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Effect of Soil Texture on Carbon Dynamics and Storage Potential in Tropical Forest Soils of Amazonia.

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We investigated the role of soil clay content in the storage and dynamics of soil carbon at primary tropical forest sites spanning a range of soil texture by combining stable and radiocarbon isotope measurements of bulk and fractionated soil organic matter. Clay content is a major control of the amount of refractory carbon in soils and therefore strongly influences the storage and dynamics of carbon in tropical forest soils. Soils in primary tropical forest have been proposed as a potentially large sink for carbon at a site near Manaus, in the central Amazon. Comparison of carbon contents of Oxisols sampled near Manaus, Brazil, over the past 20 years shows no measurable change in organic carbon stocks with time. Simple models estimating the response of soil carbon pools to a 25% increase in productivity indicate that storage rates in soils averaging 0.4 to 0.7 MgC ha⁻¹ yr⁻¹ in soil organic matter and 0.3 to 0.4 MgC ha⁻¹ yr⁻¹ in litter and roots are possible in the first decade following the increase. Export of carbon in dissolved form from terra firme soils can account for <0.1 MgC ha⁻¹ yr⁻¹, but more work is required to assess the export potential for Spodosols.