Temporal Variations of Black Carbon Aerosols and Estimation of the Effect of Long-range Transport on Seasonal Variations Over High Altitude, Hilly Station Shillong (Umiam), North East India for the Period of August 2006 to August 2009

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Diurnal, seasonal and annual variations of Black carbon (BC) aerosols concentration measured by Aethalometer (AE 42-7-ER-MC) at seven channels in the UV to near IR regions at the high altitude, hilly and semi-urban location Shillong (Umiam), North East India from August 2006 to August 2009 are investigated. BC concentration is minimum before sunrise and shows a morning enhancement after the sunrise (05:00-09:00 LT) to reach a level of $\sim 12 \ \mu g/m^3$ and then falls to a daytime (10:00–14:00 LT) average of $\sim 3.5 \ \mu g/m^3$. Morning enhancement is more pronounced in the winter periods for all the observational years. BC concentration varies between $\sim 4 \text{ µg/m}^3$ to $\sim 12 \text{ µg/m}^3$ during nighttime (20:00-04:00 LT). Also the present study reveals the seasonal variations with the low value of BC concentration in the monsoon period and high values in the winter respectively. Average value of BC is $\sim 9\pm2 \ \mu g/m^3$ and $\sim 2.5\pm1 \ \mu g/m^3$ during winter and monsoon respectively. Back trajectory analysis at 1500m and 3000m AGL has been done using NOAA Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) Model to understand the effect of long-range transport on seasonal variations of BC aerosols over the observation site. It indicates that the contribution was predominantly from SE/S as well as NW/W sector during the premonsoon season and from the NW/W land mass sector during the winter and the postmonsoon at all the two levels. During monsoon transportation is mostly from the SW/S marine sector across middle India.

Keyword: Black Carbon (BC), Temporal, Hilly station, long-range transport