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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A seesaw haze pollution in North China modulated by sub-seasonal variability of atmospheric circulation" *by* Ge Zhang et al.

Anonymous Referee #2

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This paper analyzes a specific haze event in North China, which features high and low PM2.5 concentrations in adjacent two months (December 2015 and January 2016). The seesaw pattern is modulated by circulation patterns related to a super El Nino event and a phase change of the Arctic Oscillation from positive to negative. This is supported by both observations and model results. The authors also conduct some additional model simulations and show similar seesaw features of PM2.5 concentrations during other super El Nino periods (1997-1998 and 1982-1983). The manuscript is scientifically correct and the results are well laid out. My major concern is that the role of removal in affecting PM2.5 concentrations is neglected in the manuscript. There are some points that I hope the authors could discuss or clarify in the revision.

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Specific comments:

1. The removal of PM2.5, such as wet and dry deposition, is not discussed in the paper. How are these processes represented in the model? Could they also play a role in the seesaw pattern of PM2.5 concentrations?

2. I wonder why the authors compare the difference between anomalies of PM2.5 concentrations rather than the difference between absolute values throughout the paper (except for Fig.7 if I understand it correctly)? I don't think the conclusion would change much if absolute values were used. If the authors decide to use anomalies, some description or figures of climatological values might be helpful.

3. A more detailed discussion on Fig. 10, in the main text or in the caption, would be helpful. Currently it is not very clear what those arrows in Fig. 10 indicate.

Technical corrections:

1. The unit for wind vector in Fig.3 and Fig. 4 is missing.

2. It might be helpful to show the NCP box in the figures of meteorological conditions (e.g., Figs. 3,4,5) as well.

3. Lines 254-271: In this paragraph, (Fig. 5, Fig. 6) should be (Fig. 4, Fig. 5). Fig. 5 may seem somewhat redundant, as near surface wind anomaly has similar pattern as 850 hPa wind anomaly and does not seem to provide additional information.

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