

Title : Comparing Pattern and Ion Composition of Size-fractionated Particulate Matters in Chiang Mai city and Chiang Rai Border area

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Major : Environmental Science

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ABSTRACT

This study investigates the size distribution and how seasonal variations affect the ionic composition in Particulate Matter (PM) in Northern Thailand. By analyzing PM across different size fractions, we aim to understand its dispersion and assess pollution source variability under changing weather conditions. Airborne PM samples were collected from February 1 to June 20, 2024, at two locations: Chiang Mai Meteorological Station (urban area) and Chiang Rai Public Health Office (border area). We use Cascade High Volume Air Sampler to collect PM in six size fractions: S1 (10–7.2 μm), S2 (7.2–3.0 μm), S3 (3.0–1.5 μm), S4 (1.5–0.95 μm), S5 (0.95–0.49 μm), and S6 (<0.49 μm). Sampling was collected for 24-hour at a flow rate of 40 cubic feet per minute. We employ Ion Chromatography to analyze as tracers for biomass, which include, Cation: Na^+ , NH_4^+ , Ca^{2+} , Mg^{2+} , K^+ . Anion: Cl^- , NO_3^- , SO_4^{2-} . The result of Chemical composition analysis showed that ammonium (NH_4^+) was the dominant cation, while sulfate (SO_4^{2-}) was the most abundant anion in every period but highest during Smoke Haze season. During the Smoke Haze period, particulate matter (PM) levels showed a significant increase compared to the Pre-Smoke Haze period. Fine PM (S.3-6) in Chiang Mai rose from 50.5 $\mu\text{m}/\text{m}^3$ to 98.1 $\mu\text{m}/\text{m}^3$, representing a 94% increase, while in Chiang Rai, it increased from 62.1 $\mu\text{m}/\text{m}^3$ to 135.5 $\mu\text{m}/\text{m}^3$, a 118% increase. Similarly, Coarse PM (S.1-2) in Chiang Mai increased from 11.2 $\mu\text{m}/\text{m}^3$ to 17.8 $\mu\text{m}/\text{m}^3$, while in Chiang Rai, it rose from 15.8 $\mu\text{m}/\text{m}^3$ to 28.0 $\mu\text{m}/\text{m}^3$. After the haze

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period, PM levels significantly decreased in the Post-Smoke Haze period, returning close to Pre-Smoke Haze levels, reflecting the seasonal nature of air pollution and the impact of biomass burning emissions.

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