Atmos. Chem. Phys. Discuss., 10, C13318–C13320, 2011
www.atmos-chem-phys-discuss.net/10/C13318/2011/

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.

Anonymous Referee #2

Received and published: 8 February 2011

This paper is a significant contribution to the discussion of uncertainties of emission inventory in China. Zhao et al. described a bottom-up emission inventory of several important pollutants in seven dominant sectors and performed Monte Carlo simulations to obtain the uncertainties along with sectoral and total emissions. They represented valuable information about emissions in China and statistical analysis based on different assumptions. The uncertainty analysis of emissions is in great need, either on the regional and global level due to the concerns about emission impacts on climate change and air quality. The paper is generally well organized and the methods are sound. However, justifications and further consideration are needed for some of the assumptions. I have some draw some points as follows.

1. On page 29080, line 17 (equation 1), the penetration rate of emission control technology (R) and emission factor (EF) are indicated as province dependent by subscripts. I suggest the authors provide enough information about this province dependence.

2. On page 29082, the authors extrapolate the conclusion of coefficients of variation (CV) for coal consumption by the power sector, to fossil fuel consumption by industry and residential sectors, and industrial production. The assumption that presents here seems far biased to the low side of activity levels. Zhang et al (2007a) shows higher discrepancy in industry and residential sectors. Industrial production has limited statistical data, e.g. brick. I strongly recommend the authors do more literature review and make justification of the assumptions about activity level.

3. On page 29088 (line 25-27), the authors assume that the CV of non-road emission factors is as large as on-road Stage I emission factors. However, the coefficient of variation of non-road emission factor can be larger than on-road. First, there is no direct measurement of non-road emission factor, and the authors rely on the foreign studies. Second, the characteristics of non-road emission suggest larger uncertainties. For example, the emission standards for non-road vehicles were adopted in 2007 in China. Further, the lifetime of non-road is usually longer than on-road, and emission factors increase because of deterioration rate. Thus, the assumption about non-road emission factors is biased to the low side.

4. Lack of parameters in the probability distribution table. In the supplementary, Table S3 provides the probability distributions of unabated emission factors, based on literatures, measurements or simple assumptions. However, it did not to provide enough information of several distributions. For example, the emission factors of NOx for biofuel-waste and hot water system are assumed as Gamma distribution, but they did to show enough parameters for this distribution. And also, for the uniform distribution, e.g. emission factors for open burning, the value outside parentheses is actually not the mean of the two values inside. What do these values really mean? These kinds of problem also appear in logistic, Beta, Weibull and other distributions. I suggest providing adequate

information for each distribution in order to make this work replicable.

5. On page 29106 (Table 1), the authors show the estimated emissions and the uncertainty ranges. In the supplementary Figure S2, they present the frequency distribution of different pollutants. However, the mean value of each distribution in Fig. S2 does not seem to match the one shown in Table 1 (value outside of parentheses), especially for PM, PM10, PM2.5 and BC. This would affect the uncertainty ranges and the comparisons with other studies. I'd suggest the authors to check the assumptions of each probability distribution and Monte Carlo simulation and make sure to the results are consistent.

6. On page 29097 and 29098, maybe it is better to have a brief discussion of the comparison about the estimated central values. Without justification of the baseline, the comparison of uncertainty itself will be not validated.

7. Need titles of subplots in Figure S2.

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