Dear Editor,

We are very grateful for your detailed review. Your suggestions has helped us improve the readability of our manuscript greatly. As for the textual and grammatical issues, we have adopted your corrections. Point-by-point responses addressing all the other comments are listed below. The manuscript has been revised and improved accordingly.

Best Regards

Chunsheng Zhao

1. **OMI level 3 SO2 – Define or reference this method.**

   Thank you for pointing it out, a reference has been added here.

2. **Is there a trend toward more electrical power usage and power production (with increased sulfur oxide and nitrogen oxide emissions) in summer due to increasing air conditioning loads? I expect that may contribute to the winter cf. summer trend differences.**

   Thank you for this insightful comment. Zhang (2004) shows that the electrical power consumption has increased due to the usage of air conditioning during the period 1992 to 2002. Increasing NO_x emission trends were reported by Zhang et al. (2007) during both summer and winter during the period of 1995 to 2004, while Lin et al. (2012) show decreasing SO_2 concentration trends during both seasons during the period of 2005 to 2010. The combined effect, however, is still unclear and is definitely a good subject for our future research.

   Since there is no definitive prove yet, we added your point as a speculation to our discussions in the revised manuscript.

3. ***"Chen et al. (2012) suggest that, under RH<80%, visibility is highly dependent on dry aerosol volume concentrations, only under high aerosol loadings does the hygroscopic growth become important for visibility impairment. While for RH greater than 80%, the hygroscopic growth of aerosols can greatly affect visibility, even under average aerosol pollution levels."***
   The discussion is not entirely logical to me. Check the following to see if it states your ideas correctly.
   "Chen et al. (2012) suggest that, under RH<80%, visibility is highly dependent on dry aerosol volume concentrations; only under high aerosol loadings does the aerosol become important for severe visibility impairment. However, at RH levels greater than 80%, the hygroscopic growth of aerosols can greatly reduce visibility, even under average air pollution conditions and aerosol loading levels. "

   This discussion is based on the figure below, which is from Chen et al. (2012). As can be seen, under RH<80%, visibility (extinction coefficient) varies drastically with aerosol volume concentrations. In this RH range, visibility is only sensitive to RH if the aerosol loading is high. Hence hygroscopic growth under RH<80% can only become important for visibility impairment if the aerosol loading is high.

   Your correction does not state my idea, however, we see that our phrasing might be hard to understand. This part of discussion is rephrased as the following, we hope that this makes it clearer.

"Chen et al. (2012) suggest that, under RH<80%, visibility is highly dependent on dry aerosol volume concentrations. The hygroscopic growth of aerosols in this RH range only becomes important for visibility impairment if the aerosol loading is high. While for RH greater than 80%, the hygroscopic growth of aerosols can greatly affect visibility, even under average aerosol pollution levels."

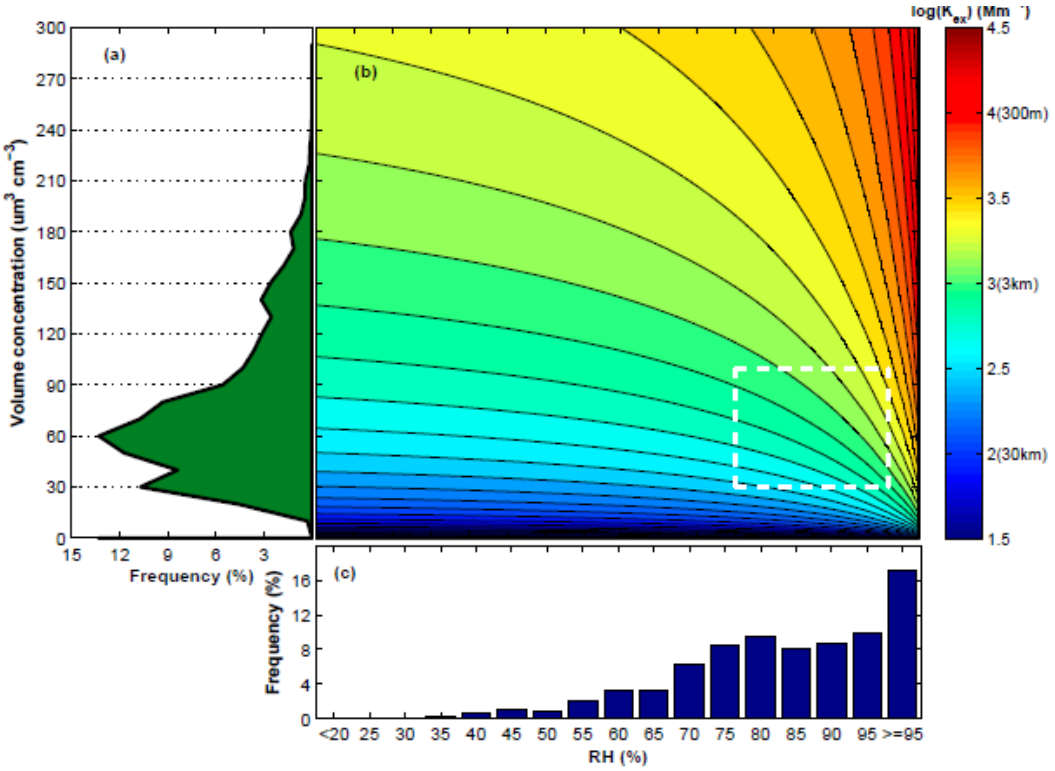

Fig. 4. (b) Calculated K_{ex} at given aerosol volume concentrations and RH at logarithmic scale; the crossed aera in white dashed line box represents the most common aerosol pollution and humidity state with the largest frequency distributions of aerosol volume concentration and RH; **(a)** and **(c)** Frequency distributions of measured aerosol volume concentrations and RH, respectively.

