

POLYCYCLIC AROMATIC HYDROCARBON (PAH) AND OXYGENATED-PAH IN AEROSOLS FROM AMAZON REGION

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Key-words: Amazon region, PAH and oxygenated-PAH.

Introduction

The Brazilian Amazon contains about 40% of the world's remaining tropical rainforest, covered with 5.5 million km², corresponding to 61% of the area of Brazil. It is the largest and the richest biome (species) of the planet. This region plays vital roles in maintaining biodiversity, regional hydrology and climate, and terrestrial carbon storage. However, the Brazilian Amazon region has been intensively affected by deforestation and biomass burning, resulting in increased impacts on our climate and environment with adverse effects on health¹.

The objective in this study was to identify and quantify Polycyclic Aromatic Hydrocarbons (PAH) and oxygenated-PAH (oxy-PAH) in the particulate matter smaller than 10µm (PM₁₀) collected in Porto Velho, located in the northern state of Rondônia, region of deforestation arc in the Amazon region.

Results and Discussion

The results showed that PM₁₀ average mass concentration in the samples collected were 27.3 µg.m⁻³ (13.0 – 58.6 µg m⁻³).

Retene was the most abundant PAH with an ambient concentration ranging between 0.01 – 4.91 ng m⁻³, followed by the ANT, PHE and DahA (Figure 1). RET accounted on average to 25% of the total PAH mass, being up to 50% during biomass burning peak. The ensemble of carcinogenic PAHs (BaA, CHRY, BbF, BkF, BaP, IcdP and DahA) are responsible for 37% of the PAH mass found during all analyzed period.

The results of oxy-PAH shows that 2-metylanthraquinone (192.2 pg.m⁻³) and 7,12-benzo[a]anthracenquinone (145.9 pg.m⁻³) were the most abundant compounds among those analyzed (Figure 2). These compounds have been associated with oxidative stress in inflammatory responses and are suspected to be a major driver of pulmonary oxidative stress and consequent cardiovascular disease in areas impacted by oxy-PAH².

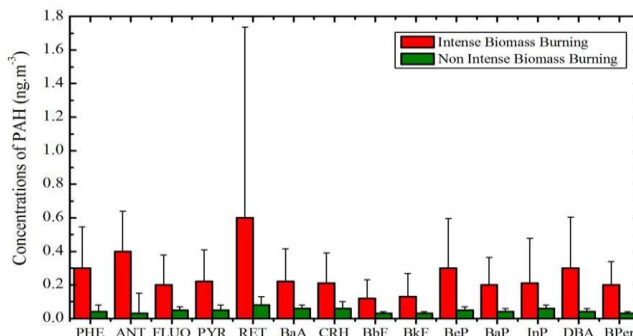


Figure 1. Mean Concentrations of PAH in the Amazon region.

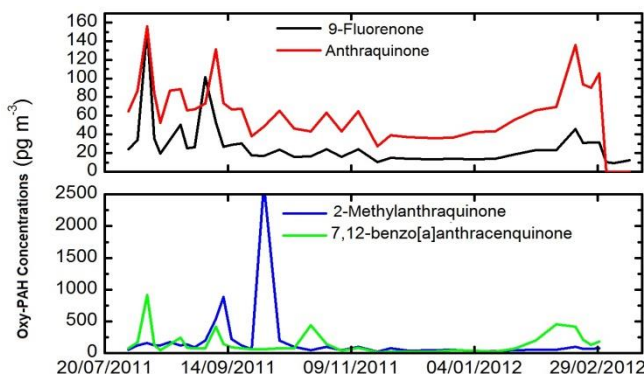


Figure 2. Time series of oxygenated-PAH in the Amazon region.

Conclusions

These results indicate the necessity of continuous research in this field to control health consequences of these toxic compounds.

Acknowledgements

FAPESP, CNPq and INCT/INPE/FIOCRUZ/INOVA ENSP.

1. De Oliveira Alves N, et al. *Environ. Res.* 2014;130:51-8.
2. Knecht AL, et al. *Toxicol. Appl. Pharmacol.* 2013;271(2):266-75.