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Discussions

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Interactive comment on "Development of a unit-based industrial emission inventory in the Beijing-Tianjin-Hebei region and resulting improvement in air quality modeling" *by* Haotian Zheng et al.

Anonymous Referee #2

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This is a timely paper that describes the development of a unit-based industrial emission inventory in northern China, which still suffers severe air pollution even though the government has put tremendous amount of effort in emission controls. A detailed, united-based emission inventory will be of great value when air quality models are used in developing/assessing emission control strategies. The paper is generally well-written. I would recommend the paper be published in ACP after addressing my comments below:

1. The paper lacks details on how vertical distribution of point source emissions are

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treated in the simulation. In the results section, it is mentioned that plume rise contributes to the difference between the CMAQ results. However, no details were provided on how the parameters needed for plume rise calculations are obtained. In my understanding, such data are not universally available (even in the US) so presumably the same situation is applicable in China. What is the criteria for selecting point sources for plume rise calculation and how missing information is estimated. I also believe that the authors should perform off-line emission vertical distribution calculations and compare with the empirical vertical distribution used for the proxy-based emission inventory. For many of people without access to the detailed unit-based emission inventory, it will be useful to see this information so that vertical distribution in the traditional inventories can also be improved.

2. One of the major conclusions from the study is that unit-based emission inventory leads to significant improvement in the model performance. However, the only quantitative assessment is monthly average concentrations of SO2, NO2, O3, PM2.5 using all the stations in the domain. This is not sufficient as information is lost in the averaging process. At minimal, the authors should show performance of these pollutants at each individual sites. Time series should also be shown for sites with significant differences. It will help identify the cause of the differences. For O3, it is necessary to show performance of 1-hr peak ozone and 8-hr daily maximum. Very large error still exists for SO2. More discussion of this over-estimation should be included.

3. Table 1 shows "annual average" but only January and July simulations were performed. How did you calculate annual average with only two months of simulation?

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