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2011 spring drought in France : Evaluation of the SURFEX land surface model.

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The spring of the year 2011 has been exceptionally dry in Western Europe. Over France, May 2011 has been one of the driest over the last 50 years. This event had a marked impact on vegetation development leading to very low value of the Leaf Area Index (LAI) during the growing season . In contrast, July 2011 has been in general wet and cold allowing a new vegetation development. This extreme event, followed by higher than normal rainfall is an excellent case-study to evaluate the capacity of a land surface model to simulate the drought impact on vegetation, and vegetation recovery after a drought.
In this study, we used the SURFEX land surface model, in its ISBA-CC (CC stands for Carbon Cycle) configuration. The ISBA-CC version simulates the vegetation carbon cycle, interactive LAI and the carbon accumulation in wood and in the soil organic matter. This model is used by the GEOLAND2 Land Carbon Core Information Service.
We performed 20-years simulations of SURFEX at high resolution (8 km) with atmospheric forcing from the SAFRAN dataset, an operational product over France. The vegetation map is provided by the ECOCLIMAP2 database.
Following previous work that have confirmed a good simulation of the LAI inter-annual variability, this study investigates the ability of the model of reproducing the observed anomalies of LAI in 2011, in terms of timing and spatial patterns. We compare the simulated LAI with long time series (10 yr) of LAI derived from Earth Observation product within GEOLAND2 BIOPAR project.
We quantify the anomalies of energy, water and carbon fluxes. We investigate the robustness of these results and the impact of modifying several important sub-modules of the model: soil texture, photosynthesis, and rainfall interception.