

Interactive
Comment

Interactive comment on “Development and evaluation of an operational SDS forecasting system for East Asia: CUACE/DUST” by C. H. Zhou et al.

C. H. Zhou et al.

Received and published: 31 August 2007

Q：This paper describes a forecast system for Asian dust storms, and its performance for some test period. A positive aspect is the comparison of the forecast not only with surface station observations, but also with lidar observations. However, the scientific content of the paper is rather limited.

A：The scientific content is the introduction of the dust data assimilation system into an operation dust storm forecasting system and the analysis of the performance of the system. Case studies have helped us to isolate the reasons both successful and failed forecasts. The paper summarized these findings and shed some lights on the direction of future development of a SDS forecasting system.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Q: Describing just one test case in greater detail does not prove that the forecast model performs well. Rather than going into this great detail with one case and briefly summarizing the ‘hits and misses’ of other cases during the test period, the model performance should have been described in greater detail for several SDS cases, including analysis of reasons for misrepresentation of dust in the forecast. Here it would be of particular interest to analyze to which extent shortcomings of the dust forecast are related to shortcomings of the weather forecast, or to the dust parameterization itself. Such analysis should be added in the paper. Also, how does this model compare in both its results and in its performance to other dust forecast models?

A: There are 31 dust storm cases in 2006 spring. TS scoring skill and observation comparison has showed that the model performs better for large scale SDS events but less successful for small scale and scattered SDS. Figure 7 is a good summary of the entire spring forecasting results. We have analyzed more cases to answer the questions raised by the reviewer and added the results to the paper. Reasons for the mis-forecasts of some SDS processes were explored.

Q: Page 7988, line 19: Please note that the forcing numbers are global averages, they can be much larger regionally.

A: Yes, it has been changed into “Its global average radiative forcing is estimated to be $-0.6 \sim 0.4 \text{ W m}^{-2}$ with great uncertainties.”

Q: Page 7990, Description section: The ‘Chemistry module’ is rather a ‘Microphysics module’ from the description

A: Yes. CUACE is a unified modeling frame for atmospheric chemistry and physics.

Q: Page 7991: The dust emission scheme should be described in greater detail, as it is of central importance for the results. Especially, what are the differences (improvements?) in the model setup compared to other dust forecast models?

A: The detailed description of the dust emission scheme used in CUACE/Dust has

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)

been described in details in the following two papers: 1) Gong, S. L., Zhang, X. Y., Zhao, T. L., McKendry, I. G., Jaffe, D. A., and Lu, N. M.: Characterization Of Soil Dust Distributions In China And Its Transport During ACE-ASIA 2. Model Simulation and Validation. *Journal of Geophysical Research* 108, 4262, doi:10.1029/2002JD002633, 2003b. 2) Zhao, T. L., Gong, S. L., Zhang, X. Y., Abdel-Mawgoud, A., and Shao, Y. P.: An assessment of dust emission schemes in modeling east Asian dust storms. *Journal of Geophysical Research* 111, doi:10.1029/2004JD005746, 2006.

Q: Page 7994: What are the definitions of ‘Severe SDS’, SDS, and blowing dust?

A: The Severe SDS, SDS and blowing SDS processes have been defined according to special criteria in another paper by Yang. Y. Q in the special issue. Simplized definition will also be added in the manuscript.

Q: Figure 5: Please use the same layout - i.e. same axis ranges - for model results and observations, such that the patterns can be easily compared.

A: Thank you for pointing this. There is a mismatch of the time axis between observations and the model results. We have adjusted the scale of the modeling results to match the observations for each location. As can be seen from the revised figures, the comparisons are much better now.

Q: Figure 6: The font size of the numbers in the figure and labels is too small.

A: We will change the font size of the numbers in the revised version.

Q: Figure 7: The figure panels are presumably prepared by Excel, they are not good quality.

A: Yes, Fig. 7 are by Excel. We will try to make then in better quality.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 7, 7987, 2007.