



Fate of BC in tropical sloping soils managed by slash and burn agriculture in Northern Laos

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In the sloping lands of Northern Laos, the traditional slash and burn agriculture leads to the production of black carbon (BC), generally thought to be a stable SOM fraction. BC may directly influence the quantity and quality of SOM sequestered in tropical soils and additionally be subject to water erosion. In this study we investigated the contribution of BC and mineral bound carbon on carbon content, chemical composition and mean residence time of SOM. The soil horizons of five soil profiles were sampled along a soil catena from Inceptisols under forest at the hills summit to Ultisols at the bottom of the slope. The BC content in the soils is the residual carbon after bichromate oxidation whereas mineralbound carbon is the carbon pool lost upon soil demineralisation. The contribution of these two SOM types was compared to the soils carbon content and their ^{14}C activity as an indicator of carbon stability.

BC contribution increased the carbon content of the soils, whereas the presence of mineralbound carbon had a negative influence. In contrast, mineralbound carbon controls the stability of the organic matter since it is correlated with the soil ^{14}C activity ($p=0.97***$). BC content showed an opposite trend with no correlation with the soil ^{14}C activity. This may be explained by: (1) a rapid microbial degradation of BC under tropical climate conditions and/or (2) the preferential erosion of BC on sloping land.

The second hypothesis was tested by analysis of BC and mineral bound carbon content of eroded sediments collected on site and at the outlet of the watershed. These results confirmed the second hypothesis and showed that BC is a determining factor of carbon

content and the chemical composition of SOM in tropical sloping land under slash and burn agriculture. Its erosion may lead to a decrease of the ability of soils to act as a sink for CO₂. These results further suggest that erosion of BC could be a crucial process for determining its fate in terrestrial ecosystems.