**Atmospheric
Chemistry
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Discussions**

Interactive
Comment

Interactive comment on "Ozone air quality during the 2008 Beijing Olympics – effectiveness of emission restrictions" *by* Y. Wang et al.
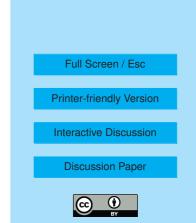
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Received and published: 3 July 2009

We thank Dr. J. Cermak for his careful reading of the manuscript and helpful comments.

You are comparing the 2008 situation to 2006 and 2007 data. Do you have any estimate how representative the conditions in those two reference years were?

The focus of the paper is on the differences in emissions, meteorology and associated pollution levels in Beijing between Augusts of 2006, 2007 and 2008. With regard to emissions, 2006 and 2007 can be regarded as 'normal' and representative of typical conditions in Beijing. With regard to meteorology, we did not attempt to address the question which year(s) represent the 'normal' condition and which year(s) not, as we compare the 2008 meteorology with that of 2006 and 2007 using data specific to those

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years, not the climatological conditions.

From Chapter 2 I understand the measurement site has been in operation since November 2004. Why did you choose not to include 2005 data in your study?

The observational data in summer 2005 were substantially less complete than those in summer 2006-2008, as we experienced the usual start-up challenges managing the site during the first summer, such as how to avoid temporal disturbances to the instruments by natural events such as thunderstorms and lightning strikes, along with power surges and outages. We didn't include 2005 data to minimize sampling biases. We clarified this point in the text: "Measurements in summer 2005 had many gaps due to instrument problems and not included for comparison."

The meteorological data used in explaining O3 deviations in different wind situations in section 3.2 seem to be monthly averages. I would expect daily variation to play a role. If you have performed any analysis on daily data the paper would probably profit from showing it here.

In this paper we focused on the differences in mean conditions of pollution and meteorology between Augusts of the three years, day-to-day variations in meteorology was found to play an important role in controlling the day-to-day variations of tracer concentrations. This may be explained that on the same calendar day but in different years our site may sample air masses of completely different origins. A comparison on daily basis does not provide much useful information on the average situation of pollution changes in Beijing. Averaging the anomalies over the whole month would cancel out the daily randomness in meteorology and represent the mean chemical composition of dominating air masses sampled at the site. We discussed this point in Section 4.2 and Figure 8b which shows the meteorology-related anomaly by days. Following a comment of Referee 1, we added Table 2 in the revised manuscript to separate the 1st week of August (heavy pollution) and the Olympics days from the monthly mean evaluation.

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If I understand the paper correctly, you estimate the SO2 reduction as the average of SO2 reductions in various meteorological classes. Do all of these classes occur with the same frequency or do you include a weighting in the averaging process? Also, I would expect that in situations with low wind speeds measured SO2 concentrations are influenced by Beijing SO2 to a smaller extent. How do you account for that?

Thanks for the suggestion. We did not use weighting averages to get the mean SO2 reduction. Following the reviewer's suggestion, we performed a weighting average by frequencies of meteorological classes. The results are similar: weighted mean reduction is 42% compared to the unweighted mean reduction of 40%. As the difference is within the uncertainty range included in the manuscript, we did not revise the numbers. We clarified in the text: "We found that the mean RD in SO2 (weighted by the frequency of the meteorology classes in Figure 6) was 40% and the variance in SO2 lifetime was 10%,..."

We agree with the reviewer's expectation that the influence of Beijing emissions at the site depends on meteorology conditions which affect not only the chemical lifetime of SO2 but also the transport time. We made it clear in the text that "One can expect that the chemical lifetime of SO2 and its transport time from the Beijing urban area to the site depend on meteorological conditions." That's why we compare SO2 concentrations by small intervals of meteorological parameters and evaluate the mean reduction (weighted also by the frequency of meteorological classes as suggested by the reviewer) across all the conditions. From the weighting procedure, we found that low wind speed conditions (<1 m/s) were sampled only 10% of the time in August.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 9927, 2009.

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