

Interactive comment on “Parametrization of convective transport in the boundary layer and its impact on the representation of diurnal cycle of wind and dust emissions” by F. Hourdin et al.

Anonymous Referee #3

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The manuscript by Hourdin et al. describes how the inclusion of a new parameterization scheme of boundary layer mass flux into the LMDZ model affects the related dynamics of the nocturnal low level jet and surface winds, and how this affects dust emissions. Improving the representation of boundary layer processes in Earth System Models would have benefits in several aspects related to land-surface energy and matter transfer. From the point of view of the dust community, emissions at large are the biggest source of uncertainty in models. Specifically, the observation that one mechanism of dust emissions in North Africa has a strong diurnal component compels models to try to account for this feature. The rationale of this work is of actual interest

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and pertinent to the scopes of the journal. The work is sound and the manuscript is well organized and clearly and concisely written. I only have minor comments and technical remarks. Overall, I think this is a good and interesting paper, and I would recommend the publication of this manuscript.

Specific remarks

27431, 18-19: define θ and θ_{th} here

27432, 1: define TKE

27433, 6-7: please give more details about the use of the Weibull parameterization

27433, 14: what is the size range of the 12 bins?

27433, 16-17: settling and dry deposition – briefly report if e.g. a series of resistances model etc. and provide a reference

27435, 4: change to “interactive”

27437, 11-12: I would say they are rather similar actually

27437, 29-30: Have you considered comparing to the Tamanrasset station as well? It should be closer to the dust sources and have data for the study period. Also, please briefly describe how the AERONET data were treated to get the daily cycle.

27442, 3: change to “at their first stage”

27443, 5: here (and earlier in the text) you are implicitly assuming that AOD is representative of dust emissions, and that model AOD is indicating underestimation when compared to remote sensing retrievals – maybe just put in somewhere what are the assumptions behind this, involving particle size and optical properties

27443, 10: change to “the same observations are”

Figure 3: what is the black solid line in the upper panel?

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Figure 7: how does this compare to Figure 4?

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