

## Assessment the Implications of Regional Transport and Local Emission Sources for Mitigating Particulate Matter in Thailand

**Authors :** Ruchirek Ratchaburi, W. Kevin. Hicks, Christopher S. Malley, Lisa D. Emberson

**Abstract :** Air pollution problems in Thailand have improved over the last few decades, but in some areas, concentrations of coarse particulate matter (PM<sub>10</sub>) are above health and regulatory guidelines. It is, therefore, useful to investigate how PM<sub>10</sub> varies across Thailand, what conditions cause this variation, and how could PM<sub>10</sub> concentrations be reduced. This research uses data collected by the Thailand Pollution Control Department (PCD) from 17 monitoring sites, located across 12 provinces, and obtained between 2011 and 2015 to assess PM<sub>10</sub> concentrations and the conditions that lead to different levels of pollution. This is achieved through exploration of air mass pathways using trajectory analysis, used in conjunction with the monitoring data, to understand the contribution of different months, an hour of the day and source regions to annual PM<sub>10</sub> concentrations in Thailand. A focus is placed on locations that exceed the national standard for the protection of human health. The analysis shows how this approach can be used to explore the influence of biomass burning on annual average PM<sub>10</sub> concentration and the difference in air pollution conditions between Northern and Southern Thailand. The results demonstrate the substantial contribution that open biomass burning from agriculture and forest fires in Thailand and neighboring countries make annual average PM<sub>10</sub> concentrations. The analysis of PM<sub>10</sub> measurements at monitoring sites in Northern Thailand show that in general, high concentrations tend to occur in March and that these particularly high monthly concentrations make a substantial contribution to the overall annual average concentration. In 2011, a > 75% reduction in the extent of biomass burning in Northern Thailand and in neighboring countries resulted in a substantial reduction not only in the magnitude and frequency of peak PM<sub>10</sub> concentrations but also in annual average PM<sub>10</sub> concentrations at sites across Northern Thailand. In Southern Thailand, the annual average PM<sub>10</sub> concentrations for individual years between 2011 and 2015 did not exceed the human health standard at any site. The highest peak concentrations in Southern Thailand were much lower than for Northern Thailand for all sites. The peak concentrations at sites in Southern Thailand generally occurred between June and October and were associated with air mass back trajectories that spent a substantial proportion of time over the sea, Indonesia, Malaysia, and Thailand prior to arrival at the monitoring sites. The results show that emissions reductions from biomass burning and forest fires require action on national and international scales, in both Thailand and neighboring countries, such action could contribute to ensuring compliance with Thailand air quality standards.

**Keywords :** annual average concentration, long-range transport, open biomass burning, particulate matter

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