Dear Editor and Referees,

We thank for the important comments and suggestions on our manuscript. Our responses are in red and the changes we made in the manuscript are highlighted.

Reviewer 1:

I thank the author for their clear responses which have remove my previous concern as well as the concerns raise by reviewer 1 (to my opinion). For me the manuscript is ready to be published as it is with only one small technical correction.

Figure 1 a, the sea now seems to be all other China. It would be easier if the author could change the elevation color to clarify this. For example by taking a color scale using color from Green at 0 m asl up to brown in the mountain and only keep blue color for the sea/river.

We thank the reviewer for this suggestion, and we have modified Fig. 1a according to the reviewer's advice.

Fig. 1. Experimental site descriptions. (a) The location of the experimental site and central Being, marked with black and red star respectively, where the color bar denotes the terrian height and blue denotes the sea. (b) the monthly BC emission inventory in China (Li et al., 2017). (c) Schematic illustration for different types of PBL defined in this study. (d) Photo of the mountain station.

Reviewer 2:

The authors have revised the manuscript thoroughly and I would suggest accepting it for publication after addressing the below minor concern.

To extend the potential radiative implication of the study, I would suggest to substantiate your results with the recently published article by Srivastava et al., (Atm. Environ., 2020).

Srivastava, A. K., et al. Implications of different aerosol species to direct radiative forcing and atmospheric heating rate. Atmospheric Environment, 241, 117820, 2020.

We thank the reviewer for this suggestion, and we have added this in our revised manuscript.

The single-scattering albedo at λ=550nm (SSA_{550}) in winter was systematically lower for all PBL types (Fig. 6 c-d and Fig. S4), lowered by 0.06, 0.05 and 0.08 than summer for diluted, neutral and polluted PBL, respectively. The decreased SSA_{550} was in line with the increased BC mass faction (Fig. 3), and also influenced by the absorbing efficiency, as it was reported that the SSA of elemental carbon (EC) particles was as low as 0.25 (Srivastava et al., 2020). Line 264-265

Li, M., Zhang, Q., Kurokawa, J.-i., Woo, J.-H., He, K., Lu, Z., Ohara, T., Song, Y., Streets, D. G., Carmichael, G. R., Cheng, Y., Hong, C., Huo, H., Jiang, X., Kang, S., Liu, F., Su, H., and Zheng, B.: MIX: a mosaic Asian anthropogenic emission inventory under the international collaboration framework of the MICS-Asia and HTAP, Atmospheric Chemistry and Physics, 17, 935-963, 10.5194/acp-17-935-2017, 2017.

Srivastava, A. K., Mehrotra, B. J., Singh, A., Singh, V., Bisht, D. S., Tiwari, S., and Srivastava, M. K.: Implications of different aerosol species to direct radiative forcing and atmospheric heating rate, Atmospheric Environment, 241, 117820, https://doi.org/10.1016/j.atmosenv.2020.117820, 2020.