INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Failure of Odd-Even scheme in Delhi indicated that the main reason behind air pollution in Indian cities has not been well understood by the government agencies. Emissions and meteorology are two important factors, which effect pollutant concentrations. Emissions directly input pollutants into the atmosphere while meteorology affects their transport, transformation and deposition. Pollutants effecting a city may be emitted from local sources or may have been transported from other states or cities. Identification of region from where high PM2.5 concentrations are originating is thus critical to control air pollution. In this study, air mass trajectories are tracked using Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT) model to identify source regions affecting Indian cities. The information from the trajectories is used to estimate contributions of different regions to PM2.5 in eight Indian cities Delhi, Lucknow, Patna, Kolkata, Mumbai, Hyderabad, Bangalore and Chennai. Mortality associated with contributions from different regions is estimated using Integrated Exposure Response (IER) risk function. To validate the risk function for Indian scenario, a time series study is carried out in Delhi. The results from the time series study indicate that when the current PM2.5 levels in Delhi are reduced to Indian national ambient air quality standards, the premature mortality will be reduced by 6.20%. Results using the validated IER function indicates that health risk is highest in northern cities and lowest in southern cities, with risk due to stroke being greatest. Moreover, mortality associated with PM2.5 can be reduced in all Indian cities by decreasing local emissions, except Delhi where regional control strategies are needed.