological fields used for the simulation of dust emission, transport and deposition, are computed by the LM and updated in MUSCAT at every advection time step of 80 s. what does of 80s mean?

Additional, dust layers within the mid-troposphere overlay the moist and denser 25 monsoon air and reaches higher transport levels in summer than in winter when the dust layer is transported within the trade winds (Kalu, 1979). Should be additionally

The present modelling study show a part of Bodele from up to 50the Cape Verde Archipelago. ???

exemplarily is consistently used to mean *as an example*. The most common usage of *exemplarily* is *outstanding* if I check my websters dictionary. Only the third definition is that it is used as an example. Please use *as an example* instead.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 16061, 2008.

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