

## ***Interactive comment on “Wintertime radiative effects of black carbon (BC) over Indo-Gangetic Plain as modelled with new BC emission inventories in CHIMERE” by Sanhita Ghosh et al.***

**Anonymous Referee #2**

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Wintertime radiative effects of black carbon (BC) over Indo-Gangetic Plain as modelled with new BC emission inventories in CHIMERE. This manuscript discussed the radiative perturbation due to black carbon (BC) with modelled BC distribution in a high resolution ( $0.1 \times 0.1$ ) chemical transport model, CHIMERE over Indo Gangetic plain (IGP) during winter period when pollution level load in high amounts. They performed multiple BC transport simulations with CHIMERE and put into practice with new BC emission inventories, which included the recently estimated India-based constrained BC emissions and the latest bottom-up BC emissions (India-based: Speciated Multi-pollutant Generator (Smog-India), and global: Coupled Model Inter comparison Project phase 6 (CMIP6), Emission Database for Global Atmospheric Research-V4 (EDGAR-V4) and

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Peking University BC Inventory (PKU)). Aerosol optical depth due to BC (BC-AOD) and its fractional contribution to total AOD are also highlighted in the study. The paper is well written and straightforward. Therefore, I recommend the manuscript for publication after some changes have been taken into account. 1. In the Abstract more quantitative information should be included 2. It would be good, if authors can include more about emission estimation of BC at global and India level with uncertainty in the introduction section which will be useful for the readers. Authors may follow these references Bounding the role of black carbon in the climate system: a scientific assessment. J. Geophys. Res., 118 (2013), pp. 5380-5552, 10.1002/jgrd.50171. Residential bio-fuels in south Asia: carbonaceous aerosol emissions and climate impacts Science, 307 (2005), pp. 1454-1456 Line 30: Authors may relate this sentence with CO<sub>2</sub> in terms of warming. 3. Line 290-293: Accumulation is the only cause of leading values or night time heavy transport vehicles emissions may be another reason. Please discuss it. 4. Line 315-319; what is cause for the lower values of BC at high altitude. Is there no impact of transport of air masses? Please explain it in detail. 5. Figure 3(f-g); Delhi and Kolkata are megacities but BC measured high in Delhi during the day time and low in Kolkata for the same period. Why? Please elaborate. 6. The captions are too long of most of the figures. If possible, please short it to better readability. 7. At few places' sentences are bit long and complex so these long sentences should be broken into small sentences which will be helpful for readers 8. Though authors have discussed their findings but still I feel more discussion about BC concentrations over IGP region. 9. The conclusion section should be short and crispy for better readability.

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