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Comment on acp-2021-436

Anonymous Referee #2

Referee comment on "Comparison of the influence of two types of cold surge on haze dispersion in eastern China" by Shiyue Zhang et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-436-RC2>, 2021

The influence of blocking and wave-train cold surges (CSs) on haze dispersion over eastern China is investigated in this study. The blocking CSs have relative weaker ability to remove the haze compared with the wave-train CSs. The topic aligns well with the scope of ACP. The manuscript is well-written with minor corrections of some comments.

- The observed atmospheric visibility and relative humidity dataset are used to defined the occurrence of haze days in this study, with the threshold of 10 km visibility. However, the visibility observation in China was switched from manual observation to high temporal resolution automated observation since the year of 2013-2014. There are some systematic biases between manual and automated observation. And 7.5 Km automated observed visibility is suggested as the occurrence of haze. I would suggest re-defined the case of haze using different thresholds before and after the automated observation.
- Three criteria are involved to select the CSs in lines 102-106. The quantitative thresholds of SLP and temperature drop need detailed reference.
- Some detailed data processing is suggested to add for Fig 5-6. What does those lines mean? Are they regional average over the EC (dotted box in Fig 1) or just the grids average where haze occurred?
- According to the definition of haze coving the information of visibility and relative humidity (RH) in this study, the time series of visibility and RH are discussed in Fig.5. However, except the haze definition, RH also has significant effects on the hygroscopic growth of particles, which will change the mass concentration of aerosols and in turn the visibility (doi:1029/2018JD029269). Therefore, RH usually shows negative correlation with the observed visibility as shown in Fig. 5. RH is an important factor dominating the variation of air quality in some situations. Thus, the spatial variations of RH before and after CSs are suggested to involved to explain the variation of haze over EC.

