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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Simulation of the mineral dust content over Western Africa with the CHIMERE-DUST model from the event to the annual scale" *by* C. Schmechtig et al.

Anonymous Referee #3

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General comments

The paper entitled "Simulation of the mineral dust content over Western Africa with the CHIMERE-DUST model from the event to the annual scale" by Schmechtig et al. presents the implementation of the CHIMERE-DUST model for the simulation of mineral dust load and surface concentrations during 2006. The model outputs are compared with AOD and surface concentration measurements as obtained for different time scales (hourly, daily, etc). The paper does not introduce a new model development, since CHIMERE-DUST with the currently-used characteristics has been previously described (e.g. Menut et al., 2009). However, an extensive evaluation study is

presented here with the aid of a great database of observational measurements that cover surface, as well as higher level data. The main advantage of implementing the CHIMERE-DUST model, as supported by the authors, is the efficiency to investigate long periods, in contrast with more resolved regional models that are considered as very time-consuming. As shown from the presented results, the model outputs have good agreement with the observations in specific cases, while the overall model performance is often non-satisfactory. Thus, I believe that the argument that highlights the reliable utilization of the present model in long-period evaluation studies should be better supported.

Specific comments

Introduction: There are several sections that should be better explained. For example, in p. 8029 lines 4-10, the meteorological parameters that control the dust cycle need to be reported. In p. 8030 lines 12-23, please elaborate more on the limitations of a regional CTM, such as the absence of interaction processes between dust and atmospheric parameters.

Tools and methods: In p. 8036, it is not clear how the eq. (1) was derived and which is the applicability of the equation in the present analysis. The comparisons of AOD values presented throughout the whole paper are reported for different wavelengths between model and measurements. The interpolation formula of Iqbal (1983) could be tested for calculating AOD at the required wavelength based on the AOD values at two adjacent wavelengths.

Results: In the present analysis, the correlation coefficients, as well as the slopes of the linear regressions are calculated in many cases. For example, the respective values calculated for Figure 9 (R=0.68, slope=0.99) reveal a very good agreement between simulated AOD and observational data that is not reflected in the figure. It would be interested if the intercept of the linear regression is also reported in these cases and investigated, since it provides a measure of the difference between the compared sets.

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Technical corrections

The manuscript should be carefully scrutinized so as to correct some typing errors. Few examples are reported below:

p.8029, line 3: . . .phosphorus, (Jickells et al., 2005 . . . – omit the comma

p.8031, line 3: 20001

p.8034, line 3: Thes simulated. . .

p.8038, line 13: 44 nm

Figure 8: The caption for left and right figures should be reversed.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 8027, 2011.