Size-segregated ions and carbonaceous fractions of ambient aerosol in Bogota

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Elemental and Organic Carbon (EC/OC) make up a significant fraction of particulate matter emitted by combustion process and water-soluble ions provide an important information about the origin of ambient aerosols. The sized-segregated chemical characterization of ambient aerosol is useful to understand its sources and formation mechanisms and complements well the information obtained from the bulk aerosol composition. Previous studies in Bogota determined the chemical composition and source contribution of PM$_{10}$ in Bogota, as well as the temporal and spatial variability of polycyclic aromatic hydrocarbons (PAH) in the same city. However, the size-segregated chemical composition of ambient particles has not been studied in Colombian cities. This work aims to better understand the variability of size-segregated PM chemical composition in Bogota, one of the main Latin American megacities. Eight sets of samples were collected using an Andersen 8-stage cascade impactor in the southwest area of the city, where the highest concentrations of PM$_{2.5}$ usually occur, over two periods in 2018. The concentration of OC/EC and ions (ammonium, sodium, potassium, magnesium, calcium, chloride, nitrate, sulfate and oxalate) were quantified. The average PM$_{1}$ concentration was 30.3 mg/m$^3$ (75% of PM$_{2.5}$). The mass size distribution was bimodal, with a coarse mode between 5.8 and 4.7 mm aerodynamic diameter and an accumulation mode between 0.43 and 0.65mm. Most of the mass (75%) of PM$_{1}$ consists of carbonaceous species, being EC the main constituent. The main inorganic ions in PM$_{1}$ were sulfate, nitrate and ammonium. These and other results from this work will contribute to the validation of models within the PAPILA (Prediction of Air Pollution In Latin America and the Caribbean) project, funded by the EU MSCA action for research and innovation staff exchange (GA 777544).