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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 #2

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This paper describes the impact of short-term traffic restrictions instituted in Beijing during the Sino-African Summit period (4-6 Nov 2006) on aerosol size distributions and number concentrations in the city. The paper made a thorough comparison of aerosol measurements made at one site in Beijing (Peking University campus) between the Summit and non-Summit period which was selected according to meteorological factors and transport patterns similar to the Summit days. It concluded that the traffic restrictions reduced the number concentrations of fine particles (40-800nm in diameter), but resulted in an increase in the concentrations of nucleation mode and coarse

mode particles. Overall the paper presents interesting new data and analysis. It is suitable for publication in ACP once important revisions have been made, as described below.

In Section 3, the paper presents different impacts of traffic restrictions on the number concentrations of particles at different modes, but the explanation for this is far from convincing or coherent throughout the paper. For example, on page 12976, line 18-21, the authors state that the increases in the number concentrations of nucleation model particles during the Summit is due to an increase in new particle formation. In the abstract (line 10-12), the authors state that the secondary particle formation actually decreases during the traffic restriction. They are contradictory statements, unless there have been differences in the formation rate of new particles and secondary particles. However, the authors do not differentiate the two types of particle formations in the paper.

In Figure 1: the time series do not contain enough days before or after the Summit: only four days before and one day after. To make a convincing statement about the impact of traffic restrictions, longer period is desired.

Section 5, page 12981, line 14-17: the paper states that the differences in particle number concentrations between the Summit and non-Summit period are not significant when the wind speed was larger than 6 m/s. However, Figure 2a indicates that these higher wind speeds ($>$ 6m/s) tend to occur more often in the daytime during the Summit when the impact of traffic restrictions is expected to be the greatest. Indeed, Table 2 shows that the data points during the Summit with wind $>$ 6m/s represent more than 1/3 of all the data. Thus the paper’s conclusion about the impact of traffic restrictions on particle concentrations is biased toward low wind speed conditions which occur more often at night during the Summit and when the traffic restrictions have minimal impact on emissions. The authors need to investigate the biases. I suggest the authors restrict their comparison for the daytime hours (both Summit and non-Summit period) and re-evaluate their selection criteria for the non-Summit period

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to include more high wind speed data (i.e., >6m/s).

Page 12983, line 22-24: the paper states that “the number concentrations of particles” in the Aitken and accumulation modes was reduced by 40-60% during the Summit period. But in the abstract (page 12972, line 10-12), the text states “the source strength” of these particles was reduced by that much. It’s important to understand the difference between sources and concentrations – they are not equivalent measures. A 40% reduction in sources normally does not result in a 40% reduction in concentrations and vice versa. The statement in the abstract about the ‘source strength’ has no support evidence in the text and thus is not correct.

Related to the above comment, the paper focuses on direct comparison of particle number concentrations, but is lack of discussion on the traffic restrictions on emissions. As indicated in the introduction of the paper, the news states 30% of vehicles were taken off the road during the Summit. Does the authors’ analysis agree with the 30% reduction on vehicle fleet reported by the news?

Page 12929, line 7: the back trajectory was run for 144 h or 6 days. Is there a particular reason to run such long-time back trajectories? What’s the typical lifetime of particles in the typical urban atmosphere in Beijing in Nov? The traffic restrictions were local actions and should not have big impact on surrounding environment. The 6-day back trajectory will over-emphasize the impact of regional influences and may lead to biases. I suggest the back trajectories shortened to match with the actual lifetime of particles in Beijing.

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

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Interactive Comment