**Atmospheric
Chemistry
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Discussions**

Interactive comment on "CUACE/Dust – an integrated system of observation and modeling systems for operational dust forecasting in Asia" by S. L. Gong and X. Y. Zhang

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We would like to thank the reviewer for the detailed review of our manuscript which gives us the opportunity to clarify some points. In the following we quoted each review question in the square brackets and added our response after each paragraph.

[The authors report on improvements of the operational forecasts when the assimilation is applied. However, lidar data, satellite- or ground based, providing the third dimension are not yet used operationally. AD-Net is probably closest to operations. Are there any concrete plans to incorporate this data into CUACE/Dust?]

Yes. We are working with WMO for a global project of Sand and Dust Storm Warning and Assessment System (SDS WAS) where a coordinated effort is to bring the

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regional observation networks together for regional SDS forecasts. AD-Net is one of the networks that provide vertical profiles of dust aerosol, especially at the source regions. The data assimilation module in CUACE/Dust is able to use the vertical profile information. Once the AD-Net is operational, CUACE/Dust will take the advantage of this network.

[I suggest authors to point out more explicitly the key importance of using the vertical component of dust observing systems, indicating that lack of routine use of such data still limits more accurate initialization of dust models. Please also reference to the work of Japanese scientists (e.g. Yumimoto, Uno) concerning their developments in assimilating of AD-Net data.]

This is a very important question about the dust data assimilation. Currently CUACE/Dust only uses the surface and column integrated properties of dust aerosols for the data assimilation with the assumption that modeled vertical profiles are not changed before and after the assimilation. This is clearly a shortcoming of the system for the SDS forecasts, especially for the long range transport of SDS. New method has been developed to use the vertical profiles from lidar measurements such as by Yumimoto and Uno et al. (2007, GRL).

[The second comment: The name of the system - CUACE/Dust (Chinese Unified Atmospheric Chemistry Environment for Dust) indicates the atmospheric chemistry aspect of the system. I suggest authors to briefly elaborate what kind of the research and operations it addresses on.]

Yes. We have added the scope of CUACE into the paper as follows:

"CUACE is a newly developed system for air quality/climate researches and forecasts in China that includes four functional modules for treating aerosols, gas phase chemistry, emissions and data assimilation. Since it is envisioned as a unified system, it can be implemented into any meteorological models such as regional air quality and climate models. CUACE/Dust is an application of CUACE to dust aerosol forecasts and is an

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integrated system that combines a size-segregated multi-component aerosol module (Gong et al., 2003a) with a 3D-Var data assimilation system implemented into two operational weather forecasting models (Figure 1)."

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 10323, 2007.

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