

## ***Interactive comment on “Air quality during the 2008 Beijing Olympics: secondary pollutants and regional impact” by T. Wang et al.***

**Anonymous Referee #2**

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This manuscript makes an important contribution to evaluating the effectiveness of enhanced pollution control measures during the 2008 Beijing Olympics. Comparison of 3 sites including an upwind site south of Beijing, a main site near the Olympic venue, and a downwind site north of Beijing demonstrate that pollution in Beijing is a regional problem that requires control upwind. Strict controls in the Beijing municipality are probably insufficient by themselves.

I would like to have seen the intersite comparisons include more rigorous statistical testing to determine the significance of the differences beyond the testing the significance test in Table 1 comparing different years.

page 12441 line 12 and figure 2. Why are the data uncertainties shown as 1/3 of the standard deviation? Based on these results it seems that the full standard error

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would be equal or in excess of the mean values, suggesting that the differences are probably not significant. It would be more useful to present these data in a format like box and whisker plot that provides a simple summary of the the probability distribution but is still fairly compact like the barplots used here. Seeing the range and values for mean median and selected quantiles (e.g. 25% -75%) would be more informative than having only the means. Same thing for Figure 3. Make sure the figures and sentences referring to them specify which site is being presented.

pg. 12441 line 25. Comparisons such as this one stating that average values increased by some percent after implementation of full controls need to be evaluated for statistical significance. This is where having a representation of the distributions in the figures would be helpful. Even better would be to show the probability distributions for these pollutants before and after controls were implemented. Considering that the bars showing standard deviations divided by 3 are overlapping I suspect that the means are not significantly different and the comparison as presented here does not support the conclusion that the control measures were not sufficient. Instead, showing in the figure that the extreme values representing pollution episodes did not drop would support the statement that control measures were not sufficient to eliminate episodes.

To what extent might the absence of a drop in ozone despite reduction in emissions at the CRAES site be explained by the well-known problem that ozone at urban core sites goes up when NO<sub>x</sub> is reduced because there is less Ozone titration?

Page 12444, lines1-5. The estimation of contribution from regional sources needs some clarification. Perhaps there are missing words in the sentence. I think this section is saying that ozone at the upwind site is on average already 62% of its peak value, implying that added emissions between the upwind site and Beijing contributed another 34%. Is that what you mean here? The comparison to downwind site is a very nice demonstration of the transport lag and a bit of dilution. The timing of the ozone peak at this site compares well with the mean diel patterns for nearby Miyun site reported by Wang, Y. et al. 2008, APC, 8,6355.

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line 7, how can the contribution from titration be distinguished from deposition depleting a shallow nighttime inversion layer as the cause of low ozone at the upwind site? Strong nighttime inversion layer would also contribute to elevated CO at night, without needing to have very large emissions. However, mean CO values throughout the day of  $\sim 700$  ppb are an indication that combustion sources are abundant near XCC. It would strengthen the point that upwind sources are important contributors of CO by including CO for the CRAES and downwind sites if available to show what fraction of the CO is already present upwind of Beijing. Page 12447 line 15. Can you include a citation for the suggestion that NO<sub>x</sub> emissions increased from 2005 to 2007? There has been considerable discussion about rapid increases in NO<sub>x</sub> emissions in China that there should be a good citation giving an estimate of the rate of increase

Minor errors. Page 12438 Line 18, refereed should be refered page 12440 line 2; the statement "these data were obtained from Systems" seems to be missing something. Is Systems a thing, or is there some missing text?

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Interactive comment on Atmos. Chem. Phys. Discuss., 10, 12433, 2010.