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Atmospheric Chemistry and Physics Discussions

Interactive comment on "China's Clean Air Action has suppressed unfavorable influences of climate on wintertime $PM_{2.5}$ concentrations in Beijing since 2002" *by* M. Gao et al.

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This manuscript is to understand the effect of changes in meteorology and emission on wintertime PM2.5 concentrations in Beijing. There are some concerns that need to be addressed. 1) There are more journal papers studying effect of meteorology and emissions on air quality in China. The introduction should be more comprehensive. 2) Line 85: Peral -> Pearl. 3) Did the model include dust emissions? If so, it is better to provide the information in the section 2.2. 4) Line 166: the second scenario had varying meteorological conditions and fixed anthropogenic emissions. According to my understanding, by comparing this scenario with the CTL scenario, the difference should reflect the effect of anthropogenic emissions. It is suggested to change the name of the second scenario as "Emis". 5) Section 3.1: Emission inventory, and initial

and boundary meteorological conditions, for different years varied, and thus the model performance for different years also varied. So, the difference of simulated air pollutant levels between years may not fully reflect the trend. In particular, the authors claimed that the PM2.5 in Beijing showed a decreasing trend of 1.4 μg/m3 per year. This result is within the model error magnitude and uncertainty. 6) The study used 150μg/m3 as a threshold to define a haze day. However, the model showed an overestimation of PM2.5 that would affect the simulated of haze days. 7) Line2 254-260: the results are not clear. It is claimed that the RH is a good indicator, but it is mentioned that the variability of RH2 is unlikely to be the driver of enhanced PM2.5 under changing conditions of climate. 8) Line 291: It is believed that the effect of meteorology and emissions should not be linear. The study performed two simulations (CTL and MET); however, it is worth to investigate one more simulation with change emissions and fixed meteorology to confirm the results. 9) Table 1: it is surprised that only RH2 and WS10 had a high statistical significance. It is believed BLH should also be one of the major factors that affect air quality. Also, wind direction should play an important role too. 10) Figs. 1 and 6: the aspect ratio of the maps seems to be incorrect.

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