Regenerating soil organic matter for the benefit of climate and food production: A systemic multifaceted approach

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Soil organic matter (SOM) provides critical agroecosystem services. Its stewardship, including its preservation and further accrual, is key to increasing resilience of food production to a changing climate, and to avoid an irreversible climate crisis. Recently our understanding of the processes and drivers of SOM formation and persistence has advanced within a coherent framework. Applying this framework can support the design of integrated measurement-modeling platforms to inform best agriculture management practices for the stewardship of SOM. I will present our latest framework to conceptualize SOM structure, formation, and persistence, and a coherent measurement-modeling approach we implemented and use. I will illustrate how SOM may affect soil properties which in turn determine the soil's capacity for functioning and ability to provide desired outcomes including supporting plant productivity, and climate adaptation and mitigation. Finally, I will provide examples of applications of our approach to quantify and forecast SOM changes under regenerative agriculture.