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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Traffic restrictions in Beijing during the Sino-African Summit 2006: aerosol size distribution and visibility compared to long-term in situ observations" *by* Y. F. Cheng et al.

Anonymous Referee #1

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This article describes the influence of traffic restrictions in Beijing during the Sino-African Summit (4-5 November 2006) on the aerosol size distribution and visibility by comparing the long-term in-situ observations from a site located at the Peking University. The article is well written and presents some very interesting results. The paper merits publication, subject to the suggestions below.

Specific Comments:

1. The authors alluded that the traffic restriction during the Summit served as a re-

hearsal for similar measure planned for the 2008 Olympics (pp 12974, 12982, 12984, 12987). However, it should be noted that the Olympics took place in August 2008, under very different meteorological conditions (winter vs summer) and emissions sources (e.g., no heating).

a) It would be interesting to compare with the results of the traffic restriction demonstration conducted during August 2007.

b) The analysis was based on observations at one site (Peking University). How well does this site describe PM across Beijing?

2. The authors indicated that traffic emissions appear to be responsible for only a very small percentage (6-7%) of the fine PM in Beijing. On page 12973: Zheng et al. (2005) and Song et al. (2006) indicated that, as a primary source, traffic emissions in Beijing contribute 6-7% to particulate mass concentrations below 2.5 micrometer (PM2.5).

However, according to the authors (page 12986): Based on statistical analysis of long-term observation, under certain weather conditions, the source strength of the particles in Aitken and accumulation modes was reduced by 40-60% during the period of 4 to 6 November 2006, when the traffic restrictions were in place. This may be mainly due to the reduction on the secondary particle source. Furthermore, on page 12987: If we assume that there were no traffic restrictions taking place and with normal level of the vehicle emissions during the Summit period, the visibilities during 4-6 November 2006 would have been lower by about 50%.

a) Were there other measures besides traffic restrictions during the Summit, e.g., biomass burning, industrial activities?

b) What types of vehicles were restricted? Gasoline? Diesel?

c) The 6-7% estimated contribution of fine PM from vehicles was based on 2000 data (see Zheng et.al., 2005; reference for Song et al. is not complete); however, on page 12987, the authors mentioned that: new car registrations in Beijing keep growing by

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about 15% annually.

The vehicle fleet in Beijing was therefore much larger in 2006 compared to 2000. Are there more recent emissions inventory data?

3. In order to select meteoroligically consistent days for comparison with the 2006 time period when the traffic was restricted, the authors use PM data from selected days with similar wind direction and magnitude in 2004, 2005 and 2006. However, as pointed out above (2 c), the vehicle registrations were growing at 15% per year and congestion is increasing.

a) How do these vehicle and traffic trends influence the PM data in 2004 and 2005, which were used to compare with the 2006 traffic reduction period?

b) As shown in Figure 2: during the Summit period the wind direction was constant with persistent strong winds; however, the selected Non-Summit period (Table 2) includes only a small fraction of data points with stronger winds relative to weaker winds compared to the Summit period. Could this bias the estimated effects of traffic restrictions during the Summit?

c) If the large effects are due to reduction in the secondary particle formation, the effects should be more pronounced by time of the day. Could the authors discuss the diurnal variation?

4. On page 12980, the authors stated that: Long-term statistical analysis does not support any weekend effect on particle number size distributions in Beijing (Wu et al., 2008).

It should be noted that the Summit period (November 4-6, 2006) occurred on a weekend (Sat-Mon); perhaps the authors could show longer periods before and after the summit in Figure 1, i.e., the reduction comparison should include other weekend days in that figure.

5. The authors stated (page 12986, line 20): our analysis suggests that traffic restric-

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tions could be effective in improving the air quality and reversing the climate change in Beijing and its surrounding areas.

Please clarify how merely reducing traffic by 30% in Beijing would reverse the climate change in the Beijing area.

6. How does the result of this study compared to studies in other urban centers related to traffic restrictions? e.g., the authors mentioned the Heilbronn experiment in June 1994 (page 12973).

Technical Comments:

P 12972, L 24: atmospheric – should be atmosphere?

P 12973, L 1: in particular, at diameter – perhaps should be in particular, with diameter?

P 12975, L 14: have been checked manfully – should be have been checked manually?

P12978, L14: Clarify domestic heating – is this residential? What about non-residential?

P 12982, L 27: were been found – should be have been found?

P 12983, L 2: It was found out that – should be It was found that?

P 12983, L 5-8: Rephrase the sentence: Compared to most of the back trajectories during the Summit period, the back trajectories with higher particle concentrations in the coarse mode during the night when wind speed ran ing 3–6ms−1 were mostly originated from more northern direction and subsided from about 2000m since 40 h away from Beijing.

P 12983, L 9: and no – should be and non ?

P 12987, L 14: were occurred – should be occurred?

P 12980, Eq 2: Provide more description in the selection of the weighting factors w and wz.

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P 12988: References:

- Some references are not complete; e.g., Song et al., 2006 – which journal?

- Update the references/statements related to the Olympics games.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 12971, 2008.

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