

Interactive comment on “Dominant synoptic patterns associated with the decay process of PM_{2.5} pollution episodes around Beijing” by Xiaoyan Wang et al.

Anonymous Referee #2

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This manuscript studied the meteorological factors that contribute to the decay process of the PM_{2.5} pollution episodes in Beijing and its surrounding regions. They identified three dominant circulation types that favor the decay of high concentrations of pollutants, using the T-mode PCA analysis of geopotential height and horizontal winds during the selected PM_{2.5} decay days. The topic aligns well with the scope of the journal. The manuscript is well-written with minor corrections of some sentences as indicated below. The method is robust and conclusions are well supported by data and results. My only suggestion is adding discussions about the importance of the study in the context of air quality as well as caveats at the end of this manuscript.

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1. Lines 28–30, “the same three circulation types (CTs)...” does not make sense, cause only two CTs were mentioned before.
2. In Abstract, it's better to define CT1, CT2, and CT3 first and then discuss their impacts on PM_{2.5} decay processes.
3. Line 130, it should be “in a specific region,”
4. Line 208, delete “of”.
5. How a dry day is defined? Is it defined for each grid cell or for the entire study domain? Is it defined as a day with zero precipitation or with precipitation less than a threshold? What precipitation data were used?
6. Line 211, should be “a specific year”.
7. Figure 8, the four variables in each circulation type and each season should be tested to see if they are statistically different from the corresponding seasonal means. The variables that past the significant test should be highlighted in the figure and described in the text.
8. Figure 13, the method to estimate the linear trend should be mentioned and corresponding p values or uncertainties of these trends should be included.
9. Figure 5 gives similar information to Figure 6, and may be moved to supplementary document.
10. Figure 1 can be modified to add topography information as shadings, since topography is also an important factor that influences the dilution of the pollutants.
11. Figure 2 can be improved by showing the mean across the 28 cities with shadings indicating the range of PM_{2.5}. The current figure is a little noisy to observe the sharp decay process.
12. It is interesting to show the corresponding time series (i.e., principle components)

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of each circulation type in Figure 5 and to check if there are any temporal trends. If there are trends, then the decreasing trends in Figure 13 can be partially attributed to circulation changes besides emission changes.

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