4. **Figure 1: Some geographical place names on the map would help those who are challenged regarding Asian geography. If possible put labels on the Bohai Sea, NCP and the mountain ranges that you mention.**

Thank you for the suggestion, Figure 1 was accordingly changed into the following, showing the NCP area with labels indicating the location of the Bohai Sea, the Yan Mountains and the Taihang Mountains.

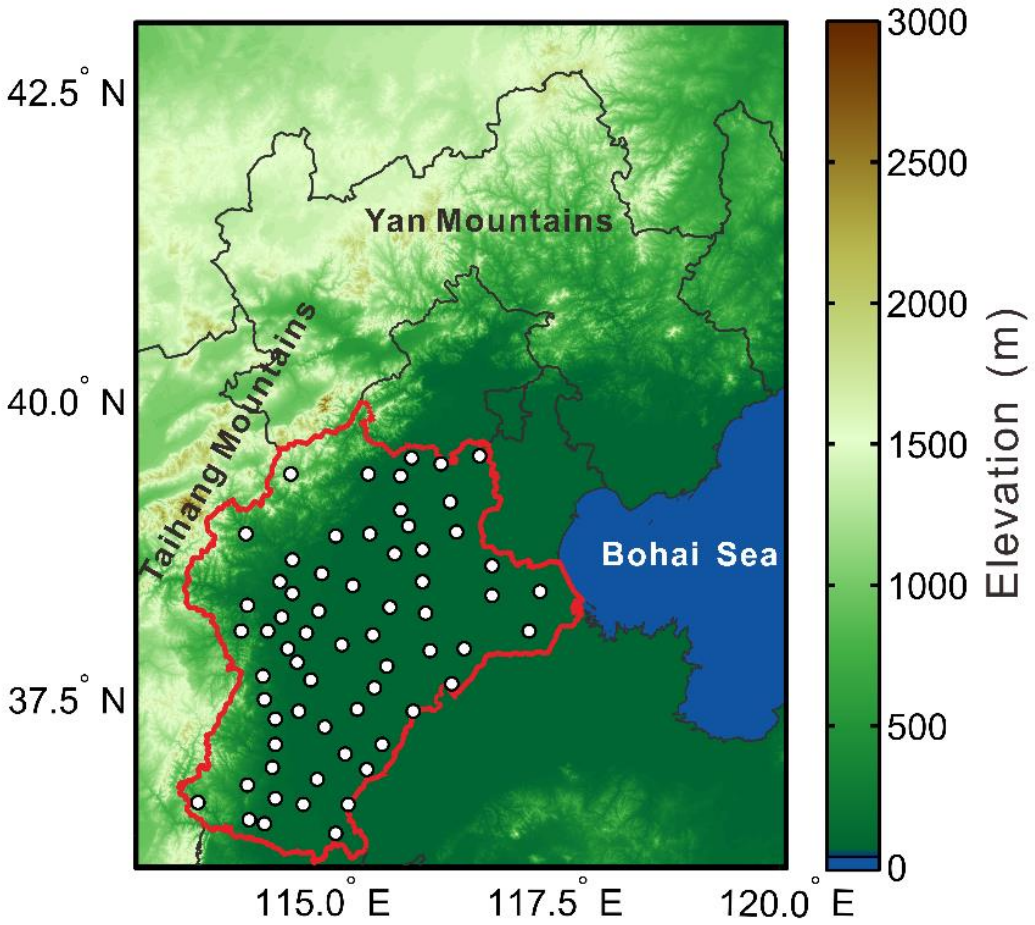

Figure 1 The location of the measurement sites (circle), the area of study (red line) and the regional topography by (Danielson and Gesch, 2011) (color).

References:

Chen, J., Zhao, C. S., Ma, N., Liu, P. F., Göbel, T., Hallbauer, E., Deng, Z. Z., Ran, L., Xu, W. Y., Liang, Z., Liu, H. J., Yan, P., Zhou, X. J., and Wiedensohler, A.: A parameterization of low visibilities for hazy days in the North China Plain, Atmos. Chem. Phys., 12, 4935-4950, 10.5194/acp-12-4935-2012, 2012.

Lin, W., Xu, X., Ma, Z., Zhao, H., Liu, X., and Wang, Y.: Characteristics and recent trends of sulfur dioxide at urban, rural, and background sites in North China: Effectiveness of control measures, Journal of Environmental Sciences, 24, 34-49, http://dx.doi.org/10.1016/S1001-0742(11)60727-4, 2012.

Zhang, Q.: Residential energy consumption in China and its comparison with Japan, Canada, and USA, Energy and Buildings, 36, 1217-1225, http://dx.doi.org/10.1016/j.enbuild.2003.08.002, 2004.

Zhang, Q., Streets, D. G., He, K., Wang, Y., Richter, A., Burrows, J. P., Uno, I., Jang, C. J., Chen, D., Yao, Z., and Lei, Y.: NOx emission trends for China, 1995–2004: The view from the ground and the view from space, Journal of Geophysical Research: Atmospheres, 112, D22306, 10.1029/2007JD008684, 2007.