

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 #1

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The authors present a comprehensive overview of their dust model's application over Africa. In particular, it was refreshing to see a discussion of the verification procedures using surface PM₁₀ as well as satellite based AOD and AI observations from seasonal means to the performance for individual events. However there is one aspect that deserves further discussion. The key to the model's performance was the empirical adjustment of the surface wind prediction to match the observations at Faya-Largeau. The authors note that the equation is only applied for winds higher than the erosion threshold. This suggests that the original estimate of the friction velocity is used to determine if a grid cell has dust emissions and then the wind speed adjustment is applied to compute the emission amounts. This procedure should be clarified. Because the

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Marticorena-Bergametti emission equation uses the friction velocity as the key meteorological variable, the authors need to connect how the adjusted wind speed is turned into a friction velocity used in the emission equation. The relationship between friction velocity and wind velocity also involves a vertical stability term. The authors should also note whether they used the friction velocities computed by the ECMWF model or computed their own values because the problem may not be the surface wind prediction but how the friction velocity is computed. It may be useful to evaluate the ECMWF model gustiness prediction as a surrogate for correcting the 10 m wind velocity. There is no disagreement that gridded these global numerical weather prediction models will underestimate the magnitude of peak events, but the discussion of the surface wind correction deserves more attention if the intent of the paper is to raise confidence that the model can be applied at other locations and times without requiring an empirical correction factor.

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