

## ***Interactive comment on “An observationally-constrained estimate of global dust aerosol optical depth” by David A. Ridley et al.***

### **Anonymous Referee #5**

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The manuscript describes a new potential tool for validation of mineral dust in global and regional models, based on a combination of remote sensing data and global climate models. The work is certainly of interest and could provide an additional useful tool to the modeling community. In general the methodology appears sound and the paper is well organized and written. A few minor revision are nevertheless needed in my opinion before the paper could be published.

#### Major comment

The construction of the global AOD dataset is the central part of this work. It stems mainly from remote sensing observations, from both satellites and ground-based AERONET stations. I think that too little information is provided regarding data pro-

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cessing (e.g. temporal aggregation) and uncertainties in these types of observations and their relation to dust AOD.

#### Specific comments

2, 8-9: please add a reference here.

2, 14-16: Why PM<sub>2.5</sub> in particular? You do not discriminate the size in your product.

2, 24: It would be useful to mention already here what is the general strategy of the work, and why you will use all of the following data from observations or model. Maybe add a table or a brief description in the text, so that the reader can already have a better idea of the role of each type of data in this paper.

3, 15: the usage of the angstrom exponent is not clear, please rephrase.

4, 24: this sentence is not clear; also the reference is missing from the list.

8, 20-24: How is your central estimate derived? Is it the mean of the distribution derived from the set of all possible combinations of models and satellite data depicted in Figure 4? Also, please describe more in detail how all the combinations were constructed in the previous section.

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