ANALYSIS OF THE CONTINUOUS MEASUREMENTS OF PM\textsubscript{10} AND PM\textsubscript{2.5} CONCENTRATIONS IN BEIRUT, LEBANON

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Abstract

Atmospheric concentrations of PM\textsubscript{2.5} and PM\textsubscript{10} were measured in Beirut, Lebanon, for a period of 12 months. The daily average concentrations of PM\textsubscript{10} and PM\textsubscript{2.5} were found to be 51.3 ± 33.1 and 30.3 ± 9.4 µg.m\textsuperscript{-3}, respectively, with corresponding maximum values of 359.7 and 208.6 µg.m\textsuperscript{-3}. The annual average concentrations of PM\textsubscript{10} and PM\textsubscript{2.5} exceeded the World Health Organization’s standards by 150% and 200%, respectively. The mean concentration of coarse particles (PM\textsubscript{10–2.5}) was found to be 41% of the average PM\textsubscript{10}, suggesting that the site was also influenced by re-suspended surface dust and soil. The mean PM\textsubscript{2.5}/PM\textsubscript{10} ratio for the entire study period was 0.61 ± 0.12. This indicates that in Beirut, PM\textsubscript{2.5} accounts for about 61% of PM\textsubscript{10}. Such a large fraction of fine particles could have considerable effect on health; thus, it is necessary to quantify its impact. Daily concentrations of PM\textsubscript{10} and PM\textsubscript{2.5} exceeded the upper threshold limit on 133 and 129 days, respectively, representing 39% and 38% of the entire sample, respectively. These findings indicate the important role dust events play within this area. Concentrations of PM\textsubscript{2.5} were highly correlated with NO\textsubscript{2}, whereas concentrations of PM\textsubscript{10} and PM\textsubscript{10–2.5} were not associated with any gaseous pollutant. Regression analysis showed that 93% of PM\textsubscript{2.5} and 43% of PM\textsubscript{10} particle mass concentrations were derived from road traffic exhaust in Beirut.

Key words: air quality, dust event, health effect, particulate matter, regression analysis

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