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# ***Interactive comment on “Impacts of atmospheric circulations on aerosol distributions in autumn over eastern China: observational evidences” by X.-Y. Zheng et al.***

## **Anonymous Referee #2**

Received and published: 13 May 2015

This study examines heavily polluted and clean cases associated with large scale atmospheric circulations in October over East China by using ten-year MODIS/Terra aerosol optical depth (AOD) product and the NCEP reanalysis data. While the study is important for understanding air quality in China, I have some major concerns with the manuscript. I would recommend a major revision before it can be accepted for publication.

Major concerns:

1. The patterns of circulation are not clear to me although it is stated that each type

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represents specific weather pattern associated with lower and upper atmospheric circulation. The authors should add some schematic highlights (arrows or other indicative marks in Figures 4, 5, and 7-15, so that the readers can identify easily the differences between the patterns listed in Table 1.

2. Accumulation of air pollutants depends on the convergence of winds and the stable atmosphere that does not favor the outflow of air pollutants. The manuscript lacks such information in their analyses.

Minor concerns:

1. Line 9 of Page 3287: There should be a ‘.’ after ‘factors’.
2. Line 12 of Page 3287: It is not right to say that meteorological parameters are under the control of circulation. For example, atmospheric circulation is influenced by temperature gradient.
3. Last paragraph of Page 3287: The authors chose to study for October. Some background information should be given here: Usually what are the most polluted months among a year based on the measurements from other approaches? Is October the worst month or a relatively clean month? How about relative humidity in October since AOD is examined in this work.
4. Line 16 on Page 3291: What do you mean by ‘stable correlation’? Explain.
5. Line 26 on Page 3291: What are the approximate concentrations of PM<sub>2.5</sub> that correspond, respectively, to AOD values of 0.6 and 0.4 in October?
6. Caption of Figure 1 needs to be rewritten. Otherwise it reads as the mean distribution of (b) SD of AOD.
7. Lines 15-17 of Page 3293: Biomass burning can increase AOD because of the enhanced emissions. Such pollution can be identified from AOD but may not be caused by circulation. Does this influence conclusions from this work?

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8. Line 21 of Page 3292: Fig 1c actually shows clock-wise winds over selected region.
9. For the purpose of this work, it will be more interesting to show interannual variations in Fig 2b by giving daily AOD so that the readers can see year-by-year variation in pollution events.
10. English needs to be improved; Chinese style English can be seen in many places throughout the manuscript.

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 3285, 2015.

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