

## ***Interactive comment on “Investigating the impact of regional transport on PM<sub>2.5</sub> formation using vertical observation during APEC 2014 Summit in Beijing” by Yang Hua et al.***

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The manuscript by Hua et al. investigated the role of regional transport on the formation of PM pollution in Beijing by combining ground and vertical measurements during a unique period (APEC). The results showed that regional transport played a major role in PM pollution but varied substantially among different episodes. In addition, the impact of emission control on PM reduction was also discussed. This study provide new insights into the formation of PM pollution from the view of vertical measurements, and the conclusions showed that vertical measurements are of critical to explain the ground observations. This manuscript falls within the scope of ACP. I recommend it for publication after addressing the following comments.

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response: We thank the referee for supporting the publication. We will put more efforts to improve the quality of our manuscript. We address the reviewer's comments below.

1. Abstract: it is better to mention the exact location for the ground and vertical measurements.

Response: the location has been added in the abstract.

2. Page 2, line 1: suggest using “aerosol optical properties, winds, relative humidity, and temperature”

Response: we have corrected as suggested.

3. Page 5, line 19: change “semi volatility” to “semi volatile”

Response: we have corrected as suggested.

4. Page 6, line 3: no blind area for CFL-03?

Response: There are 300m blind area for CFL-03. We have added it to the article.

5. Page 6, line 15: Cite Jia et al. (2008) where this technique was developed, not in this study. In addition, the approach in Jia et al. (2008) might have large uncertainties in determining the baseline (the lowest points) because of multiple influences from local emissions, regional transport, and secondary processes, I suggest the authors adding several sentences to discuss the uncertainties in quantification of the contributions of regional transport.

Response: we had cited in page 6, line 19 in the original manuscript. We have cited in line 15 as suggested.

The uncertainties discussion is also added to the manuscript. The uncertainty evaluation mainly includes systematic errors, random errors and sensitivities. The major systematic errors depend on the calibration of instruments for PM<sub>2.5</sub> concentration measurement. Minor systematic errors might be from the judging the location and

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height of the daily minima and the sensitivities analysis suggests these errors are less than 10%. Random errors include data measurement and quantification step, such as identifying the daily minima properly, dealing with days without less-obvious afternoon minima and using linear interpolation between the daily minima. All these errors are evaluate by Jia et al. (2008). As a whole, this technique has an uncertainty of 40%-50% for results of daily regional transport.

6. Page 7, line 19: It is not appropriate to call “PM1 chemical components” because BC was not included. Either use non-refractory PM1 or adding BC in Figure 1.

Response: we correct the “PM1 chemical components” to “non-refractory PM1 chemical components”.

7. Please mark the three episodes in Figures 2 and 3, or explain the vertical dash lines in the captions.

Response: we have corrected the figures as suggested.

8. Please try to combine Figures 4, 9 and 10 in one page for easy reading. Also, add the units for the color bars.

Response: we have corrected the figures as suggested.

9. The colors of chemical species in the figures should be synchronized, e.g., Figure 1 vs. Figure 2, otherwise, it is very confusing.

Response: we have corrected the figures as suggested.

10. Figure 4: change “wind vertical direction and wind speed” to “wind vertical speed”. The wind direction of “up” and “down” was already mentioned in the notes. Same as in Figure 5 and Figure 9.

Response: we have corrected the figures as suggested.

11. Suggest combining Figure 5 and Figure 8 together for easy reading and compar-

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isons.

Response: we have corrected the figures as suggested.

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