# Mitigation of Particulate Matter Problem Caused by Vegetation Fires in Thailand

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Vegetation fires are an important source of particulate matter in the atmosphere. Every year in the fire season from February to April, the dry and stagnant weather in the north of Thailand allows the $PM_{10}$ (particulate matter with an aerodynamic diameter ≤10 µm) from vegetation fires to accumulate in the atmosphere at levels higher than the national ambient standard of Thailand of 120 µg/m³. This affects the health of people in terms of respiratory illnesses and premature deaths and necessitates fire management from the Government.

This study used a meteorological mesoscale model (MM5) and an air quality model (CALifornia PUFF: CALPUFF) to find causes and solutions for the fire emissions problem so as to meet Thai air quality standard. The study period during 26 February to 1 March 2012 was used to simulate various scenarios. The land-use types of fire sources were classified for finding the main source of the smoke problem including neighboring countries, village, agricultural and forest areas. The $PM_{10}$ loadings from each land-use type of vegetation fire source were estimated by the numbers of hotspots which were derived from satellite fire-active products with Moderate Resolution Imaging Spectroradiometer. Results from the model simulation showed that $PM_{10}$ from nearby countries was less affected than the local $PM_{10}$. Most of the fire locations occurred within a range of 1 to 4 kilometres of villages and agricultural areas. In addition, meteorology is an important factor for the smoke problem in this study area. A few hot spots in the area can have high concentrations of $PM_{10}$ because the average mixing heights of these areas were less than 500 metres which were low mixing heights. Meteorological inversions lead to stagnant air, causing the fire smoke to be trapped near the ground surface.
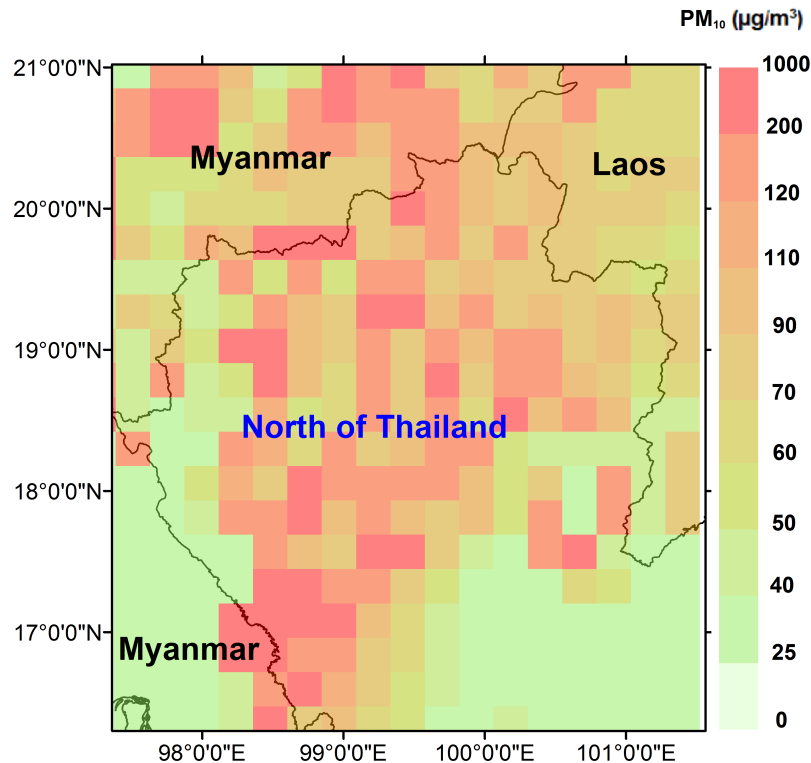


**Figure 1.** The result of estimated $PM_{10}$ concentrations caused by vegetation fires in the north of Thailand and neighboring countries in 28 February 2012 by CALPUFF model.