1.013 Modeling Particulate Matter Dispersion in Metro Manila: Application of an Integrated MM5/CALPUFF Approach .

Early Career Scientist

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Abstract:

More than fifteen years after the Clean Air Act, air pollution in Metro Manila, Philippines, continues to adversely affect the health of more than 12 million residents. Recognizing the importance of air quality and its effects on public health and the environment, a study was initiated to support the development of science-based air quality management policies. To further improve the understanding of particulate matter (PM) pathway in the megacity, an integrated MM5/CALPUFF modeling system was used to simulate PM dispersion and to determine the contribution of point, area, and mobile sources to ambient concentrations. Emissions from point sources were estimated using data from the Self-Monitoring Reports of industries while area source emissions were estimated from household cooking fuel usage. Emissions from mobile sources were estimated using the Cube Transportation Demand Modeling Software. This approach divided the megacity into more than 90 zones connected by roads and analysis was done on how different modes of transportation are used to convey people from one zone to another. Results show that 76% of ambient PM concentration comes from on-road mobile sources, 20% from household cooking, and 4% from industrial equipment. Comparison of model results with annual average PM_{10} from measurements shows that model results fall within the range of observed values when background concentrations are added. High concentrations coincide with the most densely populated areas of Metro Manila and along major highways and guidelines for 24 hours and 1 year averaging periods are exceeded in most areas. The number of people exposed to specific levels of particulates was also estimated by overlaying the gridded concentrations over the population density grid. Results show that about one-third of the population is exposed to exceedances of the 24-hour guideline and almost a quarter of the population is exposed to exceedances of the annual guideline for PM_{10}.