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Stable isotopes and chemical composition at different spatial scales indicate sink function of eroded OC in a tropical catchment

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Our objective was to evaluate the fate of eroded carbon at landscape level in a steep slope area of the Mekong basin submitted to traditional slash-and-burn (SAB) agriculture. We monitored carbon erosion at different spatial scales ranging from 1m^2 (micro-plot level) installed within a hillslope to 1$\times$107 m^2 (watershed). Samples were taken throughout the 2003 rainy season, in order to quantitatively assess the fate of eroded OC. Laboratory analysis of the chemical composition of eroded OC by analysis for its elemental, istotopic (13C, 15N, 14C) and bulk chemical composition were performed to assess potential microbial decomposition of eroded sediment during transport and sedimentation.

Our data show, that 92.7% of eroded OC were sedimented at a distance lower that 1.5m from its source. Analysis of the composition of eroded organic matter at different scales showed a significant decrease of the C/N ratio and an enrichment of 13C and 15N isotopes, which occurred within the hillslope and in first order reaches. These changes were interpreted as resulting from OC decomposition and used to assess the CO2 emissions, which might have occurred during the erosion process. Our results indicate, that within the hillslope, potential CO2 emissions with 0.43 gCm-2y-1 would be 3.3 times higher than the OC exports by water erosion but represented about 10% only of the OC deposited. Potential CO2 emissions during the transport from the hillslope to the watershed outlet would represent 14% of total eroded OC. Based on these results, we suggest that erosion induced OC sequestration amounts to 43 gCm-2y-1 in the hillslope and, 33 gCm-2y-1 at the watershed level.