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Research Project: LANDSCAPE-BASED CROP MANAGEMENT FOR FOOD, FEED, AND BIOENERGY

Location: Cropping Systems and Water Quality Research

Title: Spatially-explicit and spectral soil carbon modeling in Florida)

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Submitted to: ASA-CSSA-SSSA Annual Meeting Abstracts
Publication Type: Abstract Only
Publication Acceptance Date: 7/20/2011
Publication Date: 10/16/2011
Citation: Grunwald, S., Myers, D.B., Vasques, G., Xiong, X., Ross, C.W., Chaikaew, P., Stoppe, A., Knox, N.M., Comerford, N., Harris, W. 2011. Spatially-explicit and spectral soil carbon modeling in Florida [abstract]. ASA-CSSA-SSSA Annual International Meeting, October 16-19, 2011, San Antonio, Texas. 390-5.

Interpretive Summary:

Technical Abstract: Profound shifts have occurred over the last three centuries in which human actions have become the main driver to global environmental change. In this new epoch, the Anthropocene, human-driven changes such as population growth, climate and land use change, are pushing the Earth system well outside its normal operating range causing severe and abrupt environmental change. In this context, we present research highlights from Florida (150,000 km2) showing how anthropogenic-induced changes have had major impacts on carbon dynamics in soils, including (i) modeling of carbon and nutrient dynamics and soil carbon sequestration impacted by climate and land use change; (ii) geospatial assessment of soil carbon stocks and pools, and (iii) spectral-based soil carbon modeling. Our research is embedded in the STEP-AWBH modeling concept which explicitly incorporates Human forcings and time-dependent evolution of Atmospheric, Water, and Biotic factors into the modeling process. Spatially-explicit soil carbon observations were fused with ancillary environmental data and various statistical and geostatistical methods were used to upscale soil carbon across the region. Our results suggest that soil hydrologic and taxonomic, biotic (vegetation and land use), and climatic properties show complex interactions explaining the variation of soil carbon within this heterogeneous subtropical landscape.Profound shifts have occurred over the last three centuries in which human actions have become the main driver to global environmental change. In this new epoch, the Anthropocene, human-driven changes such as population growth, climate and land use change, are pushing the Earth system well outside its normal operating range causing severe and abrupt environmental change. In this context, we present research highlights from Florida (150,000 km2) showing how anthropogenic-induced changes have had major impacts on carbon dynamics in soils, including (i) modeling of carbon and nutrient dynamics and soil carbon sequestration impacted by climate and land use change; (ii) geospatial assessment of soil carbon stocks and pools, and (iii) spectral-based soil carbon modeling. Our research is embedded in the STEP-AWBH modeling concept which explicitly incorporates Human forcings and time-dependent evolution of Atmospheric, Water, and Biotic factors into the modeling process. Spatially-explicit soil carbon observations were fused with ancillary environmental data and various statistical and geostatistical methods were used to upscale soil carbon across the region. Our results suggest that soil hydrologic and taxonomic, biotic (vegetation and land use), and climatic properties show complex interactions explaining the variation of soil carbon within this heterogeneous subtropical landscape.