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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Impact of a new emission inventory on CAM5 simulations of aerosols and aerosol radiative effects in eastern China" *by* Tianyi Fan et al.

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Responds to Referee #2's comments: We thank the referees' valuable comments and suggestions on the improving the scientific significance of this work.

Referee: "However, there are still scientific questions to be answered that could make this paper more meaningful to the community. For example, Wang et al., (2016) described a mechanism of severe haze formation in two megacities in China, which may explain part of the large differences between the CAM5 model and ground observations over Beijing and Xianghe." We totally agree with the referee that the difference between the CAM5 model and ground observations over Beijing and Xianghe may be explained by a missing mechanism of the aqueous-phase reaction in neutralized haze

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particles, which is proved to be of critical effects on the formation of severe haze in China (Wang et al., 2016). In order to characterize the aerosol properties in China, more work needs to be done to include the aqueous-phase chemistry in the aerosol particles, as well as cloud droplets. Our improved version of the chemistry and aerosol mechanism of the CAM5 model incorporates nitrate and ammonium chemistry, which provides a basis for this further examination of the proposed missing source of aerosol in the model. Referee: "Also, the large differences between two inventories are within cities. The significant of this new inventory, instead of improving the annual mean AOD or altering the aerosol forcing, could be improving the regional air quality forecast. Overall, I agree with Referee #1 that this paper needs more analyses to better understanding the model results." We agree with the referee that the significant of the new inventory, MEIC, could improve the regional air quality forecast. Actually, MEIC has been applied to air quality models (i.e., CMAQ, Liu et al., 2010) and The advantage of MEIC emission in characterizing the seasonal variation of emission in China will show its significance in regional air quality forecast in different seasons. In addition to improve the annual mean AOD (Figure 4) and ADRE (Figure 12), the MEIC inventory has shown its advantage in modeling the seasonal variation of AOD (Figure 5) and surface concentration of primary aerosols (BC and POM, Figure 9). By introducing the nitrate and ammonium chemistry in aerosol particles, the seasonal variations of secondary aerosols (e.g., sulfate) are also expected to improve.

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