



Sampling protocol recommendations for measuring soil organic carbon stocks in the tropics

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In the tropics, there is an urgent need for cost effective sampling approaches to quantify soil organic carbon (SOC) changes associated with land-use change given the lack of reliable data. The tropics are especially important considering the high deforestation rates, the huge belowground carbon pool and the fast soil carbon turnover rates. In the framework of a pan-tropic (Peru, Cameroon and Indonesia) land-use change study, some highly relevant recommendations on the SOC stocks sampling approaches have emerged. In this study, where we focused on deeply weathered mineral soils, we quantified changes in SOC stock following land-use change (deforestation and subsequent establishment of other land-uses). We used a space-for-time substitution sampling approach, measured SOC stocks in the top three meters of soil and compared recently converted land-uses with adjacent reference forest plots. In each respective region we investigated the most predominant land-use trajectories. In total 157 plots were established across the three countries, where soil samples were taken to a depth of three meters from a central soil pit and from the topsoil (to 0.5m) from 12 pooled composite samples.

Finding 1 - soil depth: despite the fact that the majority of SOC stock from the three meter profile is found below one meter depth (50 to 60 percent of total SOC stock), the significant changes in SOC were only measured in the top meter of soil, while the subsoil carbon stock remained relatively unchanged by the land-use conversion. The only exception was for older (>50 yrs) cacao plantations in Cameroon where significant decreases were found below one meter.

Finding 2 - pooled composite samples taken across the plot provided more spatially representative estimates of SOC stocks than samples taken from the central soil pit.