

Interactive
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Interactive comment on “Observed 20th century desert dust variability: impact on climate and biogeochemistry” by N. M. Mahowald et al.

Anonymous Referee #2

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General comments:

This study reconstructs desert dust variability over the 20th century based on observations and models, and provides estimates of the impact of dust on climate and biogeochemistry along the 20th century.

The study is a first and big step towards addressing relevant scientific questions related to the impact of desert dust on the climate system with an integrated approach (inferring variability from observations, including direct and indirect effects, dust effects on ocean and land carbon uptake). It is extremely ambitious and includes a lot of assumptions, some simplifications and major uncertainties. However, the authors include a specific section addressing these uncertainties and convincingly discuss the limitations of their results.

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I strongly recommend the paper for publication in ACP. I believe this original paper will represent a basic framework for many future modeling studies on the subject.

I have only minor specific and technical comments/questions:

Specific comments:

From Page 12591 L27 to Page 12592 L17 Could you please provide the correlations of the PDSI and precipitation with the in situ Barbados data? Moreover, what is the correlation if you include the recent years (2001-2009)? Are there recent data from the Cape Verde coral record indicating (as the Barbados records) that the dust is still staying high while precipitation in the Sahel is recovering? The extrapolation in this case is one of the crucial assumptions in the paper since North Africa is the major source.

Page 12594 L17 It would be interesting to know what is the unforced model dust variability. Is it that the dust in the model remains rather constant or that there is a wrong or shifted variability and/or tendency?

Page 12596 L10 I am just curious here: Why do you use a simulation with constant dust and constant solubility to compare with increasing dust and increased solubility for the ocean response, while for the land biochemistry response you use the radiative forcing simulations (with no dust at all and with the dust variability/increasing trend)?

Technical comments:

Page 12593 L14 models instead of model

Page 12595 L20 The impact of including dust instead of The impact of the including dust

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 12585, 2010.

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