Extreme value analysis for modeling high PM10 level in Johor Bahru

ABSTRACT

Extreme value theory is a very well-known statistical analysis for modeling extreme data in environmental management. The main focus is to compare the generalized extreme value distribution (GEV) and the generalized Pareto distribution (GPD) for modeling extreme data in terms of estimated parameters and return levels. The maximum daily PM10 data for Johor Bahru monitoring station based on a 14 years database (1997-2010) were analyzed. It is found that the parameters estimated are more comparable if the extracted numbers of extreme series for both models are much more similar. The 10-years return value for GEV is 3 104εg/m3 while for GPD is 3 289εg/m3. Based on the threshold choice plot, threshold u = 74 is chosen and the corresponding 10-years return level is 3 308εg/m3. According to the air pollution index in Malaysia, this value is categorized as hazardous.

Keyword: Extreme data; Generalized extreme value distribution; Generalized pareto distribution; Return level; PM10