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Interactive comment on "Detecting critical PM$_{2.5}$ emission sources and their contributions to a heavy haze episode in Beijing, China by using an adjoint model" *by* Shixian Zhai et al.

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As for the regional and local contributions for the Beijing haze pollution, we also launched some observation studies, but were not verified by model simulations [G. Tang et al., 2015; Zhu et al., 2016]. After I read this paper, I was so glad that the simulated results were consistent with our findings. However, there were some tiny questions that I want to discuss with the authors:

a. The authors investigated the haze pollution in Beijing based on the two peaks of PM2.5 concentrations, and the PM2.5 concentrations were peaked on 05:00 BT and 23:00 BT NOV. 21st 2012 respectively. However, these two moments are probably the high pollutant concentration periods originally due to some local emissions (such as

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the diesel cars). Does it necessary to divide the period so detail? I suppose if it was better to divide the haze episode into two stages, the first stage (from NOV. 19 to 20 2012) may be defined as the early polluted period and the second stage (included the two peaks) may be defined as the heavy polluted period. And then to quantify the regional transport and local contributions.

b. Does the obvious periodic fluctuation of hourly sensitivity coefficient of surrounding emissions has some relationship with the mountain-valley winds [Guiqian Tang et al., 2016]?

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Zhu, X., G. Tang, B. Hu, L. Wang, J. Xin, J. Zhang, Z. Liu, C. Münkel, and Y. Wang (2016), Regional pollution and its formation mechanism over North China Plain: A case study with ceilometer observations and model simulations, Journal of Geophysical Research: Atmospheres, 2016JD025730, doi:10.1002/2016JD025730.

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