

Atmos. Chem. Phys. Discuss., referee comment RC3  
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## Comment on acp-2021-28

Anonymous Referee #3

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Referee comment on "Separating emission and meteorological contributions to long-term PM<sub>2.5</sub> trends over eastern China during 2000–2018" by Qingyang Xiao et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-28-RC3>, 2021

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This work used a combination of machine learning model, statistical model and chemical transport model to quantify the contribution to PM<sub>2.5</sub> variation from meteorological impacts and emission changes during 2000–2018. It is indicated that although emissions dominated the long-term PM<sub>2.5</sub> trends, the meteorology-driven anomalies also played a crucial role in PM<sub>2.5</sub> trends. Overall, this manuscript is well structured and well written. I think this work well fits the scope of this journal and it is suggested to be published after addressing the following issues.

The authors emphasized the contribution of meteorology to interannual and seasonal trends of PM<sub>2.5</sub>, especially in fall and winter. Though some existing studies have conducted similar analysis, it would be more interesting to discuss the different meteorological factors in detail based on this GAM model, rather than summarizing as meteorological effects. Also, the mechanism of meteorological impact on PM<sub>2.5</sub> might be quite different in the cold and warm season. It is also worth being analyzed since that the seasonal variation of PM<sub>2.5</sub> is discussed here.

Section 2.2 Although similar methods have been applied before, it is suggested to specify and justify the methodology and parameters used in this work. Some explanation is still needed. For example, why the PM<sub>2.5</sub> concentration is correlated to wind at 500 hPa but some other work (e.g., Zhai et al., 2019) chose 850hPa.

Line 143, missing "V wind at 500 hPa"?

Section 3.1 and 3.2 are too short to be an individual section.

Line 165: delete the redundant reference "Maji et al., 2019 "

Line 209, change to "interannual variability" or "long-term trends". It needs to be checked and corrected throughout the manuscript.