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PM_{10} and $PM_{2.5}$ particles loading over semi-arid urban environment in India

K. MADHAVI LATHA[1] and K.V.S. BADARINATH[1]
[1]*Forestry & Ecology Division, National Remote Sensing Agency*

Aerosol optical properties are one of the important global geophysical variables required in climate modeling studies. The largest variability and uncertainty in estimates of the effects of atmospheric aerosols on climate is their particle size distribution. The highest non-uniform spatial and temporal distribution of tropospheric aerosols on global scale is owing to their diverse sources, chemical compositions and lifetimes require more measurements for aerosol quantification. The extent of airborne particles penetrate into the human respiratory system is determined mainly by their size with possible health effects. The research over the scientific evidence of airborne particles to adverse health effects has been intensified in the recent years. In the present study Particulate matter (PM), PM_{10} and $PM_{2.5}$ have been analysed using Quartz Crystal Microbalance (QCM) impactor and black carbon aerosols using Aethalometer for the period of January to December over the semi-arid urban environment of Hyderabad, India. The diurnal variation of PM, PM_{10} and $PM_{2.5}$ shows a primary peak at 03:00LT and then secondary peak at 10:00 LT followed by a nocturnal peak at 20:00LT. Seasonal variations of PM, PM_{10} and $PM_{2.5}$ suggests that the concentrations are observed to be maximum during winter and minimum during monsoon. Average values of PM_{10} and $PM_{2.5}$ concentrations have been found to be around 26 and 18μgm^{-3} under ambient conditions over the study area. The results suggests that the PM_{10} concentrations are well below the standards set by several environmental agencies where as $PM_{2.5}$ concentrations appears to be quite critical over the study area. Total aerosol mass concentration showed positive correlation with air temperature and wind speed. Aerosol mass size distribution showed possibly a multi-modal size distribution over the study area. The average share of BC to the total mass concentration has been observed to be 15% during January to December. The results are discussed in detail in the paper.

Keywords: Aerosol Mass loading, Aerosol Size distribution, Black Carbon, PM_{10} and $PM_{2.5}$