Seasonal Contrast in the Vertical Structure of Aerosol Black Carbon over Indian Region and Its Implications: Results from ICARB

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Extensive aircraft measurements were made as part of Integrated Campaign for Aerosol gases and Radiation Budget (ICARB) experiments of Indian Space Research Organization – Geosphere Biosphere Program (ISRO-GBP) over Indian region during pre-monsoon (March to April, 2006) and winter (December-January, 2008-2009) seasons. These campaigns aim at understanding the spatio-temporal heterogeneities in the vertical structure of aerosol Black Carbon (BC) over Indian regions and its implications. During pre-monsoon season, the structure of the deduced BC vertical profiles (in the altitude range of 0 – 3000 m AGL) over east and west coasts significantly deviates from the general understanding that aerosol abundance decrease with altitude, instead BC values were steady in the altitudinal range of investigation. A completely contrasting structure is seen in the wintertime profiles, where BC values decreasing with increasing altitude. Back trajectory analysis reveals that, during pre-monsoon, over east coast of India, airmass pathways from the western landmass significantly contribute the BC concentration above the atmospheric boundary layer. Notwithstanding the seasonal behavior in the structure of vertical profiles, our investigations reveal that the abundance of black carbon over east coast is 2 to 3 times higher than that of west coast even at elevated altitudes. The gradients of the profiles are parameterized with best-fit analytical functions. More details and implications will be presented and discussed.