

Trace metals and PAHs content in superficial soils of Sao Paulo campus University, Brazil

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Urban soils are submitted to intense anthropic activities related to civil construction, industrial activities and vehicular traffic that are responsible for their degradation and chemical contamination. The aim of this study is to discuss the concentration distribution, composition and possible sources of metals and PAHs in superficial soils of the University campus, in the city of São Paulo, one of the largest cities of Brazil. The sampling site is located in the western region of the São Paulo city, a green-park (7.4 km²) surrounded by important avenues with intense traffic of light- and heavy- duty vehicles and inside a commercial and residential area of the city.

Superficial soils (0-10 cm) were sampled from July to September 2012 totalizing 25 samples. Samples were submitted to granulometry and X-Ray Diffraction analyses and the chemical composition of bulk fraction was analyzed by ICP-MS for metals, and by HPLC-FLU for PAHs. The average clay content of soils is 22.08±6.18% and total carbon content is low (2.5% on average). Primary minerals (quartz, feldspar, mica) are dominant with gibbsite and kaolinite as secondary minerals. Concentrations of metals are generally lower than the reference value established by CETESB (brazilian environmental agency) except for Cd (0.59±0.6 mg.kg⁻¹), Ni (11.2±15.3 mg.kg⁻¹), Pb (40.8±14.1 mg.kg⁻¹), Cr (42.2±23.8 mg.kg⁻¹) and Zn (95.6±50.8 mg.kg⁻¹). The average of the sum of 13 PAHs is 0.33 mg.kg⁻¹ [0.07-1.38 mg.kg⁻¹] and fluorene, indeno(1,2,3-cd)pyrene, anthracene, pyrene and benzo(ghi)perylene are the most abundant compounds. Highest concentrations are observed in samples collected at the entrance of the campus where traffic is concentrated during rush periods. On average, low molecular weight PAHs account for 40% and high molecular weight PAHs for 60% of total PAHs, indicating that high temperature combustion processes are their dominant sources, that is also confirmed by PAHs diagnostic ratios. PAHs patterns vary spatially in the campus area and seem to be associated with traffic intensity, vegetation and declivity.