**Title :** Particle size distribution pattern: A case study of ambient air in rural and urban areas of Chiang Mai

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# ABSTRACT

Particle size distribution (PSD) of ambient air is a critical parameter for understanding air quality, emission sources, and potential health impacts. While most of studies have considered about particulate matter pollution in urban environments, limited information is available on direct comparisons between urban and rural PSD characteristics during the rainy season in northern Thailand, particularly in Chiang Mai. This study aims to address this gap by comparing particle number concentrations and size distribution patterns in urban and rural settings. Continuous 24-hour for 7 days measurements were conducted during the rainy season at Chiang Mai University (SCB1,7 floor), representing an urban site, and Queen Sirikit Botanic Garden, representing a rural site. Particle number concentrations were measured using two complementary instruments: an Optical Particle Sizer (OPS 3330), covering particle diameters from 300 nm to 10 µm, and a NanoScan Scanning Mobility Particle Sizer (SMPS 3910), measuring particles in the size range of 10–420 nm. The analysis focused on overall particle number concentrations and modal particle size distributions between the two locations. The results show that particle number concentrations in the urban area were generally higher than those in the rural area; however, the difference was relatively small, likely due to the influence of rainy-season meteorological conditions that reduce particulate matter through wet deposition.

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Accumulation-mode particles exhibited the highest concentrations at both sites. In most size modes, the rural site showed lower particle numbers than the urban site, except for the large accumulation and small coarse modes. These elevated rural concentrations are likely influenced by biogenic particles, such as plant spores from surrounding vegetation. Large coarse particle concentrations were very low at both sites, indicating effective suppression of particulate pollution during the rainy season. These findings improve understanding of how land-use characteristics and seasonal factors influence PSD and may support air quality management and exposure assessment strategies in tropical regions.

**Keywords:** Particle size distribution; Ambient air quality; Urban and rural comparison; Rainy season; Particulate matter; Biogenic particles

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