AGU FALL MEETING
San Francisco | 12–16 December 2016

B31H-0562: Geochemical response to hydrologic change along land-sea interfaces (Invited)

Wednesday, 14 December 2016
08:00 - 12:20
Moscone South - Poster Hall

Coastal groundwater-surface water interfaces are hotspots of geochemical activity, where reactants contributed by different sources come in contact. Reactions that occur along these land-sea boundaries have important effects on fluxes and cycling of carbon, nutrients, and contaminants. Hydrologic perturbations can alter interactions by promoting mixing, changing redox state, and altering subsurface residence times during which reactions may occur. We present examples from field and modeling investigations along the Delaware coastline that illustrate the impacts of hydrologic fluctuations on geochemical conditions and fluxes in different coastal environments. Along the highly populated Wilmington coastline, soils are contaminated with heavy metals from legacy industrial practices. We show with continuous redox monitoring and sampling over tidal to seasonal timescales that arsenic is mobilized and immobilized in response to hydrologic change. Along a beach, modeling and long-term monitoring show the influence of tidal to seasonal changes in the mixing zone between discharging fresh groundwater and seawater in the intertidal beach aquifer and associated impacts on biogeochemical reactivity and denitrification. In a saltmarsh, hydrologic changes alter carbon dynamics, with implications for the discharge of dissolved organic carbon to the ocean and export of carbon dioxide and methane to the atmosphere. Understanding the impacts of hydrologic changes on both long and short timescales is essential for improving our ability to predict the global biogeochemical impacts of a changing climate.

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