# Particulate matter in São Paulo City: comparison between industrial and urban area

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Airborne particulate matter in urban atmosphere is derived from natural and anthropic sources. The chemical composition of coarse and fine particles is critical when considering their hazardous effect. This particulate matter study is part of a greatest research project that investigates the relationship between aerosols, road dusts and surface soils.

The sampling sites are located in two region (eastern and western zones) of the São Paulo City, in the two Campi of the University of São Paulo that present distinct characteristics i.e. industrial and commercial/residential backgrounds. The eastern area (EACH) is located in the floodplain of the Tietê River, near several industries, a highway and the international airport. The western area (Butantã) is located in a commercial and residential area and submitted to intense vehicular traffic.

The particulate matter ($PM_{2.5}$ and $PM_{2.5\text{-}10}$) was continuously collected during day and night periods, simultaneously in the two areas. Sampling was initiated on August 22th, 2012 and finalized on December 7th, 2012 in the eastern area and from July, 7th to September 9th, 2012 in the western area. This period includes winter and the beginning of summer (raining season). Black Carbon and multi-elemental composition where quantified in the fine fraction by reflectometry and FRX, respectively.

The results show that particulate matter concentrations during winter, in the eastern area were 23.70 ±13.05 $\mu g\ m_{-3}$ in the fine fraction and 42.73 ±37.71 in the coarse one. Concentrations in the western area were 21.09 ±14.00 $\mu g\ m_{-3}$ in the fine fraction and 16.19 ±8.17 $\mu g\ m_{-3}$ in the coarse one. During summer, concentrations were lower and similar between the two fractions. Concentrations were 20.05 ±7.72 $\mu g\ m_{-3}$ and 21.75 ±13.93 $\mu g\ m_{-3}$ in the fine and coarse fraction, respectively, in the eastern area. In the western area, concentrations were 17.25 ±8.36 $\mu g\ m_{-3}$ and 17.09 ±8.12 $\mu g\ m_{-3}$, in fine and coarse fraction, respectively. During winter, higher concentrations in the coarse mode in the industrial area may be due to higher soil resuspension since the vegetation area is reduced comparing with the western one. Chemical analysis are still being done but preliminary results showed that for the industrial area, black carbon contributed to 18.2% of the fine particulate matter mass. The elements with higher concentrations were S, Si, Fe, K, Al, Na, Zn, Pb and Cd.

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# New method for precise Cl isotopes measurement by SIMS

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Chlorine is an important volatile element. Its two stable isotopes are used to track the global halogen cycle and to determine fluid sources. Chlorine isotopes are fractionated by fluid/rock interaction, degassing, diffusion and mineralogical transformation. However, the range of Cl isotopes on Earth may be relatively limited [e.g., 1], requiring precise measurements of $\delta^{37}Cl$. Usually Cl isotopes are measured by TIMS or IRMS, and only a few measurements have been performed so far by ion probe. Previous SIMS studies reported a reproducibility of 0.8 to 1.5‰ (2 Standard Deviation (SD)) for glasses with > 200 ppm Cl [e.g., 1, 2]. We develop a new SIMS method to improve the precision of $\delta^{37}Cl$ measurements. Analyses were done on a CAMECA IMS 1280-HR, using a cesium source. One analysis consists of two minutes presputtering using a 25$\mu$m raster to clean the surface, followed by 7 minutes of analysis using a ~10$\mu$m rastered beam. $^{37}Cl^-$ and $^{35}Cl^-$ were simultaneously measured on electron multipliers in multicollection mode.

Results show internal precisions as good as <0.2‰ (2SE) and reproducibility (spot to spot) of 0.6 to 0.8‰ (2SD) for standard glass with Cl content down to 100 ppm. For standard glasses with Cl content < 100 ppm (down to 5 ppm), the reproducibility reaches 1.5‰ (2SD).

With this precision reached it is now possible to investigate *in situ* $\delta^{37}Cl$ variations at small scale, even in minerals with low Cl content, using the appropriate standard material.

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