

1.083 Analysis of first PM_{2.5} samples from a Harvard Impactor located in the city of Natal, Brazil.

Early Career Scientist

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Abstract:

We present a chemical characterization of PM_{2.5} aerosols collected by a Harvard Impactor in the metropolitan region of Natal, Brazil. Samples were taken on a daily basis using 37 mm quartz filters, which were then analyzed by gravimetric techniques, quantification of Black Carbon (BC), and fluorescence X-ray analysis. The PM_{2.5} sampling occurred continuously during the period of March 3, 2015 to March 31, 2016. First analyses from March to August 2015 show that PM_{2.5} monthly averages ranged from 3.38-14.97 $\mu\text{g}/\text{m}^3$, while daily means ranged from 0.25-70.98 $\mu\text{g}/\text{m}^3$. The primary daily PM_{2.5} standard of 25 $\mu\text{g}/\text{m}^3$ set by the World Health Organization is exceeded for nine times in this period, and the daily standard of 35 $\mu\text{g}/\text{m}^3$ established by the U.S. Environmental Protection Agency is exceeded more than six times. The month of June showed the highest monthly mean BC concentrations, reaching 1.18 $\mu\text{g}/\text{m}^3$ as well as the lowest PM_{2.5} monthly mean concentrations. Highest monthly mean concentrations of PM_{2.5} were reached in March. Meteorological conditions in June are comparable to those of March, as during both months it rained on average 300 mm. However, cultural facts enhanced the BC concentrations in June as many open wood burning bonfires occur due to the celebrations of the St. John's holiday. Analysis by X-ray fluorescence identified the chemical elements of the collected particles with highest concentrations in the filters: S, K, Si, Al, Cl, Fe, P, Ca, Mn, and Ca. Most of these were of anthropogenic origin according to their enrichment factor, while Na, Mg, Sn, Zn, Al, Fe and Ti originated from natural sources. These results for the full year as well as HYSPLIT trajectory model simulations of PM_{2.5} dispersion and deposition will be presented.