



## Evaluation of key parameters controlling phenology-induced variability of surface fluxes in land surface models

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Over the past decades, land surface models have evolved into advanced tools which comprise detailed process descriptions and interactions at a broad range of scales. One of the challenges in these models is the accurate simulation of plant phenology. It is a key element at the nexus of the simulated hydrological and carbon cycle, where the leaf area index (LAI) plays a major role in flux partitioning, water balance and gross primary production.

In this study, three well-established models are used to simulate the intrinsically coupled fluxes of water, energy and carbon from terrestrial vegetation. ORCHIDEE, ISBA-CC and the LSA-SAF algorithm each have a different approach to represent plant phenology. Whereas ISBA-CC has a fairly simple biomass allocation scheme to represent the phenological cycle, ORCHIDEE relies on a dedicated phenology module, and LSA-SAF is driven by remote-sensed forcing variables, such as LAI. Simulations were performed for a wide range of hydro-climatic biomes and plant functional types at field scale. The simulated fluxes were validated using eddy-covariance measurements, and the simulated phenology was compared to remote-sensed observations.

These models are tools to extrapolate leaf-level processes to global scale climate predictions. The origin of the parameters controlling phenology-induced variability in these models ranges from plant-scale lab experiments to global-scale calibration. The aim of this study is to investigate the key parameters controlling phenology-induced variability in these models.