

Interactive comment on “Mass deposition fluxes of Saharan mineral dust to the tropical northeast Atlantic Ocean: an intercomparison of methods” by N. Niedermeier et al.

Anonymous Referee #1

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The manuscript by Niedermeier et al. provides estimates of dust dry deposition velocity and deposition fluxes to the North Atlantic Ocean based on measurements of dust concentration, size distribution and meteorological parameters carried out with different techniques at the Cape Verde Atmospheric Observatory on the Island of Sao Vicente for January 2009. A regional climate model (COSMO-MUSCAT) re-initialized every 48 hours based on the GME global model analysis data is also used for the estimation of dust deposition fluxes. The rationale of the work i.e. comparing the ability of different techniques to estimate dust deposition to the ocean, with reference to the biogeochemical cycle implications, and more broadly to a better description of the global dust cycle, is of certain interest. In general, the different techniques are properly described and

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the manuscript is well written, but the necessity of improvements in the organization of the methodological sections and a proper discussion of the results in comparison to the existing literature in my opinion would require minor revisions of the manuscript before it could be accepted.

General Comments

In Sections 2 and 3 there should be some harmonization of the different techniques in the general context of the work, and a more accessible “at a glance” overview. See more specific comments below.

In the whole “Results” section there is too limited discussion of the results of this work compared to the existing literature. This should be more articulated for the following aspects: (1) other measurements of the same kind, (2) estimates of dry deposition velocity and (3) dust fluxes.

Specific comments

33027.1-3: the rationale for the work is clear, but I would suggest also placing it in a wider context

33027.16: “It is shown that . . .”

33027.18-20: this result is not explicitly described in the manuscript

33029:14-15: try to link better the two paragraphs

33031.11: Due to the number of different instruments it is indeed a good idea to have a clear subdivision of the methods. Still a brief introduction giving an overview would be recommended, in order give the reader a clear reference of the whole sense of the work: in addition/alternative to table 2, this could include e.g. a schematic of the sampling tower (perhaps a picture with indications) and/or a table with all the instruments and what they do, and a workflow diagram synthetizing the procedures of measurements and calculations.

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33032.23-24: “Both up and down scans . . .”

33033.12: “Both the mobility . . .”

33033.15-18: anticipate here you are going to convert both to volume

33034.9-10: somewhere describe the binning / size resolution deriving from your method

33036.8-9: was this a clean room lab? If yes please specify its characteristics

33037.15: In this section too I would suggest trying to be wordier when it comes to putting in place each method in the overall context of the work

33038.10-11. Why? Please specify this

33039.23-24: What is the relation to the text just above?

33041.18: “. . . which is related to . . .”: please be more specific

33044.13: reference for equation 17?

33045.12: same as above, the size binning that was used is described nowhere

33048.2-4: (1) the two statements about dust interactions with climate are in contradiction; (2) please add a reference for the model

33048.13-14: give longitude/latitude limits (or point to Fig. 4 where this is shown)

33048.19: In the following subsection please try to be specific whether you are describing model results or observations. If you are describing model results, then some validation should be provided for the period, for both source activation and the dust event at Cape Verde, by comparing to observations such as e.g. MSG-SEVIRI, MODIS or AERONET. This aspect is partially covered later in the manuscript, associated to the discussion of Figure 7, but relevant aspects should be anticipated here and expanded.

33048.21-22: Specify if Figure 4 refers to model or observations

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33048.24: “niveau”: level?

33048.24-25: “. . . modeled dust source . . .”

33049.1: “. . . the first mineral dust phase . . .”: episode/event?

33051.4-5: Table 3 does not seem to be really informative

33052.10: “. . . overestimated cyclone development . . .”: argument more on how this statement is derived

33052.27: concentration/amount would sound more appropriate than “dust events” in this context

33054.4: “. . . it can be seen that . . .”

33054.23: “Compared to . . .”

33056.21-23: Actually this is not the case for all the model results reported in Mahowald et al., 2005

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 33025, 2012.

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