Carbonaceous Aerosols in Foggy Days During Episodic Fireworks Event

*Pallavi Saxena¹, Umesh Kulshrestha¹

1. Jawaharlal Nehru Univ.

The present study deals with the variation of organic carbon (OC) and elemental carbon (EC) on foggy days during fireworks of Diwali festival in New Delhi. The samples were collected at different selected sites viz. JNU (dense vegetative), VN (residential) and AN (industrial) in Delhi, India. In this study, average OC and EC concentrations were found to be higher at VN i.e. 99.24 μ g/m³ and 24.31 μ g/m³ respectively as compared to AN (90.93 and 19.85 μ g/m³ respectively) and JNU (19.59 and 5.55 μ g/m³ respectively) indicating more influence of burning of fireworks during Diwali and also relatively dense populated area which favours more vehicle density as compared to rest of the sites. EC concentrations were found to be OC/EC ratios found to be 2.69, 3.85 and 4.16 in case of Pre-Diwali days, 3.30, 4.06 and 4.80 in case of Diwali and 2.33, 3.87 and 4.21 in case of Post Diwali days respectively at sites JNU, VN and AN. These ratios clearly indicate that during sampling period (covering in and around Diwali) at VN and AN sites, sufficient formation of SOA is favoured. Another reason can be, the sampling period month is November which is pre-existing winter month that involves wood burning and ultimately increase emission of volatile secondary organic compounds which condensed to form aerosols under low temperature. In addition to that, fog is also a triggering factor which occurs during winter and recorded in all days of sampling period that would increase the SOA formation and favours gas-to-particle conversion mechanisms and ultimately adsorb gaseous pollutants. Another interesting finding is that high concentrations of OC and EC were found during Diwali period but gradually declined during Post Diwali periods at all the sites. High amount of charcoal used in crackers might be the reason for high EC especially during Diwali day, but, gradually the concentrations of carbonaceous aerosols goes down during Post Diwali period because fog is a factor which act as scavenger and during Diwali, fog was observed but it doesn't affect the chemistry of carbonaceous aerosols because fresh emission from local sources like firework activities, are generally less hydrophilic, but after 2-3 days of fresh emissions, these particles become aged particles and fog can scavenge them and gradually long-lived species would give rise to the formation of SOA. In comparison to OC, EC has relatively shown less decline because due to thick coatings and less soluble properties, it scavenge less as compared to OC. Hence, fog play a significant role as a scavenger which can reduce the concentration of OC and EC with respect to freshly emitted and aged particles.

Keywords: OC, EC, Fireworks, Foggy Days, Delhi, Diwali