

Dear Editor and reviewers,

Thanks for the valuable comments, which help to improve significantly the quality of the paper. In this revision, we addressed the majority of the reviewer comments especially in terms of the study objective, figure clarity and sentence grammars rephrased. The detailed replies are listed below point by point in red.

Best regards,

Lu She on behalf of all authors

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 #1

This manuscript describes a severe dust episode originating from Gobi desert on early May 2017. The authors present the event properties based on satellite, in-situ and model back trajectory data. The manuscript is well written and the data are clearly described. However I do not recommend publication in NHESS. The reason is that at this stage it looks more like a report rather than a scientific paper and there is no clear justification of the contribution of this study to the relevant literature (e.g. unique properties of the particular event, explanation of the system behavior, impact, etc.). A simple presentation of measurements does not really contribute to our understanding on these events nor to the improvement of forecasting or mitigation activities. Similar measurements and observations are routinely performed worldwide. For example the origin and the evolution of this specific event has been forecasted by operational atmospheric dust models (e.g. <http://www.bsc.es/ess/bsc-dust-daily-forecast>) so there is really no need to perform HYSPLIT back trajectories.

Response: In this revision we have clearly stated our research objective in the beginning of the last introduction paragraph, which is to “picture a comprehensive view of dust event using different satellite and ground measurements with a recent heavy dust storm over northern China and southern Mongolia from 3 to 8 May 2017 as an example”. Note the reviewer 2 commented that “...the authors combine advantages of satellite data and ground-based data, giving readers a comprehensive and detailed view 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.” And the reviewer #3 stated that “the authors used diverse sources of observations to generate the knowledge on origin, timing and spatial coverage of the dust storm, overcoming setbacks of one observational system with other sources of measurements, leaving no room for uncertainties in created hypothesis on this event.”

We have also changed the title and abstract to reflect clearly the objective of this study. We made full use of diverse sources of observations to capture the spatial-temporal distribution of the dust storm, as a single observational system is usually unable to provide such information. Observations from both polar-orbit and geostationary satellites, from active and passive remote sensing, and from ground based measurements were used. In addition, intensive ground-based PM measurements are not derived from the optical method and thus free from the influences of clouds and can even provide measurements during night-time. This complements to the blind areas of satellite observation affected by cloud and in the night time.

We agreed with the reviewer that the operational atmospheric dust models can provide dust-forecast. For example, there are four forecast models from MACC-ECWMF, NGAC-NCEP, KMA (Korea Meteorological Administration), and CMA (China Meteorological Administration), respectively, for the dust storm forecasting for East Asia. However, as stated above, the purpose of this study to demonstrate that combining different models/observations can capture a comprehensive view of dust event. In addition, this case study presented here may be used “in further numerical models development and verification” as stated by Reviewer #3.