# Particle Size Distribution Pattern: A Case Study of Ambient Air in Rural and Urban Areas of Chiang Mai

**Sasithon Puangkulab[*], Nuttipon Yabueng[*,**]**

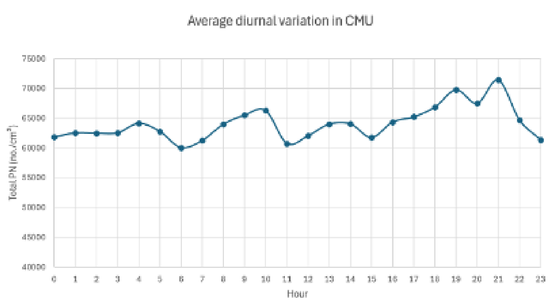
[*] Environmental Science program, Faculty of Science, Chiang Mai University, Chiang Mai 50200, Thailand.
[**] Environmental Science Research Center, Faculty of Science, Chiang Mai University, Chiang Mai 50200, Thailand.

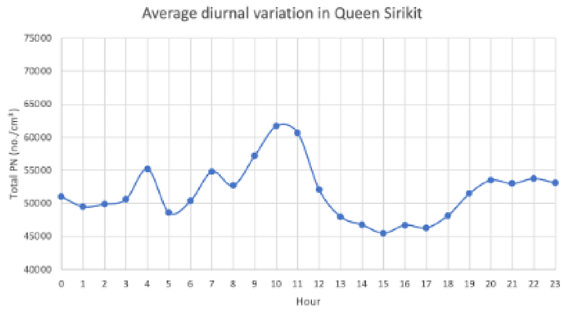
## ABSTRACT

This study compares particle size distribution (PSD) and particle number concentrations between urban and rural sites in Chiang Mai during the rainy season. Measurements were conducted for 7 days using OPS 3330 (300 nm–10 μm) and NanoScan SMPS 3910 (10–420 nm). Urban concentrations were slightly higher, but differences were small due to wet deposition. Accumulation-mode particles dominated at both sites, while higher rural concentrations in larger modes were likely influenced by biogenic particles such as plant spores.

## RESULT AND DISCUSSION

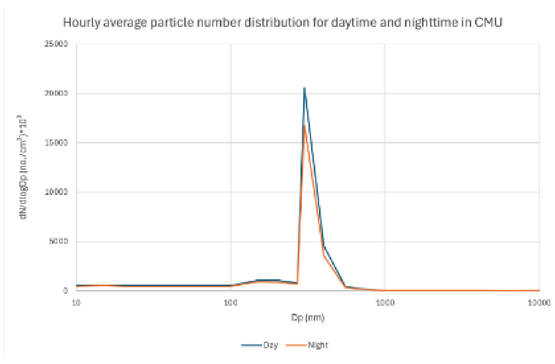
- **Total particle between urban and rural areas**

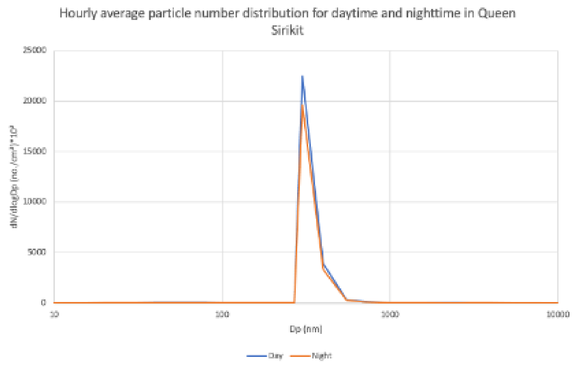



Total particle number in CMU higher than Queen Sirikit and increased of particle take more time than the rural area.

- **The size of particle in daytime and nighttime**




In both areas have high particle number in range of 300-400 nm, because this range of particle can live in atmosphere longer than other range.

- **Particle number in each mode of each areas**

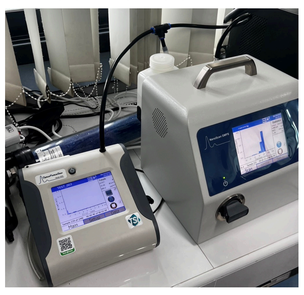



Particle in large accumulation mode of Queen Sirikit higher than CMU, the particle from pollen can effect the total amount of particle in this mode.

## METHODS

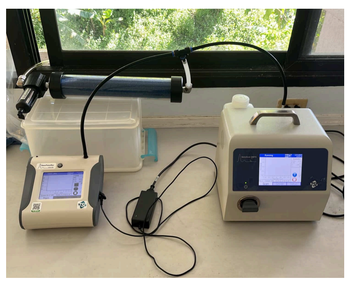
- **Study areas**

**Urban area**



CMU SCB1 7th floor.

**Rural area**



Queen Sirikit Botanic Garden, Mae Rim

- **Data preparation**



OPS3330



Nano scan 3910

**Sampling period:**
**Urban** 6Oct-14 Oct 2025
**Rural** 10 Nov-18Nov 2025

- **Boundary mode of particle**

-Nucleation (15-20 nm)
-Small Aitken (20-50 nm)
-Large Aitken (50-100 nm)
-Small Accumulation (100-250 nm)
-Large Accumulation (250-500 nm)
-Large fine (500-1 μm)
-Small Coarse (1-2.5 μm)
-Medium Coarse (2.5-5 μm)
-Large Coarse (5-10 μm)

- **Data analysis**

Present the data in graph form

## CONCLUSION

- **Large Accumulation mode (250-400 nm)** highest particle number concentrations due to longer atmospheric residence time and resistance to removal processes

- **Urban area** exhibits consistently higher particle concentrations in every mode, particularly in ultrafine particles, reflecting greater anthropogenic emissions from traffic and combustion sources

- **Further research** needed with longer sampling periods across multiple seasons and simultaneous measurements to better characterize seasonal variations and control for meteorological influences

**Reference:**

1. Hussein, T., Dal Maso, M., Petäjä, T., Koponen, I. K., Paatero, P., Aalto, P. P., Hämeri, K. & Kulmala, M. Evaluation of an automatic algorithm for fitting particle number size distributions. Boreal Environ. Res. 10, 337–355 (2005).
2. Hussein, T., Sogacheva, L. & Petäjä, T. Accumulation and coarse modes particle concentrations during dew formation and precipitation. Aerosol Air Qual. Res. 18, 2929–2938 (2018).
3. Mampage, C. B. A. et al. Characterization of sub-pollen particles in size-resolved atmospheric aerosol using chemical tracers. Atmos. Environ. X 15, 100177 (2022).
4. Şahin, Ü. A. et al. Interpretation of wide-range particulate matter size distributions in Delhi. Atmos. Chem. Phys. 22, 5415–5433 (2022).