**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Quantifying the uncertainties of a bottom-up emission inventory of anthropogenic atmospheric pollutants in China" *by* Y. Zhao et al.
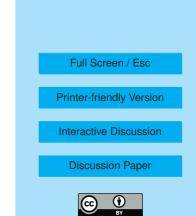
Y. Zhao et al.

yzhao@seas.harvard.edu

Received and published: 1 February 2011

We thank for the comments and suggests from reviewer #1. Following is our brief point-by-point response to those comments:

1. We agree with the reviewer that the province-specific parameters like VMT are crucial for the fuel consumption estimate for the transportation sector. Currently, however, such information is unavailable as province-by-province investigation of VMT to our knowledge has not taken place, and we have little choice but to apply national average values except for Beijing. We also agree that in principle, comparing calculated fuel consumption and official statistics would be valuable. However, Chinese official

energy statistics classify fuel consumption for a sector that combines transportation, warehousing, and postal service, and as there is no basis available to disaggregate these activities to match activity level data regarding vehicles in the emission inventory framework, we cannot yet directly make such a comparison. We have been able to compare our estimate with another study (Wang et al., 2006), and the oil consumption by vehicles (including rural vehicles) in 2005 is close for the two studies (101.1 versus 108.6 Mt). The discrepancy is within the uncertainty range estimated by our study.

2. It is true that the emission source fractions (as well as the penetrations of emission control devices) for difference provinces can vary largely and be important for emission estimate. The regional differences are well analyzed in our study for power plants, the most important source of atmospheric pollutants in China, as we are able to evaluate this sector on a unit-by-unit basis. Due to limited data, however, we cannot evaluate industrial boilers and industrial processes by province, and so the national average is applied. Future regional differentiation of input parameters such as emission source fractions, for instance, will reduce uncertainties. The reviewer's recommendation that we continue to seek more detailed data sources for future work is appropriate, as we have stressed in the conclusion of the manuscript.

3. In this study, the unabated emission factors from SEPA (1996) are mainly applied in the industrial sectors, for which most recent field measurements are lacking. On one hand, we acknowledge that their application may cause considerable uncertainties, and thus we assumed relatively large uncertainty ranges for them in the analysis. On the other hand, we consider this assumption acceptable absent further evidence on emission factors from new field studies because: 1) the major "energy saving and emission reduction" policies in China began in 2006 as part of the 11th Five Year Plan, and prior to the initiation of these policies, we think that the unabated emission factors for industrial sources improved only slightly (new plants applying more advanced technologies reduce emissions mainly through the improved removal efficiency); and 2) the removal efficiencies of control technologies are more crucial for the emission estimates

than the unabated emission factors. Those removal efficiencies are mostly taken from our recent measurements and thus are assumed to be more up-to-date and reliable.

4. Yes, Stage I and II are applied for new vehicles in Beijing one year prior to other regions in the country. Stage III was actually in effect in Beijing from December 2005, therefore its effect on emissions in 2005 was tiny and can be neglected. We considered the differences in the fleet composition of vehicles with different control levels, but assumed the same uncertainty distributions (i.e., normal distributions with CV of 20%).

5. We agree with the reviewer that the uncertainties of emissions for some specific regions and seasons can be even more important than total emission amount in terms of validation by observations. We similarly stressed the need for such analysis at the end of Section 4.5, which depends on future development of regionally and seasonally differentiated information and data.

Reference

Wang, M., Huo, H., Johnson, L., and He, D. Q.: Projection of Chinese motor vehicle growth, oil demand, and CO2 emissions through 2050, Argon National Laboratory, ANL/ESD/06-6, 2006.

State Environmental Protection Administration (SEPA): Handbook of Industrial Pollution Emission Factors, China Environmental Science Press, Beijing, 1996 (in Chinese).

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 29075, 2010.

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