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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The Strengthening Relationship between Eurasian Snow Cover and December Haze Days in Central North China after the Mid-1990s" *by* Zhicong Yin and Huijun Wang

Anonymous Referee #1

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In this study, the authors examined relationship between the snow cover over East Europe and West Siberia (SCES) and the number of haze days in December in central North China (DHDCNC). They found changes in SCES can contribute to DHDCNC through influencing soil moisture and land surface radiation during 1998–2016 but the effects are negligible during 1979–1997. This work is interesting and merits publication after following comments addressed.

General Comments:

The authors explained how changes in soil moisture and radiation lead to the atmospheric circulations worsening dispersion conditions. There are a lot of meteorological

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Discussion paper

fields and effects including in the mechanism. It is better to add a diagram illustrating all the effects.

The authors examined the relationships of SCES and DHDCNC based on the analysis of correlation coefficient. So one question raises, is it possible that they are independent but covary with each other driven by other factors (e.g., climate change).

The author mentioned Eurasian snow cover has been increasing over the last two decades (Cohen et al. 2012). What is the mechanism for the increasing SCES. In addition, based on the positive correlation coefficient between SCES and DHDCNC, does that mean the increasing snow cover in Eurasia lead to the increasing aerosol pollution in Chine during recent decades? If so, it is more interesting and the authors may discuss more about it.

Specific comments:

Line 26: typo '/'.

Line 29: Recent studies found, in additions to emissions and climate change, aerosol-meteorology feedbacks have contributed the haze in China (e.g., Ding et al., 2016; Yang et al., 2017a).

Line 37: Besides to less ventilation, transport of aerosols from upwind can also lead to regional aerosol pollution (e.g., Yang et al., 2017b).

Line 124: How can surface upward motion appears in a sinking motion atmosphere. Upward motion sometimes means non-stagnation and strong dispersion. How can it accumulate aerosols?

Line 166: Why the "west wet-east dry" pattern leads to poor dispersion conditions?

Line 172: What is the direction for positive longwave and shortwave radiation defined in this study? Also, the authors should make clear that they are the surface net radiative fluxes.

References

Ding, A. J., X. Huang, W. Nie, J. N. Sun, V.-M. Kerminen, T. Petäjä, H. Su, Y. F. Cheng, X.-Q. Yang, M. H. Wang, et al. (2016), Enhanced haze pollution by black carbon in megacities in China, Geophys. Res. Lett., 43, 2873–2879, doi: 10.1002/2016GL067745.

Yang, Y., L. M. Russell, S. Lou, H. Liao, J. Guo, Y. Liu, B. Singh, and S. J. Ghan, Dust-wind interactions can intensify aerosol pollution over eastern China, Nat. Commun., 8, 15333, doi:10.1038/ncomms15333, 2017a.

Yang, Y., Wang, H., Smith, S. J., Ma, P.-L., and Rasch, P. J.: Source attribution of black carbon and its direct radiative forcing in China, Atmos. Chem. Phys., 17, 4319-4336, https://doi.org/10.5194/acp-17-4319-2017, 2017b.

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