Abstract

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Forecasting and Component Investigation of Respirable Particulate Matter (PM_{10} and $PM_{2.5}$) from Dust Dispersion

[1]Radin Diana R. Ahmad, [2]Sazalina Zakaria, [2]Ahmad Zaki Zainol Abidin, [3]Ahmad Rosly Abbas, [4]Md. Fauzan Kamal Mohd. Yapandi, [5]Dr. Marzuki Ismail, [6]Dr. Samsuri Abdullah

[1]Principal Researcher, [2]Researcher, [3]Head of Unit, [4]Technical Expert
Built Environment and Climate Change Unit, TNB Research Sdn. Bhd., Kajang, Selangor, Malaysia

[5]Associate Professor, [6]Researcher,
School of Marine Science and Environment,
Universiti Malaysia Terengganu, Terengganu, Malaysia

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Abstract

Air pollution especially PM_{10} and $PM_{2.5}$ are of major current concern, as they are small enough to penetrate deep into the lungs and so potentially pose significant health risks. It is made worse by their long residence time in the air and overwhelming fraction contribution to the total respirable particulate matter concentration. Rapid urbanization and industrialization progress in Malaysia therefore necessitate for an action to control the source and predict the status of respirable particulate matter. In 2016, TNBR undertook a comprehensive PM_{10} and $PM_{2.5}$ field monitoring study at a coal fired power plant that incorporate ambient measurement of particulates, meteorological and surrounding land use data to determine potential sources of particulate matter and developed forecasting models. The data were analyzed for chemical characterization (ionic chemical species), multivariate statistical analyses, trajectory analyses and dispersion modelling of particulates. The algorithms based on chemical species (independent variable) and PM concentrations (dependent variable) was established through the adoption of Principal Component Analysis (PCA), stepwise Multiple Linear Regression (MLR) and ionic chemical database which were then embedded into the Dust Fingerprint and Forecasting Tool. The valuable information on dust source contributor as well as forecasting consequent month status of PM_{10} and $PM_{2.5}$ enable policy makers, local authorities and industrial project developer to better manage the particulate matter emission into the ambient atmosphere concentration thus reducing the adverse impacts of air pollution towards local residents.