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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Emission controls versus meteorological conditions in determining aerosol concentrations in Beijing during the 2008 Olympic Games" *by* Y. Gao et al.

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This paper addresses an important issue in air pollution control strategy in mega cities, like Beijing, and provide successful example of how to improve air quality in big city by control emissions. This paper points out that to improve the air quality over Beijing, emission control strategy should be focused on the regional scale instead of the local scale. These findings have important applications to other cities and other countries, especially in era of fast economical development and urbanization. The science in the paper is sufficient. I recommend publication after the minor modifications.

→Reply: We thank the reviewer for the encouraging comments.

Specific Comments: (1) No doubt that emission reduction will improve air quality eventually, but the key is the control efficiency. For control scenario, what pollutant species were cut most or cut all pollutants same. Authors should discuss more about it and which or what pollutants are limit or sensitivity.

→Reply: As indicated in section 2.3, emission control was applied at the same scale for all anthropogenic pollutants. However, the percentage reduction in aerosol concentrations was different for different aerosol species with NO3 the most efficient, and SO4 the least efficient, as discussed in section 4.2.1. Following the reviewer comment, we add in section 4.2.1 "In general the emission control is efficient for the reduction of concentrations of all the aerosol species, including SO4 (20%), NO3 (40%), NH4 (30%), BC (30%) and OC (30%) during the period from July 20th to August 31st. The reduction in NO3 concentration is most sensitive while the reduction in SO4 concentration is the least for the same scale of emission control of all anthropogenic pollutants".

(2) As authors suggested that meteorological conditions (e.g., wind direction and precipitation) are at least as important as emission controls in producing the low aerosol concentrations during Olympic Game. Authors should discuss more about the effects of meteorological condition. So it helps to make more effect control strategy, since meteorological condition can't be controlled. But we can make different emission control strategies according to different meteorological condition.

→Reply: We agree with the reviewer's comment. Now we add in the text "Since the aerosol pollution in Beijing is, to a large extent, determined by the surrounding areas when the southerly winds prevail with clear-sky conditions, it's critical to strength the emission control over the surrounding areas of Beijing (especially in the South) under these meteorological conditions" in section 5 after the sentence "This study suggests that the emission control on regional scale is necessary in order to improve the overall air quality over Beijing."

(3) As authors address that in order to improve air quality in Beijing, control strategy

should focus on the regional scale instead of the local scale. To contrast this conclusion, it's better to compare and plot of CTL-RD0 and CTL-BJ0 with CTL and NO-CTL directly, like Figure 2 in the text.

→ Reply: In section 5, we state "analysis shown in Figure 5 examines the anomaly of PM concentrations by subtracting the averaged concentration from its daily values for different cases (CTL, CTL-BJ0 and CTL-RD0) rather than the daily values to show the effect of transport on temporal variations of PM concentration in Beijing." As we want to show the fluctuation of PM2.5 concentration more clearly in CTL-RD0 and CTL-BJ0, we plot the anomaly of PM2.5 concentration in each case in Figure 5. In addition, as we want to show the impact of emission over Beijing (CTL-RD0) and outside Beijing (CTL-BJ0) on PM2.5 concentration under control scenario more clearly, we compare them with the CTL case in Figure 5, but not with the NO-CTL case. For example, in the CTL-BJ0 case, the emission over Beijing is set to zero, while the rest of the domain is still under emission control. Thus we can identify the impact of the local emission control over Beijing on the air quality through comparing the CTL-BJ0 case with the CTL case.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 16655, 2011.