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Coastal meteorology on the dispersion of air particles at the Bachok GAW Station

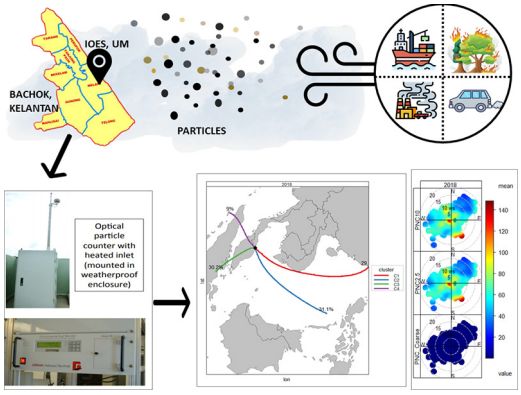
Haasyimah Ab. Rahim [a], Md Firoz Khan [a,b,*], Zul Fadhli Ibrahim [c], Asadullah Shoaib [a], Hamidah Suradi [a], Noraini Mohyeddin [d], Azizan A. Samah [d], Sumiani Yusoff [d]

[a] Department of Chemistry, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia
[b] School of Environment Science and Spatial Informatics, China University of Mining and Technology, Xuzhou, China
[c] Environment Unit, Mineral Research Centre, Minerals and Geoscience Department, Jalan Sultan Azlan Shah, 31400 Ipoh, Perak, Malaysia
[d] Institute of Ocean and Earth Environmental (IOES), University of Malaya, Kuala Lumpur 50603, Malaysia

HIGHLIGHTS

- $PM_{2.5}/PNC_{2.5}$ and PM_{10}/PNC_{10} were high during morning and night periods.
- The high count of PM_{10}, $PM_{2.5}$, PNC_{10}, and $PNC_{2.5}$ in May was blown from the roadside.
- 100% of the air masses in IOES Bachok comes from the Sumatra region during dry season.
- Transboundary particles were deducted to come either from northeast or southwest.
- PM and PNC have positive correlation with NOx and RH but negative correlation with SO_2, temperature, and wind.

GRAPHICAL ABSTRACT



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ABSTRACT

Meteorology over coastal region is a driving factor to the concentration of air particles and reactive gases. This study aims to conduct a research to determine the level of year-round air particles and the interaction of the meteorological driving factors with the particle number and mass in 2018, which is moderately influenced by Southeast Asian haze. We obtained the measurement data for particle number count (PNC), mass, reactive gases, and meteorological factors from a Global Atmospheric Watch (GAW) station located at Bachok Marine Research Center, Bachok, Kelantan, Malaysia. For various timeseries and correlation analyses, a 60-second resolution of the data has been averaged hourly and daily and visualized further. Our results showed the slight difference in particle behavior that is either measured by unit mass or number count at the study area. Diurnal variations showed that particles were generally high during morning and night periods. Spike was observed in August for $PM_{2.5}/PNC_{2.5}$ and PM_{10}/PNC_{10} and in November for PM_{Coarse}/PNC_{Coarse}. From a polar plot, the particles came from two distinct sources (e.g., seaside and roadside) at the local scale. Regional wind vector shows two distinct wind-blown directions from northeast and southwest. The air mases were transported from northeast (e.g., Philippines, mainland China, and Taiwan) or southwest (e.g., Sumatra) region. Correlation analysis shows that relative humidity, wind direction, and pressure influence the increase in particles, whereas negative correlation with temperature is observed, and wind speed may have a potential role on the decline of particle concentration. The particles at the study area was highly influenced by the changes in regional wind direction and speed.

* Corresponding author at: Department of Chemistry, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia.
E-mail address: mdfirozkhan@um.edu.my (M.F. Khan).

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