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“Resilience of agricultural systems against crises”

Models and Implementation of Carbon-Optimised Land Management Strategies in Southern Amazonia: Carbiocial

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Abstract

The globally relevant land use frontier of southern Amazonia is extremely dynamic. Deforestation is accelerating along the Cuiabá-Santarém highway and is associated with further major C losses and GHG releases. Global interest in curtailing these emissions is high as the relevance of the affected ecosystems (rainforest and savannahs) for C storage and GHG cycling is of global importance. Model calculations of C and GHG fluxes from the respective ecosystems for different land use scenarios are still highly uncertain because (a) dynamic land use patterns are not fully captured yet and (b) GHG models need precise in-situ calibration. Consequently, regionally specified models are essential and the key target of this project.

The main goals of this multi- and interdisciplinary approach for Brazilian-German cooperation within the BMBF-FONA-programme are viable C-optimised land management strategies mitigating GHG emissions and maintaining ecosystem services (ESS) under changing climate conditions. They are urgently needed to meet the goals set by Brazilian national plans and international treaties such as REDD and the Kyoto protocol.

Three regions along the land use frontier of southern Amazonia were selected: Novo Progresso (southern Pará): most active deforestation; Sinop (northern Mato Grosso): young soy bean production; Cuiabá (Central Mato Grosso): established cultivation (>20 years) and adapted mechanised cropping (*e.g.* no till). Analyses focus on soil carbon (C) turnover, climate, ecosystem functions and socio-economic processes. Simulation models will be combined as software packages to support the decision-taking process based on field and acquired data, including a step-by-step up-scaling from local to landscape and regional scale. All research and implementation activities include direct involvement of the stakeholders. Furthermore, joint field experiments for improving C storage and ecosystem functions will be performed on-farm in tight cooperation with state (Environmental Agencies, district administration) and private organisations (farmer) of Mato Grosso and southern Pará.

The presentation will give an overview on the Brazilian-German collaborative research and progress of research results.

Keywords: Carbon-optimised land management, climate change, decision support system, ecosystem services, land use change, southern Amazonia