

Influence of tropical land-use transformations on local and regional climate in Sumatra/Indonesia

Land transformation from natural to managed ecosystems such as oil palm and rubber plantations might result in changes of greenhouse gas fluxes (CO_2 and CH_4) and of local and regional climate due to land-atmosphere feedbacks after changed surface properties. The sink/source strength for greenhouse gases at ecosystem scale after such transformations is yet unknown. In addition, land-atmosphere feedbacks are non-linear and additionally complicated by climate change. To gain knowledge of the ecological impacts of transformation of rainforest into agricultural systems in Indonesia this project will combine measurements and modeling approaches to upscale the fluxes of carbon, nitrogen, biotic and abiotic drivers to landscape level and study their interactions between land and atmosphere. Climate projections (A1B) modeled by General Circulation Model (planned: ECHAM5-MPIOM) will be dynamically downscaled to regional and local scales by means of a Regional Climate Model (CCLM coupled to the Community Land Model). The uncertainties of projections will be evaluated. The models' outputs will be tested for biases. The land surface model coupled with the regional climate model will be parameterized with the help of our water, energy and Greenhousegas measurements and remote sensing. The effects of spatial and temporal variability on ecological functions will be quantified. With this we will improve the sustainability of land use in lowland tropical regions.