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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A modeling analysis of a heavy air pollution episode occurred in Beijing" *by* X. An et al.

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The authors applied a state-of-science chemistry transport model (CMAQ) with recent emission inventory to simulate a heavy particulate and sulphur episode observed in spring 2005 in Beijing. They compared the model results with observation from a ground site for PM10 and SO2 and from satellite for AOD. They then calculated the contribution from sources outside Beijing (non Beijing source (NBS)) to the concentration of fine (PM2.5) and course (PM10) particulate matter and sulfur dioxide in Beijing, and the simulation inferred an important contribution (40-45%) to the particulate matter concentrations in Beijing. They also simulated the transport pathways from the regional sources. The topic on contribution from regional sources to an urban area is important for air quality management; this is especially the case for Beijing which will host the 2008 Olympic Games, and the Chinese Government is making tremendous effort to

improve the air quality of the city. This study is thus very relevant to the formulation of anti-pollution measures for Beijing. My main concern, however, is the apparent inconsistency between the observation and model simulation, raising doubt on the accuracy of the modelled results and thus the main conclusion of this study.

All the observational data indicate this episode is largely due to local sources in Beijing: (1) Only Beijing and Tianjin showed very high air pollution index of 350 while cities in the surrounding region had moderate values of below 150 (Fig 2), this suggests a dominant contribution from Beijing's own sources (2) The IAP tower measurement (Fig 3) showed increased concentrations of SO2 and PM10 when wind speeds decreased (except for one brief period on April 6 between 10:00 and 18:00 when PM10 reached 900 μg/m3 and the winds gained strength and SO2 dropped, which appeared to be due to wind blown dust). (3) The AOD plot (Fig 5a) also showed a hot spot in Beijing, again suggesting a large local contribution. These observations do not support an average contribution of 40% of PM10 in Beijing from regional sources.

The predominant contribution from local sources for this case is actually supported by the simulation of SO2. The modelled SO2 agreed very well with the observation (Fig 4a) and the model showed a small (20%) contribution to SO2 from outside sources. The large contribution for PM is likely due to an underestimation of local sources for PM in the inventory. It is noticed that the model simulated PM10 was significantly lower than the observation (Fig4b), indicating missing important sources for PM10 in the inventory. If this source is local, then the current model calculation would overestimate outside contribution. The author must address this issue as it will directly affect the conclusion.

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Interactive Comment