

## **Effects of the Manila Bay Breeze Circulation on the Particulate Matter Concentration of Metro Manila**

### **ABSTRACT**

The densely populous and highly urbanized area of Metro Manila, being strategically located at a coastline, has its own economic benefits such as uses for commerce and trade. However, an overlooked negative impact of the coastal region is the transport of air pollutants through breeze circulations. Hourly meteorological and particulate matter measurements were taken from four sites within Metro Manila, in order to characterize breezes from the adjacent Manila Bay and quantify the breezes' impact on particulate matter concentration. This study covers the period of November 2016 to October 2017. A section algorithm using a set of criteria based on the reversal of wind direction and the existence of the physical forcing mechanism was used to identify the breeze days from the non-breeze days.

The four stations, kilometers apart, exhibit varying meteorological characteristics and therefore varying breeze characteristics. Surrounding urban topography largely influences site readings. Monthly frequency of breezes, wind speeds, water and land temperature contrast, and PM ratio were independent in each station. While identified breezes in some stations were found to be dependent on the proximity to the Manila Bay coast, breezes identified in other stations were found to be enhanced by background wind.

It was found that breezes generally increase pollution levels in the urban area. Diurnal trends in this study is specifically for breeze days cases. In addition to lower atmospheric boundary height brought by breezes, the low wind speeds of breeze days contribute to the stagnation of air pollution. This condition can be aggravated by other factors such as temperature.