Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2020-762-RC1, 2020
© Author(s) 2020. This work is distributed under
the Creative Commons Attribution 4.0 License.

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Optical and hygroscopic properties of black carbon influenced by particle microphysics at the top of anthropogenically polluted boundary layer" *by* Shuo Ding et al.

Anonymous Referee #1

Received and published: 19 October 2020

General Comments: The manuscript (#acp-2020-762) entitled "Optical and hygroscopic properties of black carbon influenced by particle microphysics at the top of anthropogenically polluted boundary layer" by Ding et al presents detailed aerosol optical characteristics and hygroscopic nature of coated BC. The study seems to be interesting but the data length is too short. Also, the study lacks with the major implications. Thus, I recommend this paper for the "major revision", which needs to be revised as per the comments and suggestions given below. Specific Comments: 1. Line 13, Why summer MACBC is higher than the winter, if BC mass concentration is found to be relatively higher in winter than in summer? 2. In the "Introduction" and "Results and Discussion" sections, please include some comparisons and citations over various global regions

Printer-friendly version

Discussion paper

when analyzing the results of monthly and seasonal changes of BC optical characteristics, such as: Raju M. P. et al., Black carbon aerosols over a high altitude station, Mahabaleshwar: Radiative forcing and source apportionment. Atmospheric Pollution Research, 11, 1408-1417, 2020. Srivastava, A. K., S. Singh, P. Pant and U. C. Dumka: Characteristics of black carbon over Delhi and Manora Peak-a comparative study. Atmospheric Science Letters, 13, 223–230, 2012. Srivastava, A. K., D. S. Bisht, K. Ram, S. Tiwari and M. K. Srivastava: Characterization of carbonaceous aerosols over Delhi in Ganga basin: Seasonal variability and possible sources. Environmental Science and Pollution Research, 21, 8610-8619, 2014. Govardhan G., et al., Possible climatic implications of high-altitude black carbon emissions. Atmos. Chem. Phys., 17, 9623–9644, 2017. Vijayakumar S. Nair, S. Suresh Babu, K. Krishna Moorthy, Arun Kumar Sharma, Angela Marinoni & Ajai (2013) Black carbon aerosols over the Himalayas: direct and surface albedo forcing. Tellus B: Chemical and Physical Meteorology, 65:1, 19738, DOI: 10.3402/ tellusb.v65i0.19738. 3. Line 52-53, It is mentioned here that the study is done for the first time. However, several studies on BC microphysics have been published for mountain sites (few references are mentioned above). I would suggest to discuss and mention earlier studies. 4. The reported data length is too short. I would strongly suggest to include more possible data set to strongly support your findings. 5. Line 83, BC is highly absorbing in nature. How estimation of scattering cross-section of BC would be useful? 6. Line 159, why BC is high in winter as compared to summer when the station is found to be below the PBL? What are the major sources and how it reaches to the study site? 7. What are the uncertainties in the observed hygroscopic properties of BC as the pure BC is highly non-hygroscopic in nature? 8. It is not clear here that which type of particle coating is considered? How such coating or mixing state of particles with BC affects the overall atmospheric radiative characteristics? I would suggest to go through the paper by P. Srivastava et al., (Atmos. Res, 2018) and discuss a comparison accordingly. Srivastava, P., S. Dey, A. K. Srivastava, S. Singh, S. Tiwari: Most probable mixing state of aerosols in Delhi NCR, Northern India. Atmospheric Research, 200, 88-96, 2018.

Printer-friendly version

Discussion paper

CC BY

9. In Figures 6 and 7, how mass concentration of PM1 was obtained? Please discuss in detail.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2020-762, 2020.

CC BY