

This study investigated the important impacts of the northeast Asian anomalous anticyclone (NAAA) on the intraseasonal variations of PM_{2.5} pollution in the North China Plain (NCP). The paper presents novel concepts, ideas and tools. The scientific methods and assumptions are valid and clearly outlined so that substantial conclusions are reached. The description of dataset and calculations are sufficiently complete and precise. Hence, the manuscript is recommended for publication after minor revision. Specific comments can be found as follows.

General comments:

In this study, the authors reported the air quality deterioration two day prior to the peak day of NAAA and suggested that the geopotential height anomaly and meridional wind anomaly were the main causes. However, the cause and effect between the anomalies and PM_{2.5} should be fully discussed. Because, increases in aerosols, especially absorbing aerosols, can also heat the air, leading to the atmospheric stagnation (e.g., Ding et al., 2016), and decrease the winds over the NCP (e.g., Lou et al., 2019). Therefore, the aerosol accumulation may also cause or at least intensify the dynamical or thermodynamical anomalies.

Specific comments

Title: The term “air pollution” was used throughout the text including the title. But this study only focused on PM_{2.5} pollution. It should be revised for the whole text.

Lines 16 and 21: “day -3” and day “day -1” should be made clearer.

Line 39: All sea surface temperature studies listed here are belong to ENSO impacts. It could be more accurately presented. Also, a recent study also reveal impacts of different duration of El Nino on PM_{2.5} over China (Zeng et al., 2021).

Line 43: Studies also revealed that the aerosol pollution over NCP during COVID-19 was related to NAAA, which could be included here (Ren et al., 2021).

Line 77: The PM_{2.5} data used in this study were from TAP generated using a machine learning approach and covers the period from 2000 to present. But the reanalysis data are from 1979 to present. The authors is suggested to use the long-term aerosol data for the same period as meteorological parameters in future studies (e.g., Li et al., 2021).

Line 100: What do the ‘e’ and ‘T’ mean?

Line 125: “which is conduced to the accumulation of pollutants in the NCP” should be given after “is weaker than normal”.

Line 154: Please give a short description about the wavenumbers 1-10.

References:

Ding, A. J., Huang, X., Nie, W., Sun, J. N., Kerminen, V. M., Petäjä, T., et al. (2016). Enhanced haze pollution by black carbon in megacities in China. *Geophysical Research Letters*, 43, 2873–2879. <https://doi.org/10.1002/2016GL067745>.

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Zeng, L., Yang, Y., Wang, H., Wang, J., Li, J., Ren, L., Li, H., Zhou, Y., Wang, P., and Liao, H.: Intensified modulation of winter aerosol pollution in China by El Niño with short duration, *Atmos. Chem. Phys.*, 21, 10745–10761, <https://doi.org/10.5194/acp-21-10745-2021>, 2021.

Ren, L., Yang, Y., Wang, H., Wang, P., Chen, L., Zhu, J., and Liao, H.: Aerosol transport pathways and source attribution in China during the COVID-19 outbreak, *Atmos. Chem. Phys.*, 21, 15431–15445, <https://doi.org/10.5194/acp-21-15431-2021>, 2021.

Li, H., Yang, Y., Wang, H., Li, B., Wang, P., Li, J., and Liao, H., Constructing a spatiotemporally coherent long-term PM_{2.5} concentration dataset over China during 1980–2019 using a machine learning approach, *Sci. Total Environ.*, 765, 144263, <https://doi.org/10.1016/j.scitotenv.2020.144263>, 2021.