Geophysical Research Abstracts
Vol. 14, EGU2012-4197-2, 2012
EGU General Assembly 2012

Effects of land use change on soil organic carbon: a pan-tropic study

O. van Straaten, E. Veldkamp, K. Wolf, and M. D. Corre

Georg-August-University of Goettingen, Buesgen Institute, Soil Science of Tropical and Subtropical Ecosystems, Goettingen, Germany (ostraat@gwdg.de, +49551393513)

Tropical forest deforestation is recognized as one of the major contributors to anthropogenic greenhouse gas emissions. In contrast to aboveground carbon stocks, comparatively little is known on deforestation's effect on the magnitude and the factors affecting soil organic carbon (SOC). In this regional scale study, we focused on tropical sites with deeply weathered, low-activity clays soils in three countries: Indonesia, Cameroon and Peru. Using a clustered sampling design we compared soil carbon stocks in the top 3 m of soil in undisturbed forests (the reference) with converted land uses that had been deforested. The most predominant land use trajectories relevant for each region were investigated. These included (a) conversions from forest to cash-crop plantations (rubber, oil palm, cacoa), (b) conversions from forest to cattle grazing pastures and (c) conversion from forest to shifting cultivation. Preliminary results from the Indonesian case study, found that the conversion of forests to oil palm plantation caused a loss of 20.1 $\pm$ 4.4 Mg C ha^{-1} within 20 years from the top 3 m of soil, while deforestation followed by the establishment of rubber plantations caused a release of 7.2 $\pm$ 4.2 Mg C ha^{-1} for the same time period and depth. SOC losses were most pronounced in the top 30 cm, and less so below. Additionally, regional scale constraints such as soil physical and chemical characteristics (texture, CEC, pH) and climate (precipitation, temperature) effect on SOC emissions have been identified using multivariate statistical methods. The results from the Cameroon and Peru case studies are expected imminently.