

## Chemical characteristics of inhalable particulate matter in the eastern portion of São Paulo State.

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### Introduction

The objective of this study was to evaluate the chemical characteristic of the Inhalable Particulate Matter (IPM) in its fine (F-PM<sub>2.5-10</sub>) and coarse (C-PM<sub>10</sub>) mode in a transect in the eastern portion of São Paulo State from a rural area (INPE's Cachoeira Paulista: **CP**), medium size urban area (INPE's São José dos Campos:**SJ**) and highly urbanized area (IBot São Paulo: **BT**). The sampling period of this study extended from February until October 2014 and samples were collected on 24 hours base covering all weekdays however, for each week the samples was taken on a different day on rotating base, using a Gent-stacked unit filter (SFU) sampler totalizing 30 samples for the fine and coarse fractions<sup>1</sup>.

### Results and Discussion

The main characteristics of the PM at the studied region are presented on figures 1a and b.

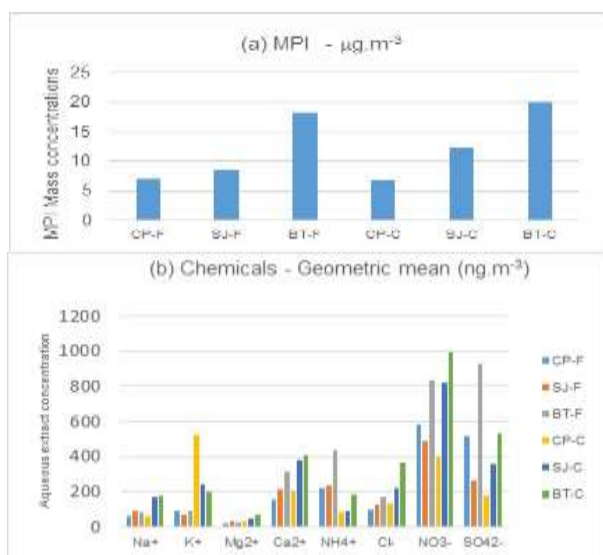


Figure 1 – Characteristic of the Inhalable Particulate Matter for the Fine and Coarse fraction (a) mass concentration ( $\mu\text{g}\cdot\text{m}^{-3}$ ) and (b) chemical concentrations ( $\text{ng}\cdot\text{m}^{-3}$ ).

The statistics for the samples was calculated to infer if significant differences among the sites for the same chemical and fraction existed as well as a

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factor analysis with varimax rotation was performed to investigate the possible sources of each chemical. Statistically significant difference was found among the three sites for most of the chemical species particularly those derived from anthropic sources such as NO<sub>3</sub><sup>-</sup>, NH<sub>4</sub><sup>+</sup> and SO<sub>4</sub><sup>2-</sup>. However, **CP** presented high values of K<sup>+</sup>, NH<sub>4</sub><sup>+</sup> and NO<sub>3</sub><sup>-</sup> due to the long dough period and the presence of fires on the surroundings (Fig1) nevertheless the **BT** site has systematically higher concentration values for all chemicals than the ones determine in **CP** and **SJ**. The factor analysis with varimax rotation for the three sites show that together 3 factors account for more than 95% of the variability in the original data for the three sites and both modes. Sea, biogenic, soil dust and anthropic sources where identified and among them, the sea source was easily identified in the three sites and for both modes because Na and Cl are isolated on specific factors for both fine and coarse modes. However, sources such as the biogenic, soil dust and anthropic although identified they came up can on the other factors.

### Conclusions

As expected the mass concentration values as well as the chemical concentration values of the studied species increase from the rural site toward São Paulo however for the chemicals some anomalies due to biomass burning in **CP**. The main emission sources was inferred from the classical factor analysis. Although the aerosol mass concentration are significantly smaller in **CP** and **SJ** than in **BT** the chemical composition of the aerosol are similar at the three sites being NO<sub>3</sub><sup>-</sup> the dominant species.

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<sup>1</sup>Ferreira, T. M.; Forti, M. C.; Alvalá, P. C. INPE, 2012. v. 1, 24 p. <http://urlib.net/8JMKD3MGP7W/3B9PGQL>.