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## Multi-scale time series of biophysical parameters and vegetation structure in heterogeneous landscapes of West Africa

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### Abstract

The aim of the BMBF-funded research project CONCERT is to identify emission mitigation options for the major greenhouse gases (GHG), in parallel with improving food security in West Africa. This will be achieved – among others – through the estimation and projection of GHG emission budgets for the region using a fully-coupled regional Earth System Model (ESM), specifically adapted to the WASCAL region.

Science-based information for adaptive land management requires quantification of vegetation parameters at stand-scales, and updated high-resolution land cover and vegetation maps to upscale measured GHG fluxes to country-scales. For reliable ESM predictions of future GHG budgets and crop productivity, we need to improve our understanding of the spatial pattern and temporal dynamics of land use and land cover (LULC) in West Africa.

Satellite Earth observation can provide valuable datasets of vegetation dynamics and structure, but global products are oftentimes not perfectly suited to regions like West Africa as they are coarse in spatial and temporal resolution.

Here, we assess time series of the leaf area index (LAI) based on earth observation data at different spatial and temporal resolutions. Time series methods allow to fill gaps in the spatial and temporal domains in order to compute dense time series and assess vegetation dynamics. Time series of Sentinel-2-based LAI allow to detect multiple growing cycles with specific magnitudes and provides structural information of vegetation as an important input of ESM. Our regional focus lies thereby on Burkina Faso and Ghana and specifically on the border region between the two countries.

**Keywords:** Biophysical parameters, Copernicus, leaf area index, time series, vegetation structure