

Characterization and regional transport of PM_{2.5} in different Indian metropolises

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Indian cities are facing severe air pollution with 18 cities among the top 50 most polluted cities in the world as reported by WHO in 2016. This paper studies the seasonal variations of PM_{2.5} from June 2015 to May 2016 in seven Indian metropolises including New Delhi and Lucknow in north India, Patna in east India, Bangalore, Chennai and Hyderabad in south India, and Mumbai in west India. Correlations of PM_{2.5} with other criteria pollutants and meteorological parameters were studied. PM_{2.5} showed a stronger co-relation with NO₂ in winter and SO₂ in monsoon. PM_{2.5} concentrations were the highest during winter and lowest in monsoon except in Chennai where highest concentrations were in monsoon. Cities in northern and eastern India had higher concentrations than other cities. Three days back trajectory was obtained at heights of 500 m to determine the transport of regional sources. Cluster analysis using k-means clustering algorithm was performed for each city. A concentration weighted trajectory analysis was carried out to understand potential regions of higher concentrations. In winter, potential regions are north-west for Delhi, Lucknow and Patna, south-east for Chennai, Hyderabad, and Mumbai, and north-east for Mumbai. The differences between local and regional sources on hours with extreme concentrations were also identified. In winter, significant long range transport is evident for PM_{2.5} in Delhi, Lucknow and Bangalore.

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