

**The authors thank the reviewer for constructive comments and suggestions. The manuscript was revised as advised by the reviewer.**

(1) Inclusion of AERONET - While AERONET is mentioned in the introduction, comparisons to AERONET derived AODs are not included in the current manuscript. Of special interest is a long record site on the Azores in the Atlantic, downwind of easterly Saharan dust plumes, as well as various sites on the Arabian peninsula. Data from sites near Beijing, if available, could nicely augment the northern China case study. In addition to direct beam attenuation retrievals of AOD, AERONET almucantar inversions provide some information on aerosol size distribution and composition, which may prove useful in further analysis of the dust scheme presented in the paper.

**Answer: AERONET inversion data is added in section 3.2 of the revised version for comparison of aerosol volume-size distributions, AERONET AOD data is also added in section 4.2 for comparison with modeled AOD in “dusty” sites.**

(2) Inclusion of MODIS Deep Blue aerosol retrievals - The authors should include mention of the Deep Blue MODIS AOD retrievals over bright (desert) surfaces, available now for both Terra and Aqua in MODIS Collection 5.1. A comparison to Deep Blue AOD might be included as well, or, if not, a brief explanation of why MISR (or the Donkelaar MODIS/MISR combined product) is preferred over Deep Blue.

**Answer: MODIS deep blue data is combined with the previous MODIS plot in section 4.1. Relevant information about the dataset is included too.**

(3) Discussion of the potential for additional satellite based information - The authors indicate that satellite retrievals have difficulty discriminating amongst various aerosol types. MISR, however, does attempt to report AOD by aerosol type. Whether the type-specific retrievals are of sufficient accuracy is not clear. The standard MODIS ocean product includes small mode and large mode aerosol fractions, as well as Angstrom exponents at

two wavelengths. A comparison of Angstrom exponents (also included in the Deep Blue product) might help further validate the dust size distributions. These topics may be appropriate for inclusion in a subsequent study.

**Answer: The statement about satellite products are revised in the end of section 1, in the beginning of section 2.3 and section 4.1. Comparison with Angstrom exponent and fine mode aerosol fraction will be considered in a future study as suggested by the reviewer.**

(4) Further discussion of vegetation cover - The vegetation cover is stated as being based on an 1850-2005 land surface model climatology. Since the model is being evaluated against present day surface and satellite observations, it may be more suitable to use a much shorter time period, for example, 2000 - present. Land surface changes over interannual and decadal time scales are relevant for dust emissions. For example, the Aral Sea has rapidly receded over the last five decades and is now a significant dust.

**Answer: A detailed description and discussion of the vegetation cover applied in the model simulation is added after equation (3). A future version of the terrestrial model will include more realistic land surface changes, which can provide the input of time varying bare fraction for dust simulations over interannual and decadal time scales.**

Technical changes

**All corrected as the reviewer suggested.**