Is the Curuai floodplain (Middle Amazon, Brazil) an efficient trap for particulate mercury?

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Particulate mercury (Hg) biogeochemical dynamics has been investigated in the Curuai floodplain system constituted of thirty lakes interconnected and linked to the Amazon River by nine main channels. Total Hg analyses were performed in the total suspended solids (TSS) in the water column of each main lake and in the bottom sediments (till 50 cm depth) for different hydrological periods. The total mercury concentrations (T-Hg) measured in the TSS, ranged from 0.93 to 3.51 nmol.g-1, with maximum values at the sediment-water interface (SWI) owing to a formed transient oxic-anoxic oscillation zone that promote the T-PHg exportation from bottom sediments to the water column, process induced by the wind action and bioturbation in shallow water lakes. We did not observe any temporal variation of T-Hg concentrations in the bottom sediments, whereas a spatial variation was observed depending on the biogeochemistry of the studied floodplain lakes. The black water lakes showed the highest average values of T-Hg and total organic carbon (TOC) (0.81 ± 0.20 nmol.g^{-1} and 21.70 ± 6.90 mmol.g^{-1}, n = 2 for both). Contrary to the white water lakes, the

black water lakes are characterized by an enrichment in Hg of the particles compared to the Amazon river inputs, confirming the predominant role of the biogeochemical processes in the Hg speciation compared to the hydrodynamics of the system. The particulate Hg is highly correlated to the particulate Mn (P-Mn) in the TSS. In the white water lakes TSS, the increasing of the P-Mn doesn't induce the same behaviour in their Hg content showing the low sedimentation rate of T-PHg in the floodplain lakes. This observation is confirmed by the T-Hg concentrations in the sediment cores where the maximum values (up to to 1.04 nmol.g^{-1}) are observed in the first 10 cm. The particulate Hg (P-Hg) burden associated with the fine particle fraction deposited in the Curuai floodplain has been estimated at $\sim$100 kg P-Hg.y^{-1} (between 66 to 128 kg P-Hg.y^{-1}) which represents only 7% of the daily P-Hg flux of the Amazon R. during the rising water stage (when flooding the plain and its lakes). In conclusion, the Curuai floodplain system doesn't represent an efficient trap for particulate Hg and its speciation and cycle is more influenced by the local biogeochemical processes than by the sediment dynamics.