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Hysteresis in the Central African Rainforest

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Past climate change caused severe disturbances of the Central African rainforest belt, with forest fragmentation and re-expansion due to drier and wetter climate conditions. Besides climate, human induced forest degradation affected biodiversity, structure and carbon storage of Congo basin rainforests. Information on climatically stable, mature rainforest, unaffected by human induced disturbances, provides means of assessing the impact of forest degradation and may serve as benchmarks of carbon carrying capacity over regions with similar site and climate conditions. BioGeoChemical (BGC) ecosystem models explicitly consider the impacts of site and climate conditions and may assess benchmark levels over regions devoid of undisturbed conditions.

We will present a BGC-model validation for the Western Congolian Lowland Rainforest (WCLRF) using field data from a recently confirmed forest refuge, show model – data comparisons for disturbed und undisturbed forests under different site and climate conditions as well as for sites with repeated assessment of biodiversity and standing biomass during recovery from intensive exploitation. We will present climatic thresholds for WCLRF stability, analyse the relationship between resilience, standing C-stocks and change in climate and finally provide evidence of hysteresis.