

Atmos. Chem. Phys. Discuss., referee comment RC1
<https://doi.org/10.5194/acp-2020-1140-RC1>, 2021
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Comment on acp-2020-1140

Anonymous Referee #1

Referee comment on ""Warm cover": precursory strong signals for haze pollution hidden in the middle troposphere" by Xiangde Xu et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-1140-RC1>, 2021

This work proposed that abnormal 'warm cover' in the middle troposphere could suppress the convection and diffusion in the boundary layer, leading to haze pollution in Eastern China. It is also indicated that such 'warm cover' is attributed to the warming of the Tibetan Plateau. I think this work well fits the scope of this journal. Overall, this manuscript is well structured but needs more in-depth analysis to further improve this article. Besides, the writing needs to be polished. It is worth being published after addressing the following issues.

Major comments

The introduction is too simple and is not sufficient to clearly demonstrate the background and scientific significance of this work. Pre-existing literature on this subject is suggested to be fully reviewed, and a comprehensive introduction ought to be provided in this part.

The Great Smog of London in 1952 is one of the most well-known air pollution events across the world. Comparatively speaking, the haze in the North China Plain in February 2014 is not that "eye-catching". Why chose this pollution episode for comparison? 2013 Beijing Haze has drawn more attention from both scientific research and public concern.

It is plausible that 'Warm Cover' may intensify the haze pollution in Eastern China, theoretically. However, as mentioned by the authors, the thermodynamical structure is closely related to circulation, which can significantly influence the regional transport/ventilation of air pollutants. It needs to be clarified whether the anomalous

circulation or thermodynamical structure (ABL height decrease) is the main cause of haze pollution. This work only provides correlation and cross-sections of temperature anomalies and PM2.5 concentration, both of which are a little too descriptive. More in-depth discussion and some quantitative analysis are suggested to be provided.

The writing needs to be polished by language editing to improve the overall readability.

Minor comments

Line 26: "In addition to"

Line 43: Delete "with excessive concentrations of PM2. 5"

Line 87: the North China Plain. Please check it throughout the manuscript.

Line 88-89: Change to "for the long-lasting and heavy haze pollution". This statement needs to be rephrased. "sulfur-dioxide pollutants" is not appropriate.

Line 98: What do you mean by "long heavy air pollution "?

The labels in the contour plot in Fig.3-4 are overlaid and need to be optimized.

All the abbreviations should be defined for the first time. Please check throughout the article.