The influence of submarine groundwater discharge on coastal marshes in Louisiana, USA

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The chemistry of near-surface pore waters is commonly studied in coastal marshes, especially with respect to microbially induced redox reactions and cycling of contaminants. However, deeper groundwaters and more specifically, terrestrially derived groundwater discharge as a source of fresh water to coastal marshes has been largely understudied. A series of radon and geophysical surveys have indicated the presence of fresh groundwater fluxes in interdistributary channels of the lower Mississippi River, specifically in Bayou Fortier of Lac des Allemands and Myrtle Grove [1].

Lac des Allemands is a fresh, interdistributary lake, whereas Myrtle Grove displays a range of salinities over the }15 km transect that ends at Barataria Bay. Seasonal geochemical sampling of groundwater and surface water indicates high spatial and temporal variation of trace metal concentrations (i.e. V, As, Fe, Mn) at both sites. In surface waters, major ions generally shift from bicarbonate-rich to chloride-rich with distance from the river, suggesting mixing of river-sourced water and saline water occurs. In groundwaters of Myrtle Grove, sulfide, sulfate, and DOC covary suggesting that microbially driven sulfate reduction occurs in the marsh. Lac des Allemands lacks a marine sulfate source but displays variable Fe and As redox states. Trace metal concentrations at both sites vary as a function of redox and sorption reactions. Additionally, 10-20 cm short cores were taken in April and September 2014 to sample pore water changes with depth and determine the effects of sulfate and iron reduction with seasonal changes and fluctuating water levels.

[1] Kim et al. *Ocean Sciences Meeting* [Conference]. Hawaii, USA. 25 Feb 2014.