

The Source Distribution of PM_{2.5} near a Coal-fired Power Plant and the Health Risk towards the Population

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Abstract

Burning of massive solid fossil fuel such as coal releases various pollutants into the surrounding atmosphere. Among them, particulate matter less than or equal to 2.5 μm in aerodynamic diameter (PM_{2.5}) is a great concern. It can penetrate the human respiratory system and circulate into the bloodstream. Aside from massive amount of CO₂ release, hazardous elements are also included during the combustion of coal such as Hg, Ni, As, and Pb. These pollutants can cause serious health damage to the people living near a source. An effective mitigation plan will first require the source and concentration of the pollutants to be identified. The present study will focus on finding the sources of PM_{2.5} by collecting them using a High-Volume Air Sampler (HVS) and analyse the compositions of trace metals, ionic compounds, elemental carbon and organic carbon. The potential sources of PM_{2.5} will then be identified using multivariate receptor modelling which include absolute principal component score (APCS), positive matrix factorization (PMF) and chemical mass balance (CMB). The responses of the modelling results will also be further validated using a trajectory-based modelling. A separate health risk assessment analysis will also be performed to identify the toxicological risk towards the populations in the area.