

Trace elements and oxy-PAH in Latin American urban sites: São Paulo, Lima and Medellin

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The South American Emissions Megacities and Climate (SAEMC) is a project that focused on the investigation of air composition and its impact on climate over South American cities and included São Paulo (SPA, Brazil), Lima (LIM, Peru) and Medellin (MED, Colombia). The sampling was done for 24 hours, with particulate matter (PM₁₀) being collected in quartz fiber filters with high volume sampler. It was collected in the month of June, 2010. Oxy-PAHs were determined by gas chromatography technique, while trace elements were determined by inductively coupled plasma mass spectrometry.

The average of particulate matter was higher for SPA and lower for LIM and MED (67, 43 and 46 $\mu\text{g m}^{-3}$, for SPA, MED and LIM, respectively); SPA had a higher average than the recommended by World Health Organization (daily average of 50 $\mu\text{g m}^{-3}$ for PM₁₀). The quinone fraction of PAHs have been attributed to toxic effects to health, although more studies are necessary; 9,10-anthraquinone is classified as possibly carcinogenic to humans (2B)1,2. 9,10-Anthraquinone (AQ) and 9-fluorenone (FO) can originate from both primary and secondary sources3. AQ had higher concentrations in MED, while FO had higher concentrations in LIM. Benz[a]anthracene-7,12-dione (BaAQ) concentrations were higher in SPA, and is often attributed to the ozonation of precursor PAH4. Concentrations of potassium were higher in SPA and MED (805, 873 and 402 ng m^{-3} , for SPA, MED and LIM, respectively); suggesting possibly higher biomass burning sources for these sites. Zinc is often associated with industrial emissions and traffic (tyre abrasion) and was higher in SPA and lower in LIM (350, 205 and 164 ng m^{-3} , for SPA, MED and LIM, respectively). Copper, which is associated to vehicular sources (wear emissions), was also higher in SPA (123, 42 and 17 ng m^{-3} for SPA, MED and LIM, respectively). Iron was also higher in SPA, this element is more related to soil resuspension and road dust (1761, 632 and 740 ng m^{-3} for SPA, MED and LIM, respectively) and is expected to be high in this period (dry season). Lead was higher in MED than in the other sites (55, 124 and 25 ng m^{-3} for SPA, MED and LIM, respectively), its concentrations depend on its content on gasoline and emissions by industries, so as garbage incineration5. Vehicular and biomass burning sources appeared to be more important for both SPA and MED sites.

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