Does Mangrove Encroachment Enhance Biogeochemical Resilience to Sea Level Rise?

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Tidal marshes are biogeochemical control points in the landscape, intercepting and removing reactive nitrogen (N) at the terrestrial-marine interface. This function is tightly coupled to marsh vegetation, as plants can regulate soil redox conditions and provide organic carbon to heterotrophic microbes. However, climate change has resulted in multiple, often concomitant impacts on vegetation composition, productivity, and persistence, with subsequent impacts on associated belowground biogeochemical processes. We investigated how two climate disturbances, saltwater intrusion and mangrove expansion, impact soil nitrogen removal potential (i.e., denitrification). Individually, both disturbances can alter marsh nitrogen removal capacity. Salinization can lower plant productivity and increase sulfide accumulation in soil, inhibiting the denitrification pathway. In contrast, the change in root structure associated with mangrove encroachment can increase oxygen delivery to the soil, alleviating sulfide inhibition and promoting coupled nitrification-denitrification. To test how these concomitant disturbances can affect marsh nitrogen processing, we conducted a full factorial greenhouse experiment where *A. germinans* seedlings were grown in conjunction with *J. roemerianus* at increasing levels of salinity (0, 5, 10, 15 psu). We predicted that *A. germinans* would buffer salinity effects on denitrification potential rates, measured using the isotope pairing method on soil slurries. We found that salinity, rather than plant assemblage, impacted denitrification potential. Rates in the 0-salinity treatment were more than twice as high as all other salinity treatments. While there was a trend of higher removal potential in *A. germinans* compared to mixed and *J. roemerianus* treatments, there was no significant effect of assemblage on N-removal potential. Our results indicate that at least at early stages of mangrove growth, saltwater intrusion may have a greater impact on N-removal rates than mangrove expansion. However, it is possible that the greater salt tolerance of mangroves may help maintain ecosystem N-removal capacity.