A Novel Hybrid Approach for Mapping Belowground Productivity and Carbon Sequestration Potential within Georgia Salt Marshes

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ABSTRACT

The purpose of this study is to develop data fusion tools that use remote sensing to estimate both above and belowground production, GPP, CHL and overall carbon sequestration potential in salt marshes. We plan to accomplish these goals by adapting our initial algorithms for spectrally estimating foliar N, above and belowground biomass to a broader range of Georgia salt marshes. Additionally, by modifying a second existing algorithm to estimate salt marsh GPP based on spectral reflectance derived canopy chlorophyll measures and providing scaled-up, ground-truthed maps of our study areas that can serve as baseline measures for future monitoring of above- and belowground biomass, GPP and C sequestration potential within salt marshes. By developing scripts, training manuals and other tools for coastal decision makers within Georgia Department of Natural Resources and elsewhere, allows them to implement our research approach for future monitoring and decision making. Lastly, we hope to contribute to coastal marsh ecology education efforts and provide science experiential learning for students and educators in Georgia coastal communities.

Georgia contains 164,000 ha of estuarine wetlands (www.fws.gov/wetlands). Within these estuarine wetlands, salt marshes contribute up to 1713 g C m-2 to soils annually. It is important to understand patterns in salt marsh gross primary production (GPP) and belowground biomass because when these variables are low, marshes have low carbon sequestration potential and are vulnerable to sea level rise and habitat loss. We have pilot data that partly develops the approach we outlined for GA salt marshes. This proposal continues development of these salt marsh models more broadly. The technique we propose represents a novel approach with great potential for estimating productivity in coastal wetlands. Additionally, the models we develop may assist in evaluating the effectiveness of ongoing restoration projects. We anticipate that our project will enhance the monitoring practices currently employed by the Georgia Department of Natural Resources and other state and federal agencies, facilitating prioritization of conservation and restoration efforts. Further, these models may assist with national efforts to characterize blue carbon in coastal wetlands.