

Interactive comment on “Air-borne in-situ measurements of aerosol size distributions and BC across the IGP during SWAAMI” by Mukunda Madhab Gogoi et al.

Anonymous Referee #2

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The manuscript describes measurements of vertical profiles of size resolved number concentrations using an aerodynamic particle sizer and BC derived from a 7 channel aethalometer from three different going from west to east in the Indo Gangetic Plain (IGP). Measurements were made during an experiment named SWAAMI and the results from this experiment were discussed earlier in a couple of publications (Vaishya et al., 2018; and Govardhan et al., 2019) and probably others. There is a lack of vertical profile data of aerosols over the Indian sub-continent and in particular during the pre-monsoon season when the radiative balance over India and surrounding regions plays large role in driving the monsoon circulation. In that sense this paper is a welcome addition. However, the manuscript feels like the authors have tried to slice and dice

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the data in different ways but in the end doesn't seem to add anything new. It may be useful as a document of the data/analysis and I accept the paper with that view, though it often reads like a report than a research paper. The description of the dataset and the outcomes of the analysis is reasonable and there is not a lot that can be said in terms of any technical shortcomings of the arguments presented. I have a few specific comments: Line 462: The authors mention 'soot' emissions as of importance from thermal power plants. I generally assume this is primary fly ash and other suspended particulate matter (heavy metal containing particles). They seem to suggest there is soot and SPM and I am not sure what the distinction is? Line 466: seems to suggest soot is BC. Are there any measurements in the power plant plumes to suggest that BC is a major emission from burning coal in power plants? I haven't come across this in discussions of power plant emissions elsewhere.

Figure 13: The figure shows the large fraction of the measurements with angstrom absorption exponents over values of 1 with median values of 1.3 and significant fraction near 1.5 and over. The authors say this is all fossil fuel emissions. Shouldn't these values of the angstrom absorption coefficient put these in the biomass burning and probably BrC range? Generally what fraction of the absorbing material measured using the technique used here fall in the BrC range as compared to BC?

Figure 11: Either labels on the figure (namely figure (a) and figure(b)) or the title of the figure is either wrong or not clear

Figure 9: The focus of the figure is on values less than 0.3, the scale has just one color below that. It will be better if the color scale is recalibrated and plotted with the scale going from 0 to 0.5.

Line 290: The temperature in the western most location is said to be 40 C. This should make this location have the deepest ABL and is not consistent with the description of ABL depths in lines 238:243

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