

ABSTRACT

EFFECTS OF DIURNAL WIND REVERSAL ON THE AIR QUALITY OF THE NATIONAL CAPITAL REGION (NCR), PHILIPPINES

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An overlooked, negative impact of a coastline are thermally generated winds due to the difference in heat capacities of land and water, which could transport and/or entrap pollutants. This study aims to investigate the surface wind characteristics occurring in the NCR, a coastal metropolitan region in the Philippines, and to investigate the influence of surface wind on air quality. The classification of surface wind behavior is based on a set of criteria, which include the wind direction behavior within a day, wind speeds and consistency, and the thermal contrast between the sea and the land surface. Hourly meteorological and air quality data were taken from stations within NCR. Results showed that surface winds of NCR are more influenced by monsoon winds and winds from the Pacific Ocean, rather than winds generated by a coastline. Thus, non-reversing winds are more prevalent, occurring at about 5.5 times more than diurnal reversing winds in all stations. The surface winds per season were mapped to show how surface wind readings spatially and seasonally differ by station. This indicates how the surface airflow in NCR varies in a small distance scale. Diurnal wind speed plots show unusual behavior. Daily maximum wind speeds are usually recorded from past 12:00 PhT to 3:00 PhT contrary to usual findings of late morning until noontime in similar studies of coastal areas. PM level behaviour have shown the characteristic diurnal peaks during morning and evening busy hours which are more observed during the drier months (November to May). ANOVA test results confirms a significant difference in PM levels during a reversal and a non-reversal day, although the statistical correlation of surface wind characteristics (wind speed, wind direction, and frequency) with PM levels is generally weak.

Keywords: *surface winds, wind reversal, non-reversal, air quality, urban coastal region*