518/E1

Identification of Sources of Atmospheric Aerosol (PM 2.5) in Urban Areas in Colombo

Shirani Seneviratne,[1*] V A Waduge,[a] S Sanjeewani,[1] Thilaka Attanayake,[1] & Nuwan Jayaratne[2]
[1]*Life Science Division, Atomic Energy Authoirty, Wellampitiya*
[2]*Environmental Monitoring Division, "Parisara piyasa", Battaramula*

Due to the increased use of vehicles and other human activities in Colombo and its suburbs, long term monitoring of particulate in air at fixed sites was conducted in 2000 and 2003. The specific objectives were to measure the elemental composition of coarse and fine air particulates, to identify the trend of pollution, to identify the main polluting sources and to quantify the source contribution using statistical tools.

Samples of air borne particulate matter (PM) in the 2.5 -10 μm size range (PM2.5 and PM10) were collected using a "Gent" PM 10 stacked filter sampler from two urban areas in Colombo i.e. the Air Quality Monitoring station (AQM) of the Central Environmental Authority (CEA) for the period May 2000 to August 2006 and the Atomic Energy Authority (AEA) Orugodawatta from May 2003 to December 2006. The samples were collected every 24 hrs on weekdays with a flow rate - 18-15 lpm in the sampler. The coarse and fine filter samples were analyzed for 18 elements by ED-XRF.

The measured range of annual averages of PM 10, PM 2.5 and BC at AQM station during 2000-2006 were (100-50), (32-16) and (15-8) $\mu g/m^3$ respectively. Sulfur is a dominant element in fine particles and S in fine particles at AQM and AEA sites ranges from 0.0007 ± 0.0001 to 3.6 ±0.1 and 0.0001± 0.00005 to 2 ±. 0.4, respectively.

The fine fraction data set including Black Carbon and major elements (Na ,Mg, Al, Si, Cl, Fe , Zn , Ni, Cu, V, S, Br, Pb Cr, K ,Ca and Ti) analyzed by EPA-PMF (positive matrix factorization) technique to explore the possible sources of atmospheric aerosols in the two study sites revealed five factors for elemental composition in both sites. The sources common for both sites are vehicular emissions, sea salt and secondary sulfate. AQM also had a mixed source with soil mixed with cement characterized elements and domestic metal processing, while AEA had soil dust**.**