



Modeling land-atmosphere interactions: the impact of deforestation in tropical Africa on the regional climate.

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Deforestation is generally seen as an alarming trend, especially in third world countries. This research focuses on the climatological impact of anthropogenic forest degradation in tropical Africa, a study area which has received relatively few attention. Building on previous studies, additional and new research methods are applied. A regional climate model (COSMO-CLM) will be used and coupled to a soil-vegetation-atmosphere transfer component (the Community Land Model). As this research just started, the poster presentation will give an overview of the project, which is described below.

Firstly, the impact of overall deforestation estimates will be quantified by applying a spatial algorithm for different deforestation amounts, constrained by allocation rules. Secondly, this algorithm will also be used to investigate the impact of spatial deforestation patterns, e.g. concentrated versus dispersed logging. Thirdly, climate-vegetation feedbacks will be included in the model runs. Physiological effects of increased greenhouse gases on vegetation (e.g. reduction of stomatal conductance, hence decrease in transpiration) and dynamical vegetation cycles (e.g. reaction of leaf area index on dry spells and heat stress) are the focus of interest. Finally, the effect of land cover change on detailed atmospheric processes such as convective activity will be studied.

The second as well as the fourth goal requires a substantial increase in spatial detail compared to current studies, which will be obtained by increasing the horizontal resolution (for the atmospheric model and for the land cover data) and making use of sub-grid flux calculations for energy and moisture. The impact of the above-mentioned elements will be quantified by comparing different model simulations. The overall climate forcing from land cover change will be compared with the forcing from greenhouse gases, which allows for quantifying their relative importance.