



Soil erosion and associated organic carbon transfer along the southern Amazon land use frontier – status quo and future scenarios

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The Southern Amazon deforestation arc is one of the world's most dynamically changing landscapes mainly caused by global demands on animal products. Already more than 50 % of the savanna vegetation in Mato Grosso is converted to agricultural land. Following the BR-163 highway to the north deforestation is continuing, where former tropical rainforest is converted to pastures. Consequences are expected to be negative and highly relevant concerning soil functions. Soil losses and related carbon transfer by water erosion are likely to occur on a larger scale.

Within the Carbiocial project, the impact of land use changes on soil loss was measured by applying artificial rainfall simulations. Experimental results were used to parameterize the physical based EROSION 3D simulation model in two meso-scale watersheds. The impact of future land use and climate scenarios on soil erosion and particle bound organic carbon transfer were simulated in addition to present day effects.

Our results allow different predictions: Land use changes from natural vegetation to pasture lead to increased surface runoffs and soil losses. Due to the predominant no-tillage management, croplands do not reveal a similar behaviour; runoff and sediment yields are close to the initial level. Particle bound organic carbon losses are negligible compared to the removal of biomass during deforestation. Compared to the land use change effect more significant differences appear concerning the predominant soil types of the study region. Deterioration of soil functions are less pronounced for Ferralsols with a stable microstructure than for Acrisols. Additionally, our data suggest, that the main soil losses are related to the narrow time windows of land use conversion.

Consequently, intensifying production on existing agricultural land rather than creating new production area (deforestation) might be the most practical way of preserving soils of the Southern Amazon.