



## Estimating Regional Changes in Soil Organic C Stocks using a Combination of Modeling and Measurements

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Quantifying soil organic C change from regional to continental scales is needed to understand the impact of land use and management on the carbon cycle. We have developed an approach combining process-based modeling with measurements to simulate carbon stock changes across a range of scales, with the goal of providing unbiased results with rigorous estimates of uncertainty. The approach has been applied in the US using land use and management data for the past few decades from a point-based survey in combination with weather and soils data as well as remote sensing data on vegetation greenness. Model-based results demonstrate that the agricultural soil C stocks are largely, but not exclusively controlled by land use and management in US croplands, particularly tillage practices, decisions to include forage or hay in cropping rotations, and setting-aside cropland from production. Uncertainties are addressed using a combination of a Monte Carlo simulation approach and an empirically-based method comparing model results to measurements, with the goal of assessing not only the variance in model results but also any biases. Reducing uncertainties will depend on model improvements, but also depend on an expanded network of measurements to evaluate uncertainties in the model results.