Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2020-236-RC1, 2020

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Comprehensive analyses of source sensitivities to and apportionments of $PM_{2.5}$ and ozone over Japan via multiple numerical techniques" *by* Satoru Chatani et al.

Anonymous Referee #2

Received and published: 13 May 2020

The paper by Chatani et al. is based on source sensitivities and apportionments of O3 and PM2.5 over Japan by comparing 3 numerical techniques, 4 grids, 12 source groups. The paper is well organised and written, and the overall discussion is properly articulated. Figures are clear and they are all them necessary. I have only two minor comments for the authors: Minor comments -Line 178-179. According to the simulations and statement, "The PM2.5 concentrations were underestimated in all regions. The statistics tended to be worse in eastern Japan as opposed to western Japan." If the problem with the simulation has a clear geographical gradient (W-E), and after reading the discussion is mainly due to OC and nitrate, there is a probability of missing sources/atmospheric processes from local origin. Western Japanese sites are affected

by long-range transport aerosols from other Asian countries, but Eastern sites are also affected by Japanese sources (considering a prevalent western to eastern air flow).

-Line 381-384. The authors say "If ozone transported from outside Japan is not as reduced in future, efforts to reduce precursor emissions in Japan will not effectively contribute to the reduction in the concentrations of secondary PM2.5 components because OH that originated in ozone transported from outside Japan affects their formation", which is an interesting statement. But it is hard to figure out which sources are releasing PM2.5 precursors (for example NOx, SOx or VOCs) but not releasing O3 precursors. All combustion sources are strong VOC emitters, and efforts are made/have been made to abate NOx and SOx. Of course that the efforts in reducing emissions in Japan will not counteract the arrival of steady emissions from outside, but the reduction in precursor emissions in Japan will led to a lesser formation of secondary aerosols (although not in the same proportion as the applied reduction) and will contribute to the reduction of the continental O3 background.

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