

Interactive comment on “Harmattan, Saharan heat low and West African Monsoon circulation: Modulations on the Saharan dust outflow towards the north Atlantic” by Kerstin Schepanski et al.

Anonymous Referee #2

Received and published: 11 July 2017

General remarks:

The present manuscript investigates the atmospheric circulation pattern over North Africa about its role favouring dust emission and dust export towards the tropical North Atlantic. The focus of the study is in Summer 2013 (June to August) when it took place the field campaign SALTRACE (Saharan Aerosol Long-range TRansport and Aerosol-Cloud interaction Experiment). While the results of the study are interesting to be published, their presentation and discussion are not yet sufficient to be published in Atmospheric Chemistry and Physics in the current form. Therefore, it is worth to be published after addressing major revisions which are explained below along with a few

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other details.

Major comments:

One of my main concerns is related to the study period, i.e. in summer 2013. This is justified because of the SALTRACE experimental campaign. However, I couldn't find any model comparison within the exceptional observational database from this experimental campaign which includes among others aerosol vertical profiles neither any link to other publications related to this campaign and the link with your results. Then, why are you limiting your analysis to summer 2013? If you include more years, the results would be more representative. If not, it would be reasonable that in the discussion of the results, you also consider to include a description of the vertical dust structure associated with the North Atlantic dust transport (and its associated dust sources) and the relation with the dust concentrations measured in the Caribbean.

Otherwise, it would be good that you reinforce the performance of the model results because the evaluation sounds qualitative. You don't include any performance skill score with the AERONET database neither comparison with satellites. Meanwhile, your analysis of the dust emission is based on satellites; you only use the model results for the analysis of the dust transport. In this sense, how is the agreement between the dust emission fields between satellite and model results? Can the model reproduce the results (timing and spatial distribution) obtained from MSG? For example, from the model evaluation against AERONET is clear that haboobs are missing in your simulations (see Cinzana and Banizoumbou in late July in Figure 3). Then, in your discussion about the results based on the model simulations. Are haboobs negligible?

Minor comments:

Page 3 Line 19: A reference to CV-Project (from University of Aveiro, http://www.cesam.ua.pt/subsites/files/seasonal_variability_of_pm_over_cv_island._iceh_lisb) is missing.

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Page 3 Line 34: Please, you include further information about the referenced companion paper.

Page 5 Line 19: Numeric labelling in the title of the section is missing.

Page 10 Line 7: How is the agreement between the dust emission fields between satellite and model results?

Page 10 Line 23: What AERONET dataset are you using? Quality-assured?

Page 11 Line 6: In the AERONET comparison, what about the model overestimations observed in Cinzana and Banizoumbou in early August? Could you include spatial verification of the model outputs based on satellites such as MISR or MODIS?

Page 12 Line 22: Add a reference to Figure 6.

Page 16 Line 2: As you indicate, "maybe there is a temporal lag at which the Harmattan winds and the SHL act on the dust export". Have you been tried to correlate NAFDI/LLAT and dust flux introducing delayed days between them?

Figure 4: Correct NADI by NAFDI.

Figure 11: Indicate in the caption the order of the month for each panel.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2017-309>, 2017.