



## **High-resolution simulations of vegetation growth over France between 1994-2007: Analysis of its inter-annual variation.**

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Land surface models describe the exchange of water, carbon and energy between the continental biosphere and the atmosphere. They are an important part of the numerical weather prediction systems and a valuable tool to describe and understand the functioning of the vegetation. In particular, allowing a more accurate quantification of the inter-annual variability of the vegetation, which is strongly driven by climate variations.

The increase in computational power and the development of new datasets provide us now with the means to perform simulations covering large domains at spatial scales similar to in-situ flux tower measurements. In this context; the CARBOFRANCE project studies the variability of carbon and water fluxes over France. The project includes analyses of measurements obtained from 14 existing flux towers in combination with high-resolution process models. As part of this project, new simulations of the vegetation (LAI, water and carbon fluxes) have been undertaken over southwestern France (a domain of 68,000 km<sup>2</sup>). Using a high resolution (1km) land cover map (ECOCLIMAP II) and an 8km resolution hourly meteorological forcing data set (SAFRAN), the land surface model ISBA-A-gs (included in the SURFEX modelling platform) was run to produce prognostic LAI for the region.

Through this modelling framework we obtained LAI estimates for more than a decade and at a high spatial resolution (8 km). These data allow us to study in depth the relationship between vegetation and atmosphere in contrasted environments.

In this study we have

- a) evaluated the model with both in situ measurement and remote sensing products)
- b) investigated the inter annual variation of a number of simulated variables (carbon, water and energy fluxes)
- c) Compared our simulations with similar simulations from the ORCHIDEE model.

In particular, the simulated LAI is compared with LAI products derived from the MODIS sensor. The impact of the heatwave that occurred throughout Europe in 2003 is also assessed.