Clim. Past Discuss.,
https://doi.org/10.5194/cp-2018-39-RC1, 2018

Climate of the Past Discussions

Interactive comment on "Rapid increase in simulated North Atlantic dust deposition due to fast change of northwest African landscape during the Holocene" *by* Sabine Egerer et al.

Anonymous Referee #1

Received and published: 27 April 2018

Egerer et al. use an atmosphere-aerosol-land model with dynamical vegetation to conduct a series of equilibrium climate simulations for the Holocene, with the aim of analyzing the effects that changes in climate and surface conditions have on dust emissions in North Africa. Model results for vegetation composition and dust are compared to observational data, respectively pollen and sediment records from the NW African continental margin. This work follows two previous studies with similar versions of the same model and different configurations, also dedicated to analyzing variations in the Holocene dust cycle in North Africa. I found the work and the manuscript generally satisfactory, and I only have some minor comments.

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Discussion paper

2 (19-20). What about Egerer et al. 2017?

3 (3-6). Is dust having any feedback on climate in your simulations?

4 (29-31). You mention initial and boundary conditions. How long have you run your dust experiments from there?

5 (5). Since we cannot see the manuscript in preparation, please spend a couple of words on it.

Figure 5. The model results (absolute values, North-South gradient) are similar to Egerer et al. 2017, but quite different from Egerer et al. 2016. Could you briefly explain what changed? This could be useful in your discussion concerning the apparent over-estimation of deposition fluxes in correspondence of the more northern cores. Also, somewhere in the text please discuss a bit more the data, e.g. what are the assumptions in terms of isolating the dust flux, what size ranges you are comparing, etc.

10 (10-15). Could you calculate dust emission budgets for the two sub-regions and see the absolute and relative changes to support your discussion?

10 (15-20). These explanations all refer to the real world I believe, but what about in your simulations?

10 (19-20). The two potential sources have different composition; but which one does match the chemical composition of dust in those cores you are looking at?

10 (15-20). In general I do not think you really show that one source is dominant for the cores in your model simulations. You may argue explicitly that it seems reasonable to assume so. In this paragraph it seems that model and observations are mixed up, whereas I think you should separate clearly what you can say for each of them, and later discuss if you see convergences and/or differences.

Figure 8. I wonder if you can highlight somehow in the figure the boxes you discuss in the text

19 (13). Please add a concluding paragraph that concisely describes your results with a short summary.

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