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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Development and testing of a desert dust module in a regional climate model" *by* A. S. Zakey et al.

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Thanks for your comment !

1: Cyclonic development during the SHADE case. On this special event , we did some tests at 60 km resolution and 40 km without a net amelioration on the cyclonic pattern . It is possible that getting towards finer resolution would improve the dynamic on the vortex. Some test we did showed quite lot of sensitivity to the convection scheme used, pointing out potential (and classical !) problems in convection physics and vertical motions/resolutions. In fact we managed to simulate other meso-scale system with more success the particular SHADE event (including African Easterly waves) : however , the SHADE event is largely documented in the literature in and offers interesting vertical observations and we chose to present it.

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2: The model can simulate the occurrence of the event and the main outflow (eg observed at Cape Verde) quite reasonably and produce also reasonable burden according to the event intensity. We think that the emission module tends to react consistently to wind intensity and that the main sources positions are captured over the domain (cf also the seasonal average) . The spatial pattern inconsistency between the model and shade observation (on the second day notably) is due primarily to atmospheric dynamic.

3. Vertical structure

There are two problems in comparing the model to the lidar cross section : 1 : all the inconsistencies in the modeled plume horizontal development affect the comparison between model and observed cross section (cf the relative position of the plume and the plane trace) : In fact when we scanned the vertical structure of simulated dust plume in different vertical plans (varying around the SHADE plane trace) , we found some positions for which the simulated structure compared better with the lidar cross section. 2 : Nevertheless the strong observed stratification was never captured due a lack of vertical resolution and possibly vertical diffusion inaccuracies.

4 : Simulation cold start This actually a mistake in the text : the simulation extends from the 11 to 17 of March, while the result are showed from the 13 to the 17. From 11 to 13 , only brief and local emissions are simulated on the domain from 11 to 13.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 1749, 2006.