* + 1. Improved modeling of vegetation photosynthesis under highly variable ambient conditions by use remote sensing observations

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**Abstract**

Photosynthesis is a complex physiological process that consists of numerous bio-physical sub-processes and chemical reactions. Spatial and temporal patterns of photosynthesis depend on dynamic plant-specific adaptation strategies and highly variable environmental conditions. Currently the dynamic adaptation of plant photosynthesis is not correctly parameterized in local, regional and global carbon models (Hilker et al. 2008). State-of-the-art models are often only able to simulate potential photosynthesis in certain time steps and do not account for dynamic adaptation of the physiological status of plant canopies. However, differences between potential and actual photosynthesis may have a drastic influence on the carbon balance and calculations of gross primary productivity (GPP). Recently, passive or active monitoring of chlorophyll fluorescence with hyperspectral sensors is successfully used for tracking the dynamic vitality of the photosynthetic apparatus (Meroni et al. 2009)). Fluorescence was successfully related to vegetation light use efficiency, suggesting its suitability as a proxy for carbon assimilation (Damm et al 2010).

The objective of this project is to test the assimilation of remotely sensed passive chlorophyll fluorescence, in the Community Land Model (CLM; http://www.cgd.ucar.edu/tss/clm) for improved modeling of photosynthesis and transpiration. Within the framework of the Transregio32 project (www.tr32.de) we will install automated hyperspectral sensors in spring 2012 (a) at a temperate grassland site (riparian meadow) and (b) at an agricultural site (sugar beet, winter wheat) located in the Rur catchment area in west Germany. The sensors will record time series of sun-induced fluorescence of canopy in the footprint of eddy covariance towers. While this project is in an early stage and no measurements are taken up to now, we will present our working concepts.

**References**

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