

Atmos. Chem. Phys. Discuss., referee comment RC1
<https://doi.org/10.5194/acp-2021-166-RC1>, 2021
© Author(s) 2021. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on acp-2021-166

Anonymous Referee #1

Referee comment on "Intensified modulation of winter aerosol pollution in China by El Niño with short duration" by Liangying Zeng et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-166-RC1>, 2021

This study investigated the different impacts of short duration (SD) and long duration (LD) El Niño on the aerosol pollution in China. The authors found that SD El Niño exerts more significant influences on the PM_{2.5} concentrations in winter, which increase in northeastern and southern China and decrease in central-eastern China. The anomalous atmospheric circulation induced by SD El Niño is the dominant reason for PM_{2.5} concentration changes. These findings are interesting and useful to air quality prediction and improvement. The logic of this article is good. However, there are some major concerns about the physical mechanism that I doubt. The comments below that I expect are helpful for improving the manuscript.

Major comments:

- The anomalous atmospheric circulation induced by El Niño plays a vital role in changing the PM_{2.5} concentration distribution. The authors should give the observed atmospheric circulation conditions induced by SD and LD El Niño using the reanalysis data. Then, the authors can compare the observed atmospheric circulation with the simulated circulation, and can further evaluate whether the model simulates a reasonable atmospheric circulation. This check is very important, because atmospheric circulation induced by El Niño determines the conclusion of this study.
- It is known that the anticyclone over the western North Pacific is the key atmospheric circulation system that El Niño exerts its impact on East Asia. Certainly, the southeasterly winds on the western side of this anticyclone lead to increase of the PM_{2.5} concentration. However, the authors reported that the decrease of the PM_{2.5} concentration in central-eastern China is attributed to the anomalous northerly winds of the cyclone over the East China Sea (Figure 7a). This anomalous cyclone is rarely reported. I doubt whether this anomalous cyclone indeed exists in observation, or it only appears in simulation? So, I suggest the authors should check the observational circulation condition using the reanalysis data to verify the simulated result.

Minor comments:

- Please pay attention to the singular and plural in English grammar, for example:

Line 45, "have" should be changed into "has"

Line 77, "have" should be changed into "has"

Line 170, "is" should be changed into "are"

Line 188, "are" should be changed into "is"

- Line 172-176, please rewrite this sentence
- Line 191, plus "anomaly" after "SST"