TOTAL MERCURY DITRIBUTION IN ORGANIC MATTER EXTRACTED FROM SOURCES OF SEDIMENT SAMPLES WITH DIFFERENT TYPES OF WATER IN THE AMAZON BASIN

Luiz Fabrício Zara[1], B. C. P. Rocha[2], T. M. da Silva[1], W. S. Figueiredo[1]

[1]University of Brasília, UnB Faculty Planaltina, Brasília-DF, Brazil
[2]State University of São Paulo, Chemistry Institute of Araraquara, Araraquara-SP, Brazil
fabriciozara@gmail.com

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Introduction

In 1950 Harald Sioli published a historical work about the different types of water in the Amazon region classifying them as: white water rivers (muddy), black water rivers and clear water rivers (Sioli, 1985). Sediments play an important role in the characterization of impacts on water sources and are considered the main metal species sinks and reservoirs in aquatic environments (Mozeto et al. 2007). Mercury is a toxic metal known and its toxicity is potentiated with organification process. Therefore, considering the importance of sediments and organic matter as the main sinks and metal species reservoirs in aquatic environments, it is environmentally relevant investigate the total mercury distribution in the organic matter extracted from sediments collected in watersheds with different types of water in the Amazon basin.

Methods

The samples were taken in the flood season hydrological and drought in 2013 and 2014, the respective springs according to Table 1.

Table 1. Wellsprings collected Amazonian waters classes, periods of sampling in 2013-2014 and UTM coordinates.

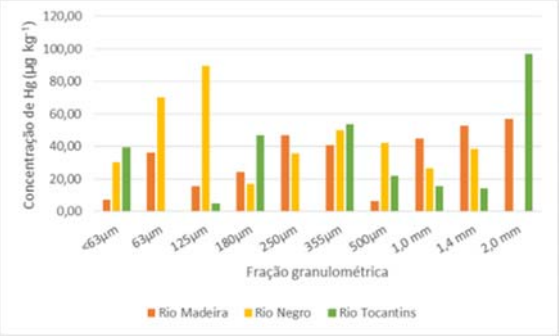
Wellspring	Water Class	Sampling	Sampling	Coordinats	
				X	Y
Madeira river	White water	April	October	266960	8937744
Negro River	Black water	December	June	9870128	554531
Tocantins	Clear water	November	July	8509334	804497

The collected samples were made using timely sediment collector (dredger Eckman), allowing the collection of more reactive layer of sediment in the areas of backwater. After collection, the samples were packed in PET bags, kept refrigerated at about 5 ° C to the preparation and laboratory analysis. After homogeneinização wet the PET own bags and drying at room temperature, granulometrically were fractionated in 10 fractions using sieves of 2 mm and 63 pm. Humic substances (HS) were extracted from the size fractions according to the procedure recommended by the International Humic Substances Society-IHSS. The total organic carbon in humic fractions determinations were made according to the methodology described by Silva (2014). The total mercury concentration was determined by the technique of mercury vapor generation cold coupled with atomic absorption spectroscopy (CVAAS) - EPA 1631, adapted.

Results

Statistical analysis indicated no significant difference between the periods of flood and drought. The results for these periods are below the reference values reported in the literature (Mozeto et al. 2007). As for total organic carbon (TOC) determined in sediment samples could be established the following descending order of the springs with different water classes: Negro river>Madeira river>>Tocantins river. According to the TOC levels determined in humic fractions, it was possible to establish the following decreasing orders in the fountains: Madeira river: 1.4 > 1.0 > 2.0 mm > 180 > 500 > 355 ≈ 250 > 125 > 63 pm > fraction < 63µm; Negro river: fraction less than 63µm > 125 > 63 ≈ ≈ 180µm 1.4mm > 2.0mm ≈ 355 ≈ 500 > 250 uM > 1.0mm; Tocantins river: 1.0 mm > 180 ≈ 125 > 250 > 63 µm > 1.4mm ≈ 500 > 355µm > 2.0mm > fraction <63µm. As for total mercury concentration (Figure 1) could be established the following descending order of the springs with different water classes: Negro river>Madeira River≈ Tocantins river. In fractions, the highest total mercury concentrations were determined in those with higher COT. According to Oliveira et al. (2011), this can be explained due to complexation with the metal species humic substances.

Figure 1. Total mercury concentrations determined in the organic matter extracted from bottom sediment samples collected in the Madeira river, Negro river and Tocantins river.



Conclusion

Sediment collected in spring of black waters (Negro river) have higher concentrations of total organic carbon that the white water (Madeira river) and clear (Tocantins river). Consequently, higher concentrations of total mercury. The highest total mercury concentrations in the extracted organic matter of sediments were determined in the smaller size fractions for the black water fountain. On the other hand, in white water sources and clear water were characterized greater total mercury concentrations in the larger particle size fractions.

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