

Interactive comment on “Primary aerosol emission trends for China, 1990–2005” by Y. Lei et al.

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Thank you very much for your kindly and comprehensive comments and suggestions that help us to clarify some vague issues and improve the quality of our manuscript. Taking all the comments and suggestions into careful consideration, we carried out some further analysis and made some revisions. Following are the detailed responses to your questions:

1. There is large uncertainty in both the activity data and the EFs, as acknowledged by the authors in the manuscript. More importantly, the reliability of the data sources likely changes with time, from the beginning to the end of the study period. This is reflected by the generally larger error bars assigned to the 1990 inventory than those to the 2005 inventory. All these make it dangerous to try to derive some general emission

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trend(s) from the data set. An uncertainty analysis is done but I feel that more detailed breakdown of the error bars should be given in the paper for potential users. Estimates assuming no and complete compliance in emission regulation may be interesting as well, and may reflect the effect and the potential of pollution control in China.

Response: We agree that presenting breakdown uncertainties could help the potential audiences to know the major source of the uncertainties. Uncertainties of sub-sectors were presented in Table 10 in the revised version. Uncertainty of emissions from some specific sources, such as coke industry, residential sector, and off-road vehicles are relatively higher than others. We also added a short discussion on this in Sect 5.4.

We also agree that it is interesting to compare the emissions assuming no and complete compliance in emission regulation. We added a section (Sect 5.3) to discuss the effectiveness of PM emissions reduction in China. In 2005, emissions of PM_{2.5}, PM₁₀ and TSP were reduced by 11.0 Tg, 18.4 Tg and 29.7 Tg, respectively due to implementation of emission regulations.

2. It is unclear to me whether some primary aerosol sources are included in the inventory or not, for example, fugitive dust from construction or traffic, and the burning of agricultural residuals. Natural sources are not included in the inventory, and this should be reflected in the title.

Response: Fugitive dust from construction and traffic and open burning of agricultural residuals were not estimated in this work. We added this statement in the revised paper. We also added “anthropogenic” in the title.

3. The authors mention historical high in emissions of several species in 2005, the end of the study period. Does this imply drop in emissions starting in 2006?

Response: We did not update this inventory beyond 2005 at this moment. We would like to extend our study to 2006-2010 periods when activity data are available. We replaced the statement of “historical high” by “peak” in the revised paper to avoid mis-

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understanding.

4. One important source of uncertainty is the penetration of PM control technology, estimated based on government emission standards. I'd suggest that the authors elaborate their methodology more in section 2.2.4.

Response: The approach to estimate the year-by-year penetration of PM control technology in a dynamic way is one of the most innovative parts of this study. And yes, it might result in some uncertainty. In revised manuscript we added some sentences in Sect 2.2.4 to describe the approach. We also refer it to another paper of ours (Lei et al., 2011), in which an example applying this approach to estimate inter-annual EFs in cement industry is described in Sect 2.3.

5. The emissions from the residential biofuel deserve further examination, given that this sector contributes a large fraction of BC and OC. The 20-30% decrease from 1990-2000 followed by the increase of similar magnitude from 2000 to 2005 (Table 9) has not been explained. What's the possible driving force behind the change or is this simply an artifact resulting from the energy use data?

Response: We assumed constant EFs for biofuel combustion. Therefore, the trend showed here simply reflected the inter-annual change of bio-fuel use. However, as noted in Sect 5.1.4, there's large uncertainty on biofuel use data, and could potentially leading to considerable uncertainty in our estimates of BC and OC emissions. This point of view is also discussed in Klimont et al. (2009). We added some sentences in Sect 5.1.4 to present this argument.

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