

Interactive comment on “Rapid reduction of black carbon emissions from China: evidence from 2009–2019 observations on Fukue Island, Japan” by Yugo Kanaya et al.

Anonymous Referee #3

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The manuscript uses 11-year measurements of BC at a single site downwind of China to estimate emission trends of BC in different regions of China. Meteorological variability was estimated based on the WRF-CMAQ model with fixed emissions. Although only one site is used, the 11-year-long data record has valuable information that can be used to constrain source emissions.

My main concern is on the robustness of the regional trends derived with this single site. The regional trends were estimated by sampling observations and WRF-CMAQ model outputs by the footprint of HYSPLIT trajectories (c.f. Figure 5). Neither WRF-CMAQ model nor HYSPLIT footprint was evaluated with regards to their respective

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ability to simulate interannual variability of meteorology, particularly precipitation. What is the resolution of the GDAS1 meteorology to drive HYSPLIT? The manuscript does not specify the resolution; it might be as coarse as 1 degree x 1 degree. Since the authors used two models, they should be cross-validated. For validation of the HYSPLIT footprint, the footprint for one region should be compared to WRF-CMAQ simulation with that region's emissions turned off to validate if the two methods provide consistent variability of BC at the receptor site.

For the validation of WRF-CMAQ, although the manuscript did compare WRF-CMAQ model against the EMeRGe-Asia campaign, that comparison was only for one spring season (2018) while the main use of the model was to estimate interannual variations of BC. It is the WRF-CMAQ model's ability to simulate interannual variability of meteorology that should be evaluated. For example, the manuscript should present WRF-CMAQ simulated meteorological parameters at Fukue Island with those observed, and such comparison should be done for interannual scale. If data are available, the WRF-CMAQ model's meteorology over mainland China should be evaluated too.

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