Effects of seasonal variation and transport routes on the chemical characteristics of $PM_{2.5}$ and $PM_{2.5-10}$ in southern Taiwan

Chi-Fu Yeh[1*], Chon-Lon Lee[2], Peter Brimblecombe[3]

[1]Green Quality Technology Company, Kaohsiung 80642, Taiwan
[2]Department of Marine Environment and Engineering, National Sun Yat-sen University, Kaohsiung 80424, Taiwan
[3]School of Energy and Environment, City University of Hong Kong, Kowloon, Hong Kong, China

*Corresponding author
Email: wastonyeh@gmail.com

This study investigated seasonal variation and transport routes of ambient $PM_{2.5}$ and $PM_{2.5-10}$ associated with the distribution of mass and metallic elements in the urban coastal area of southern Taiwan. Sampling campaign was conducted from March 2009 to February 2010. Sixteen metallic elements in $PM_{2.5}$ and $PM_{2.5-10}$ samples were determined by ICP-AES and ICP-MS. Multiple methodologies, backward trajectory analysis, enrichment factors (EF_c), and principal component analysis (PCA), were adopted to identify the potential sources of the selected elements. Analysis of the temporal distribution revealed seasonal peaks for most of the trace elements in $PM_{2.5}$ and $PM_{2.5-10}$ during the winter and the major elements in $PM_{2.5-10}$ during the autumn. High EF_c values of Cu, As, Zn, Pb, Cd, and Se revealed these elements were originated from anthropogenic sources. PCA suggested traffic emissions, coal, and heavy oil combustion from both local and neighboring areas, as the major anthropogenic contributors and apportionment at the sampling site. Backward trajectory analysis, showed the different chemical characteristics between the northeast (winter originating in China) and southwest monsoon (summer, from the Southeast Asia).

Keywords: Metallic elements; Backward trajectory analysis; Enrichment factors; Principal component analysis