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Coupled biogeochemical hydrologicprocesses controlling arsenic and metal redox cycling in Varzea Floodpains, Brazil.

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The Amazon floodplain is a dynamic system where the exchange of water, carbon, trace elements and gases depend on hydrological connectivity between the river, floodplain and groundwater. A critical emerging issue in the management of water resources, tropical forests and livelihood of local communities regards chemical water quality, which can be impaired by redox-sensitive elements such as As and Mn. Furthermore, water quality issues are compounded by global climate change, since warming can cause shifts in aerobic and/or anaerobic microbial process that drive carbon, metal and contaminant dynamics.

The goal of this research project is to investigate coupled biogeochemical-hydrological processes that control the biogeochemical cycling of redox-sensitive metals/metalloids like arsenic (As), manganese (Mn) and iron (Fe) in várzea floodplains and associated water bodies within lowland regions of the Amazon Basin. The hypothesis guiding this research is that changes in organic carbon fluxes and chemistry related to river dynamics drive microbial and geochemical processes that cause the release of contaminants into groundwater from the alluvial sediments.

Piezometers were installed in the amazon floodplains and sampling was conducted in dry and rainy season to investigate the exchange of metals/metalloids and organic matter between sediments, groundwater and surface water. We used a combination of elemental analysis, water isotope analysis and organic carbon analysis to decipher the cycling of C and metal / metalloids.