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102624 Sea Level Rise Alters Arsenic Speciation in Wetland Plants and Soils.

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Wednesday, November 9, 2016
Phoenix Convention Center North, Exhibit Hall CDE

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Presentation Description:

Abstract:
Coastal wetlands sequester large amounts of heavy metals in their sediments and biomass; however, sea level rise and invasive exotic plant species destabilize marsh ecosystems and may cause previously sorbed contaminants, such as arsenic (As), to be released. Marsh plants play a critical role in the fate and transport of As in wetlands through direct absorption into root tissue, sorption of the metal to iron plaques formed around the roots, and incorporation and secretion of As in aboveground biomass. These relationships were tested on *Phragmites australis* (common reed) and *Spartina Alterniflora* (marsh cordgrass), which were raised in a controlled growth chamber and exposed to saline conditions ranging from freshwater to seawater. The experiments were first conducted hydroponically and then in natural marsh soil. Arsenic concentrations were determined in the root plaques and aboveground plant biomass. Salts excreted on marsh cordgrass leaves were collected and analyzed. The distribution/association of As in the roots and soils collected from these experiments were also investigated using synchrotron-based micro-X-ray absorption near edge structure (micro-XANES) and micro-X-ray fluorescence (micro-XRF) spectroscopy, respectively. Roots and outer plaques were analyzed as whole and cryosectioned 30 µm cross-sections to spatially differentiate the oxidation state of the As sorbed on the plaques and absorbed in different regions of the roots. This study provides key insight to more fully understand the impact of sea level rise on the cycling, mobility, and speciation of redox sensitive As and other heavy metals in the rhizosphere of wetlands.

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