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Fate of arsenic in groundwaters of the Llanos de Moxos (Bolivian Amazon)

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On the South-American continent, especially in the Altiplano and the Chaco-pampean region, arsenic poisoning through drinking water has been documented early on. More recently, widespread natural arsenic enrichment of groundwater resources in the Peruvian and Brazilian Amazon has been discovered. Reducing subsurface conditions in the alluvial sediments deposited by the Amazon river and its tributaries originating in the Andes, are favoring arsenic mobilization in the aquifers. Hence, the controlling factors seem to be very similar to well-known affected basins in South and South-East Asia. As in the latter, a high spatial variability in arsenic concentrations in the studied floodplains prevail. Understanding the factors leading to this spatial variability is key for mitigation strategies for identifying arsenic-poor groundwater. In the Amazon Basin, it has been shown that the fluvial dynamics plays a crucial role for the enrichment of arsenic to concentrations harmful for human health. In particular, it is related to the most dynamic parts of floodplains of rivers carrying high sediment loads. Unraveling the fluvial dynamics of alluvial basins will therefore allow to predict geogenic arsenic contamination of its groundwater resources.

We tested this hypothesis in the Llanos de Moxos in the Bolivian Amazon. The Llanos de Moxos is a remote vast alluvial plain of about 130.000 km^2 to the east of the Andes. Several tributaries of the Madeira river pass this mosaic of wetland savannah and rainforest, affected by seasonal flooding. Here, we present initial results of a field campaign in which we sampled and analyzed water from about 70 tube wells in the Llanos de Moxos, covering different parts of this uncharted floodplain. In more than one third of the well water the arsenic concentrations are up to 40 times superior to the current WHO-guideline value of 10 µg/l. We link the hydrogeochemical data with the fluvial geomorphology and will discuss first results about the fate of arsenic in this area.