



Making it real: operationalizing soil C sequestration and GHG mitigation on agricultural lands

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Land use and management account for roughly one-third of total anthropogenic greenhouse gases (GHGs) with about 10-12% coming from active management, primarily on agricultural lands and ca. 15-20% from land clearing and deforestation, which in many instances is tied to expansion of agricultural land use. Within this larger GHG source category of land use, soils play a significant role not only as a GHG source but also as a potential sink, through storing C in soil organic matter. However, despite 'being in the conversation' for many years, there has been relatively little engagement of agriculture, particularly with regards to soil management, in policies and programs for GHG mitigation. Now, that appears to be changing and there is increasing interest in 'bottom-up' strategies to incentivize agricultural management practices that sequester C in soils and reduce non-CO₂ soil emissions, ranging from GHG offset projects within cap-and-trade systems, to inclusion of GHG emission reductions in 'green labeling' of agricultural products for consumers. In this paper, we review current knowledge of how soil management practices impact emissions and removals of GHGs and the current status of agricultural soil mitigation activities, in the US and globally. Critical areas for science support to further operationalize soil GHG mitigation strategies at local to national scales are discussed, including providing rigorous quantification technologies into the hands of management practitioners, providing estimates of impacts on productivity and costs associated with implementing mitigation practices, and gathering data on baseline practices and monitoring changes in practices over time.