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

Anonymous Referee #3

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The article presents testing of a of dust module within regional climate research. In a light of general a lack of knowledge how much dust influences the atmosphere at a regional scale, I find the paper of particular importance. The presented work well balances the theoretical background and results of experiments. It also uses appropriate approach to validate the model. I agree with one of comments that comparison with AOD would contribute to more complete insight of the model capabilities. Answers to two questions bellow would contribute to further improvement of the paper that I recommend for publishing:

1. The SHADE case: Do the authors believe that failing to reproduce the cyclonic development could be improved with further increase of the model resolution? In other

words, does the failure happen due to the atmospheric driver model or the dust module? Because of the relatively coarse vertical resolution, I would expect that the simulated vertical cross section should have major patterns more consistent with the observed lidar picture, but coarser. This is not the case in the experiment (Fig 9). 2. Dust 'cold start' (section 3.1): The authors started the simulation on 13 March, and refer that during 13 to 16 March 1998, a particularly intense sand storm occurred over the region of interest. Starting the simulatiuon the same day when the storm was generated does not give the model enough time to 'warms up'. Experiences from other dust modelling works indicates that 2-3 days after a cold start are necessary to well recover the 3d structure of the dust plum. Authors' comments are required on that issue.

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