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Comment on acp-2021-339

Anonymous Referee #1

Referee comment on "A black carbon peak and its sources in the free troposphere of Beijing induced by cyclone lifting and transport from central China" by Zhenbin Wang et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-339-RC2>, 2021

In this manuscript, A BC-tagged method in WRF-Chem model was used to investigate the origins of BC peaks at the altitude of 4km in Beijing, China. It is important to better evaluate the radiative effect of aerosols and its effect on boundary layer in polluted regions. I would recommend publishing in ACP after addressing the following comments.

1. Meteorological and chemical observations in Beijing was used to evaluate the model performance. It is not enough for evaluation on regional transport. More observations in North China are needed, particularly, HN, SX (source regions).
2. Usually, high BC is related to impact of biomass burning because these emissions are easily lifted to high altitudes in high temperature without atmospheric dynamic uplifting. I suggested that authors investigate the impact of biomass burning in this study. At least, fire counts from satellites.
3. Section 3.2.1 more dynamic conditions are suggested to conduct. For example, the convergence of BC/PM_{2.5} at different altitudes in each phase of this episode. It's better to provide a comprehensive dynamic driving forces of regional transport.
4. 3.3.1 what is the input data of HYSPLIT?
5. Line 169 China central seems to be central China.