Modeling Soil Organic Carbon within the St. Johns River Basin

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Rising levels of greenhouse gas concentrations in the atmosphere have raised concern that human actions are altering the world's climate. Landuse change may be a significant contributor to this problem, but may also provide a way to re-capture carbon into terrestrial systems. The world soil carbon reservoir is approximately four times greater than the atmospheric carbon reservoir and five times greater than the biotic reservoir; as a result, relatively small changes in the terrestrial carbon pool could have a large impact on the climate.

The objectives of this study were to i) assess current soil organic carbon (SOC) stocks within the St. Johns River Basin (SJRB) and ii) relate SOC to environmental landscape factors, such as landuse/landcover and soil types. The study area measures 22,251 km^2 and has experienced significant landuse change. 304 sites were sampled across the basin (0-20 cm depth) and analyzed using a Shimadzu gas combustion analyzer to determine total soil carbon (TC) and derive bulk densities. SOC was derived by subtracting inorganic carbon (IC) from TC. Log-normal ordinary point kriging and block kriging were used to characterize the spatial distribution of SOC stocks (kg C m^{-2}) across the SJRB. Cross-validation and validation was performed to assess the quality of SOC predictions.

Our study indicated that major amounts of soil carbon are stored in wetlands, swamps and marsh systems that cover approximately 30% of the study area. Spodosols (30.8% coverage) and Histosols (9.8% coverage) accounted for the majority of the soil carbon budget.