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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Emissions of air pollutants and greenhouse gases over Asian regions during 2000–2008: Regional Emission inventory in ASia (REAS) version 2" *by* J. Kurokawa et al.

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Emission inventory is fundamental important for atmospheric chemistry modeling. Since the beginning of this century, the emissions of air pollutants and greenhouse gases in Asia have been changing significantly, and an estimate of the trend of these emissions is necessary for the evaluation of their impact on changes in regional/global air quality and climate. This paper by Kurokawa et al. presents a newly developed emission inventory of major air pollutants and greenhouse gases for Asia for each year from 200 until 2008. The authors collected many activity data and emission factor parameters from recently published studies to update their inventory. In particular,

the emission mitigation measures in China during different phases between 2000 and 2008 were taken into account in the development of the inventory, and large power plants were extracted as point sources. The inventory has an high resolution of 0.25 by 0.25 degree with monthly variation. This paper, along with the dataset freely provided to the public, is of interest of atmospheric chemistry modeling community and should be published in ACP. I would recommend that the authors make necessary revisions in response to my following questions and suggestions before the acceptance of the paper.

1. Sect. 2.2.5 Seasonal variation and grid allocation: The statistics activity data set used in this study is based on the country and sub-region (e.g. province for China) levels, with geographical areas being much higher than 0.25N $\times$ 0.25E degree. The authors applied higher resolution population data to allocate the emissions from the area sources to such grid cells. This kind of method is reasonable in the emission estimate of some activities, but it may not work for other emission sources, e.g. from large industrial plants. In addition to power plants, other large industrial plans, such as steel and cement plants, should be considered as point sources. The authors have a discussion of this issue in the paper, but unfortunately they prefer to dealing with it in the next version of the inventory. To find a location of a large steel and iron manufacturing enterprise by its name may not be too difficult. It seems that their inventory is not entirely ready for 0.25N $\times$ 0.25E grid cells.

2. Sect. 2.4 Emission factors: In addition to activity data, emission factors as well as removal efficiency are import for accurately calculating the source emission rates. Since measurements of emission factors are spares in Asia region, different values for a same emission factor parameter, either from sparse local measurements or from measurements in the US or Europe, have generally been adopted, leading to a great variability of an emission factor in different inventories. It would be nice if the authors could provide a table to summary what emission factor values are used in their inventory, at least for those with great uncertainties and those that are new compared to

other commonly used inventories.

3. Sect. 3.2 Spatial distribution: Except for larger regions (e.g. eastern China and southern India), no discussion on the geographical distributions of emissions at smaller scales is given. Since the inventory is at 0.25N $\times$ 0.25E grid cells, the emissions from hot pollution sources like megacities should be resolved. The emission estimate for these pollution hot ports might be presented and compared with previous regional emission inventories (e.g. Zheng et al. 2009; Huang et al., 2011; Zhao et al., 2012).

4. Sect. 3.6 Uncertainty: The content about uncertainties is far from satisfactory. The authors focused merely on the improvement in the accuracy of their current version of the inventory compared to previous one. The uncertainties of the emission estimates should be estimated based on the uncertainties in emission factors and activity rates as done by Zhang et al. (2009) and Zhao et al. (2011). They could also be estimated by comparing different emission inventories for the same region and period as done by Zhao et al. (2012).

Technical issues

Page 10058, Formula (3): Should (1-beta_i) be added to account for the fraction of distance travelled with a hot engine? In order to save the space, can Table 2 (and Table 4) be shown with 13 columns? Maybe Figs 4, 5 and 6 can be reorganized to form two figures, one for regions and another for sectors, each having 4 rows $\times$ 3 columns. Similar revisions may be considered for other figures (Figs 7a and 7b as well as Fig. 8)?

References

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