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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Long-range Transport Impacts on Surface Aerosol Concentrations and the Contributions to Haze Events in China: an HTAP2 Multi-Model Study" *by* Xinyi Dong et al.

Anonymous Referee #2

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This paper presented a work analyzing the contribution from Europe to China's atmospheric particle concentrations and haze events, with intensive chemistry transport modeling. The authors made great efforts on incorporating multiple transport models to understand the difference between models and to reduce the uncertainty of simulation. They also evaluated the impacts of emission inventory on the simulation, as the accuracy of emission inventory for anthropogenic pollutants is always a big concern on the air quality research community. Before it can be accepted as a final atmospheric chemistry physics paper, however, the following issues need to be further discussed or stressed.

1. The significance of the paper needs to be reconsidered and relevant statement should be revised. In current format, the authors stated that there were limited studies conducted on regional transport to China and it might be important as China is controlling its emissions. The results, however, show that the impacts of Europe was very few, and the studying period was before 2010, during which the emissions in East Asia were expected to still increase. It seems that the current work did not fully answer the question they raisedïij§The most serious haze events after 2010 were not included in this study?

2. Lines 9-10, Page 2: this results is quite old, there are recently more studies on health impacts of China's air pollution.

3. Lines 13-16, Page 6: Please define how the MNB was calculated. Is there any criterion indicating the acceptable range of MNB?

4. There are limited PM2.5 observations used in model evaluation for China. I understand that the official data were not available until 2013. However, could the data published in previous studies be available and could the evaluation be improved?

5. Figures 5 and 6 illustrated the surface aerosol response under EURALL and RBUALL. Can you explain why the seasonal variations were different between models? In Fig 6, for example, larger response was found in summer for CAM-chem and SPRINTARS, while smaller was found in summer in EMEP and GEOSCHEMADJOINT. By the way, caption of Figure 6 should be revised (Figure XXX?).

6. Lines 23-27, Page 10. I am not persuaded by the authors by the linearity assumption. They estimated the full impact by scaling the PM responses under the 20% emissions perturbation conditions by a factor of 5. If this is the case, why not directly estimate the PM response by removing 100% emissions for given region? Nonlinearity of PM2.5 concentrations to precursor emissions was strong, and the uncertainty of the assumption should be carefully analyzed and quantified.

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