

## ***Interactive comment on “Investigation of severe dust storms over the Pan-Eurasian area using multi-satellite observations and ground-based measurements” by Lu She et al.***

### **Anonymous Referee #2**

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In this paper, authors use multi-satellite observations and ground-based measurements to analyse a strong dust storm occurred in East Asia during 3 - 8 May 2017, the long-distant transport of the strong dust storms and the properties of dust aerosols were analyzed. The paper investigated the sources and different transport directions of the dust storms from different satellite observation (OMI, CALIPSO, and AHI) and particle matter (PM) measurements from ground-stations, and the HYSPLIT model were used to calculate the backward trajectories of air masses. The aerosol properties and its variation during no-dusty and dusty days were compared using AERONET data. The paper is clearly structured and logical. The authors combine advantages of satellite data and ground-based data, giving readers a comprehensive and detailed view

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for this dust event, including its transport trajectory, horizontal and vertical properties of storm, and its influence on aerosol properties. It can be expected that the study provides a useful contribution to dust transport and related to this Journal. However, the language of the paper requires some improvements. There are some sentences that are unclear or too long to follow. There are also some redundancies that should be removed. But I realize the authors' first language is not English, and this is not a criticism of them. I would recommend publication if my following comments/suggestions can be adequately addressed.

Some comments and questions are given as follows:

Major comments:

1. The core of this paper, in my opinion, is to clearly describe the dust transport process and the dust affected areas. The authors used long length to explain the transport of dust storm based on multi observations, but it would be better to see a more compact analysis with clearer connections between different observations.
2. The authors should define the scientific aims of this study in more detail than what is done in the last paragraph of the introduction.
3. The authors point out that the dust transported to Korean Peninsula and Japan, but I don't see much analysis supporting these findings, especially for Korean Peninsula. Please check this claim more carefully.
4. The authors have also analyzed the aerosol property variation using four AERONET sites measurements. The variations in the AOD (440 nm) and Ångström exponent at four sites are shown, but why just show the VSD and SSA at Beijing and Baotou, what about Xuzhou-CUMT and Ussuriysk?
5. There are some sentences and points which are confusing and invalid, even misleading readers. I suggest authors polish those important sentences to make your analysis more useful and clear.

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6. It is hard to read the figures, because some figures are heavily digitized. So I suggest authors to re-plot them or upload un-compressed manuscript.

Detailed comments:

1.Line 53, 'mm' should be ' $\mu\text{m}$ '

2.Fig.2, suggest to use "brown" or other color scheme to represent the UV\_AI within 0-1. In addition, the labels on the color bar almost cannot be read! Please enlarge.

3.Fig.3 the PM sites cannot be read. Please enlarge. We can barely read what is written.

4.Fig.4 the orbit tracks is not clearly depicted, please enlarge or just deleted, as the trajectories have been shown in Fig.3

5.Line 191, 'over the region of northern China on 6 May', it seems that the overpass trajectory of 6 May didn't pass over northern China, see fig.4d. Please check it

6.Line 212-215, sentence structure needs to be revised

7.Line 231, 'true-colour' should be 'true color'

8.Fig.6 and Fig.7 are somewhat blurred, it's hard to tell the 'dust clusters' that described in line 235, as well as the dust transport.

9.Line 233-247: This section is a bit confusing, it should be rephrased to make it clearer.

10.Line 262 'caused a high PM10 concentration (>500) in south-central China (e.g., Hunan Province)' It would be better to specify the fig.- rather 'Hunan province', as it's not shown on the map, it is just a new city name to reader.

11.The authors should clearly conclude the transport process of dust, including different transport directions in 'Result' section.

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