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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Counteractive effects of regional transport and emissions control on the formation of fine particles: a case study during the Hangzhou G20 Summit" *by* Ying Ji et al.

Anonymous Referee #3

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This manuscript presents analyses of aerosol and meteorological observations taken at an urban site in Hangzhou, China, before, during, and after the G20 Summer in Sep 2016. The measurements have rich datasets of aerosol speciation, which allows for the use of species correlation to diagnose transport and source characteristics. In combination with back trajectory analysis, the authors attempted to estimate the contribution of local, regional, and continental scale transport to the observed variations in aerosol concentrations at that site. The paper is overall well-written with solid analysis. I have two major concerns about the scale the measurements would represent and robustness of trajectory analysis.

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Discussion paper

First, the paper did not specify the resolution of the meteorological data that drive the HYSPLIT back trajectories. On line 157-158, it says the GDAS is used. The GDAS data has a horizontal resolution of 1 degree by 1 degree, roughly 100 km x 100 km. Thus, it is possible for the GDAS-driven back trajectories to distinguish between local and regional transport. The study domain shown in Figure 1 (right), which is on the scale of 300 km at the maximum, will be covered by only a few grid boxes. This shortcoming would make all the related discussion of transport patterns and source location attributions highly uncertain. I think the authors should use a much finer meteorological dataset to drive the back trajectory model, e.g. from WRF with horizontal resolutions of a few km at least.

Second, I found the sea breeze related discussion groundless. First, they do not provide concrete evidence there was indeed sea breeze circulation during the study period. Sea breeze is a localized circulation pattern on the scale of a few kilometers with distinctive diurnal reversals of winds: offshore flow during the day and onshore during the night. The authors did not establish any of these patterns in the paper. I actually doubt there exists a sea breeze circulation in Hangzhou. Second, given the sea breeze as a local circulation pattern with wind reversals, it is unlikely one can detect continental outflow from the sea breeze without careful analysis of the flow patterns or modeling. What happen more often with sea breeze is the recirculation of local pollutions, as often seen in coastal cities around the globe. Offshore winds at night and during early morning push urban pollutions to the shallow marine boundary layer, which then recirculate back to the urban area in the afternoon by the offshore flow. So, if the authors could establish there was indeed sea breeze circulation during the study period, the follow-up discussion should be restricted to the local scale circulation, rather than the continental background. The local scale focus also reinforce my first comment that a finer-resolution back trajectory analysis should be used.

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