

Interactive comment on “Regional severe particle pollution and its association with synoptic weather patterns in the Yangtze River Delta region, China” by Lei Shu et al.

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Received and published: 31 August 2017

In this manuscript, the regional characteristic of aerosol and its relation with synoptic weather patterns were discussed over the Yangtze River Delta region China. There are a lot of previous studies about PM10 and PM2.5 pollution in China. However, only a few of them have focused on the potential impacts of weather patterns on this kind of pollution. The results of this manuscript may be of great interests to the ACP audiences. Also, the study may be able to provide some useful views for the government on the air pollution control.

We would like to thank the referee for the valuable and affirmative comments of our

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manuscript. We carefully revise the manuscript based on the following comments.

Several comments and suggestions should be addressed before the publication of this paper.

(1) Section 3.1.1 and 3.1.3. Apart from the in-situ monitoring particle concentration records, the aerosol optical depth data (monitored records, satellite observation, etc.) can be analyzed to deep the discussion on the particle pollution in YRD.

Response: Thanks for the constructive comment. In the new revised manuscript, the aerosol optical depth data from satellite observation (MODIS/AOD) are used to reveal the regional characteristics of aerosol pollution and deep the discussion. The introduction of MODIS/AOD data has been added in Section 2.1. More discussion of AOD has been added in Section 3.1.1, 3.1.2 and 3.3.1. These added data and discussion words can help us to understand the spatial distribution of aerosol in this region.

(2) Section 3.2.2, the author only mentioned and analyzed the geopotential height fields and wind fields at 850 hPa on the key date. The results may be quite different when it comes to the averaged condition of all days corresponding to each weather pattern. It's suggested to add the averaged geopotential height fields and revise the discussion.

Response: Thanks for the constructive comment. In the new revised manuscript, we have removed Figs. 6-10 of the original manuscript, and replaced them with Figs. 7-11. Figs. 7-11 present the averaged condition of all days for each weather pattern. Meanwhile, according to the suggestion of Referee 1, we also added the comparison of geopotential height fields and wind fields between different layers (500, 850 and 1000 hpa) in Section 3.3.2 of the new revised manuscript.

(3) Section 3.3.1, the occurrence frequencies of five weather patterns during the regional particle pollution episodes are not yet enough to conclude the relationship

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between them. It's suggested to add more detailed analysis for the monitoring data of particles (PM2.5 and PM10) and their precursors (such as SO₂, NO₂, etc.) at surface corresponding to each weather pattern.

Response: Thanks for the constructive comment. More detailed analysis of the surface monitoring data of air pollutants (including PM2.5, PM10, O₃, NO₂, SO₂ and CO) for each weather pattern have been added in Section 3.3.1. Please see new Fig. 6 and the relevant discussion words in the new revised manuscript.

(4) Section 3.3.2, the wind speed and wind direction at surface are closely related to the transport processes. It's suggested to add the analysis of meteorological parameters from observational records corresponding to each weather pattern instead of NCEP reanalysis data.

Response: Thanks for the constructive comment. More detailed analyses for the surface monitoring data of meteorological parameters (wind speed, temperature, surface pressure and relative humidity) have been added in Section 3.3.1 of the new revised manuscript (new fig. 6 and the relevant discussion). In addition, the wind rose plots based on the daily data at the Nanjing site corresponding to each weather pattern from December 2013 to November 2014 are added in Figs. 7-11. The relevant discussion has also been added in Section 3.3.2 of the new revised manuscript. Besides, we also added the discussion of sea-level pressure field and wind field at 1000 hPa layer based on the NCEP reanalysis data, which can to some extent reflect the transport processes at the surface.

(5) The English should be polished. Some grammatical errors in this paper are listed as follows, Line 75, "Eastern Asian monsoon circulation" should be "East Asia monsoon circulation", "increasing aerosol loading" should be "increased aerosol loading". Line 110, "focuses the pollution" should be "focuses on the pollution". Line 271-272, "the most importance source" should be "the most important source". Line 577, "it also confirmed" should be "it was also confirmed". It is suggested to correct

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the errors with the aid of a professional language correcting company.

Response: Sorry for these grammatical errors in the original manuscript. The errors listed above are corrected as follows.

The words "Eastern Asian monsoon circulation" on line 75 of the original manuscript are revised as "East Asia monsoon circulation". The words "increasing aerosol loading" are revised as "increased aerosol loading".

The words "focuses the pollution" on line 110 of the original manuscript are revised as "focuses on the pollution".

The words "the most importance source" on line 271-272 of the original manuscript are revised as "the most important source".

The words "it also confirmed" on line 577 of the original manuscript are revised as "it was also confirmed".

Additionally, with the aid of a professional language correcting company, the authors have carefully modified and improved the English in the new manuscript.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2017-473>, 2017.

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