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Abstract
Measurements of trace metals and inorganic ions were carried out in aerosols particles on four zones of Queretaro city: Tlacote (Tla), Universidad (Univ), Zaragoza (Zara), and Candiles (Can). Sampling was made in the southern section of downtown Mexico City. Samples were collected with an Mini-Vol PM10 . Eight different sources were identified for PM10 aerosols: secondary sulfate, wood combustion, fireworks, road traffic, mineral dust, de-icing salt, industrial and local anthropogenic activities. The ions SO42-, NO_3-, Cl-, Na+, K+, Ca2+, Mg2+ and NH4+,were analyzed by ion chromatography and the trace metals using an atomic absorption spectrometer. The result indicated that SO42- was the most abundant ion and with respect to trace metal. All the trace elements except Mn and V show statistically significant differences between monitoring sites. The Pearson's correlation applied to all data, showed a high correlation among SO42-, NO_3- and NH4+, indicating a common anthropogenic origin. In addition the correlation found between Ca2+ and Al indicated a crustal origin. On the other hand, in considering the total sampling period for particles as well as for all the metals, it is appreciable the significant differences between sites and meteorological seasons. The cluster analysis of air back-trajectories employed in the paper is a technique widely used to identify transport patterns and potential sources of both anthropogenic pollution and natural constituents of the atmosphere, including atmospheric aerosols. It is also used to determine how aerosol optical properties observed over the station differ depending on source region and transport pathways In order to gain a better insight into the origin of trace metal and major inorganic ions, a Principal Component Analysis was applied to the results for 6 elements and 8 ions, from the years 2009 and 2010. Further, the statistical analysis demonstrated the adequate selection of the monitoring areas, confirming that main emission source of these atmospheric pollutants is anthropogenic origin. Evidence suggests that the organic and inorganic species are not always internally mixed, especially in the small modes. The aerosol seems to be neutralized most of the time; however, there were some periods when there was not enough ammonium to completely neutralize the nitrate, chloride and sulfate present. The diurnal cycle and size distributions of nitrate suggest local photochemical production. Although the sources of chloride are not clear, this species seems to condense as ammonium chloride early in the morning and to evaporate as the temperature increases and relative humidity.

Keywords: Heavy metals measurement, total suspended particles, emission sources.
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