ACCIDENTIAL INTERVENTION: PRESCRIBED BURNING ALTERS TIDAL MARSH NITROGEN PROCESSING

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Tidal marshes are control points for water quality improvement, intercepting and removing terrestrial nitrogen (N) loads before they reach coastal waters. Prescribed burns are human interventions employed in coastal forests to restore habitat and promote native vegetation growth. Prescribed burns often extend into adjacent tidal marshes, altering vegetation biomass and community composition, but the impact on marsh N removal capacity is unknown. We investigated the impact of a prescribed burn on N processing in a tidal marsh at the Weeks Bay National Estuarine Research Reserve (WB-NERR) (AL, USA). WB-NERR uses prescribed burns to promote the growth of native understory vegetation in the forest and promote marsh landward migration. Using isotope pairing technique on sediment slurries, we measured N removal potential via microbial denitrification in plots dominated by one of three plant species (*Cladium mariscus*, *Juncus roemerianus*, and *Spartina patens*) leading up to and following a prescribed burn. We also measured plant above- and belowground biomass, porewater dissolved inorganic N concentrations, porewater sulfide concentrations, and soil bulk carbon and N concentrations. Following the burn, we observed a spike in porewater sulfide concentrations concomitant with reduced aboveground plant biomass across all three vegetation zones. Denitrification potential rates were highly variable but generally decreased in the months following the prescribed burn. We hypothesize that lower plant activity following the prescribed burn limited radial oxygen loss to the rhizosphere, which increased sulfide accumulation and inhibited denitrification rates. Additionally, the controlled burn dampened differences in N removal rates between vegetation types. Although prescribed burns may dampen N removal potential, they can also promote marsh landward migration into upland environments, providing a pathway for retreat in response to sea level rise. Thus, while burning may impact ecosystem functions in the short term, it may enable them to persist in the long term.

PRESENTER BIO: Dr. Tatariw is an ecosystem biogeochemist who specializes in nitrogen transformations in variably inundated ecosystems. Her research addresses how human disturbances such as land use change and climate change impact nutrient processing in both natural and human built systems, ranging from inland wetlands to coastal marshes to roadside ditches.