

MARKERS COMPOUNDS FROM SUGARCANE BURNING IN AEROSOLS COLLECTED IN SÃO PAULO

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Introduction

Sugar cane burning in the vicinities of São Paulo city can contribute to the atmospheric pollution through long-range transport of the particulate matter (PM) and has raised serious concern for its effects on local and region air quality, human health and climate¹. In the most of the previous studies, levoglucosan (arised from the pyrolysis of cellulose) was used as marker of biomass burning. In this study other compounds were also investigated.

Aerosol samples were collected inside the University of São Paulo, during 2012 and 2013 winter campaigns. Liquid chromatography and gas chromatography were used for the determination of biomarkers compounds. The compounds determined in the samples were monosaccharides, nitrocatechols and other organic compounds. The aim of this study was to correlate sugar cane burning activity in São Paulo State with the increase of biomarkers concentrations in São Paulo atmosphere.

Results and Discussion

The concentrations of PM₁₀ varied from 28 to 148 µg.m⁻³. Some samples presented higher concentrations than those recommended by CONAMA (50 µg.m⁻³).

Figure 1 presents the average concentrations for the monosaccharide and others compounds. Levoglucosan was the most abundant compound (from 330 to 500 ng.m⁻³). Fructose, glucose and mannosan were also abundant.

2-methylglycerol (2-MG), 2-methyltriol (2-MT) and 2-methylerytritol (2-ME) are products of isoprene photo oxidation. They are important for secondary aerosol formation and for the increase of particulate matter concentration. Arabitol (ARA) and mannitol (MAT) are biomarkers for fungi activity². Alkenes-triols (Alk1, Alk2 and Alk3) are usually detected in atmosphere with low NO_x concentration³.

Figure 2 presents the nitro-organic compounds; 4-nitrocatechol is the most abundant (from 15 to 34 ng.m⁻³). A strong correlation between 4-nitrocatechol and levoglucosan was observed, indicating the same source (R²=0.8)². Air mass trajectories showed the transport of pollutants from sugarcane areas to São Paulo city during the winter campaigns.

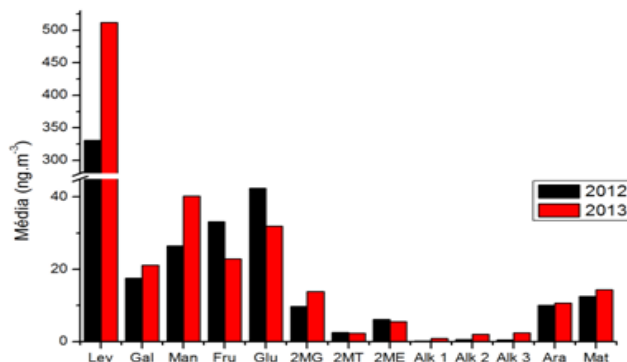


Figure 1. Mean Concentrations of biomarker compounds in São Paulo atmosphere.

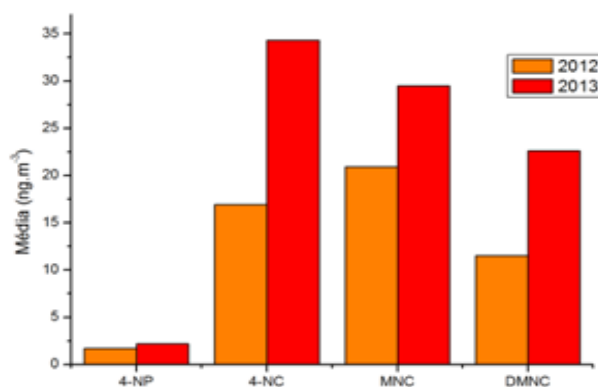


Figure 2. Mean Concentrations of nitro-organic compounds in São Paulo city.

Conclusions

It is the first time that nitro-organic compounds were identified in Brazilian samples, correlating with sugarcane burning. Besides levoglucosan, nitrocatechols presence was attributed to biomass burning emissions.

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² Kahnt, A. et al. *Atmos. Environ.* **2013**, 81, 561– 568.

³ Claeys, M et al. *Env. Chem.* **2012**, 9, 273-284.