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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Resolution dependence of uncertainties in gridded emission inventories: a case study in Hebei, China" *by* Bo Zheng et al.

Anonymous Referee #1

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This study describes the construction and evaluation of a high-resolution bottom-up inventory of air pollutant emissions for Hebei Province in northern China. The authors compare the performance of a mesoscale chemical transport model (WRF/CMAQ) using their new inventory, which is built from local data, with CTM runs that use a proxy-based national inventory as a model prior. Their results show nicely that uncertainties in model output are influenced by the spatial resolution of the model grids, and the degree to which the inventory priors rely on spatial downscaling to generate gridded emissions at local scales. The authors have isolated the contributions of different elements in the prior inventories, which allowed them to quantify uncertainties in the spatial distribution of emissions, as well uncertainties produced by aggregating emissions to coarser spatial grids. There findings that the proxy-based inventory produced large biases in estimated pollution concentrations at high resolution in urban areas is

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Discussion paper

novel, and should be of interest to the broad readership of ACP. Their results are a valuable confirmation that urban-scale modeling of emissions and pollutant concentrations requires high-resolution local activity data to accurately capture the spatial patterns of pollution.

Overall, the paper is well written and well constructed, and the authors provide good context and background support in their introduction section. The methodology is clear and concise, and the presentation of the results are similarly clear. The discussion focuses on the main results, namely the biases generated by using a proxy-based inventory, relative to their new bottom-up product. The figures are well designed and clear to interpret. As currently written, I feel that this paper is suitable for publication as-is in Atmospheric Chemistry and Physics.

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