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A statistical evaluation of aerosol data collected from Colombo city limits

This study reports a statistical analysis of elemental concentration in air particulate matter carried out in an attempt to identify the major sources of airborne elemental pollutants. Elemental concentration levels in 75 sets of air filters collected in a Gent PM 10 air sampler during 1996 was used for this study.

The finger print for each of the various sources of air particulates can be determined by a statistical analysis of elemental variations of the filters. Each air filter can have a mix of air particulates from different possible sources. A statistical package, such as Statgraphics, can perform factor analysis or principal component analysis to determine the grouping of elements which makes up each finger print processed. Varimax rotated factor analysis was applied to the PM 2.5(fine particulate) data. The analysis distinguish four factor loadings for each element. Major sources related to three factors can be identified. They are 1) soil dust/resuspended soil having crustal elements such as Ca, Fe, K,Si,Zn and some Al,2) motor vehicular emissions with Pb and S, 3) paint fumes where loading of Ti was observed. The source for the fourth factor which had a high loading for Ni was not identified.