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Atmospheric Chemistry and Physics Discussions

Interactive comment on "WRF-Chem simulations of a typical pre-monsoon dust storm in northern India: influences on aerosol optical properties and radiation budget" *by* R. Kumar et al.

Anonymous Referee #1

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the article is interesting, well written and the results are presentation is satisfactory; in particular, I appreciated the extensive comparison with all available observations

I only have some minor comment on the methodology:

- the authors apply the nudging at all model levels while the common practice would be to nudge the variables only above the PBL in order let the dynamics to evolve freely in the lower troposphere, which is especially important for the processes described in this paper, can the authors justify this choice and to discuss how this choice might affect the dust production and transport?

- it doesn't look nice that the statistics of the aerosol radiative forcing listed in the abstract are not significant, I would substitute with (or add) the results computed in an area significantly affected by the dust plume

- the best way to compute the aerosol radiative forcings would be by invoking the radiation package twice during the simulation, one with and one without aerosols, and saving the second results in the output without feedbacks on the thermodynamics and dynamics of the model; computing the difference between two simulations with and without aerosols also includes the effect of the different the dynamics that can alter the state of the atmosphere and the results of the comparison; probably the difference is not so big since the run is nudged, but the authors should prove this

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