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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Effects of atmospheric circulations on the interannual variation in $PM_{2.5}$ concentrations over the Beijing-Tianjin-Hebei region in 2013–2018" *by* Xiaoyan Wang and Renhe Zhang

Anonymous Referee #1

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Review of "Effects of atmospheric circulations on the interannual variation in PM2.5 concentrations over the Beijing-Tianjing-Hebei region in 2013-2018" by Wang and Zhang (MS ID#ACP-2020-198)

This study was aimed to explore the possible contribution of atmospheric circulation anomaly on the interannual variation of winter PM2.5 over northern China. Six dominate synoptic circulation types that favorable and unfavorable for the PM2.5 diffusion are revealed, which is interesting and quite important for us. Furthermore, the authors revealed that there is approximately 76.5% of the observed decrease in PM2.5 concen-

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Discussion paper

trations in 2017 over BTH could be attributed to the improvement of the atmospheric diffusion conditions. This paper is well written and organized, and there is no big flaw. I recommend it to be published in ACP after several minor corrections.

1. In this study, the authors have explored that there is approximately 76.5% of the observed decrease in PM2.5 could be attributed to the improvement of the atmospheric diffusion conditions. That is, the contribution of effect of atmospheric anomaly exceeded 70%, which presented far larger than that from the early studies and also confused me. As description in Introduction, the effect of atmospheric anomaly was just accounting for about 5% or 12%. Is there any idea about this large difference? Moreover, the additional discussion about the uncertainty of the evaluated contribution should be added. Is it related to the large bias of the WRF-CHEM model? 2. The winter season should be highlighted in the abstract. 3. More detailed introduction about the rotated T-mode PCA method was suggested. 4. The synoptic types of CT1 and CT2 is favorable for the air pollution divergence, while CT3-CT6 is unfavorable. CT3-CT6 can account for 56% of the weather types. How about it from the WRF-CHEM model? 5. How about the atmospheric circulation patterns in year 2016? The PM2.5 in this year was recovered and higher than the other years. How large contribution of the atmospheric circulation effect in your mind? Or the high PM2.5 is mainly sourced from the emission.

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