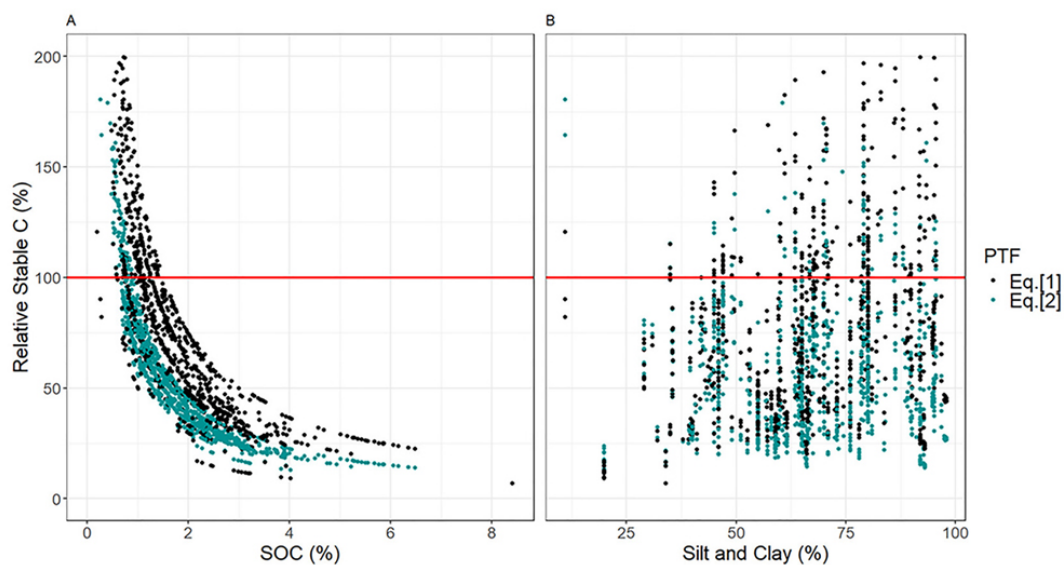




Updating how stable carbon is estimated in models

October 13, 2026



Comparison of relative stable carbon values from texture and soil organic carbon (SOC) samples within an independent dataset, using either the traditional equation (1) or the new equation (2) to calculate absolute stable carbon. The red line indicates when relative stable carbon is overestimated (>100%). Data are plotted against the sample's total SOC content (A) or silt + clay content (B). Figure courtesy of Cara Mathers, first author on the study.

Ecosystem models are increasingly being used to understand and predict the impact of agricultural management on soil organic carbon (SOC), and SOC on crop productivity. Many of these models have been built over decades by multiple authors, which means that it's worthwhile to periodically comb through the model to surface and challenge assumptions that may no longer hold.

In the DSSAT-CENTURY model, stable carbon is initialized using an equation derived from soil samples collected within a limited geographic area. How stable carbon is initialized in the model will affect nutrient availability and carbon stock change over time. Researchers at the Soil Health Institute in partnership with the University of Florida developed a new equation using data from the North American Project to Evaluate Soil Health Measurements (NAPESHM) that include a greater range of soil texture over a much broader area.

When tested against an independent dataset, the new equation was less likely to overestimate stable carbon, particularly for fine-textured soils. Because DSSAT is used as a decision support tool across the globe, improving estimates of stable carbon could strengthen soil management recommendations.

Dig deeper

Mathers, C., Bagnall, D. K., & Morgan, C. L. S. (2026). Updating carbon pool initialization within DSSAT-CENTURY. *Soil Science Society of America Journal*, 90, e70239. <https://doi.org/10.1002/saj2.70239>

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