Effects of climate change on phenology in two French LTER (Alps and Brittany) for the period 1998-2009

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Climate and vegetation are linked all over the world. In this study, we work on a seasonal weather classification based on air temperature and precipitation to deduce a link with different phenological stage (greening up, senescence, ...) over a 12 year period (1998-2009) for two different domains in France (Alps and Brittany). In temperate land, the main climatic variable with a potential effect on vegetation is the mean temperature followed by the rainfall deficit. A better understanding in season and their climatic characteristic is need to establish link between climate and phenology; so a weather classification is proposed based on empirical orthogonal functions and ascending hierarchical classification on atmospheric variables. This classification allows us to exhibit the interannual and intra-seasonal climatic spatiotemporal variability for both experimental site. Relationships between climate and phenology consist in a comparison between advance and delay in phenological stage and weather type issue from the classification. Experiment field are two french Long Term Ecological Research (LTER). The first one (LTER 'Alps') have mountain characteristics about 1000 to 4780 m ASL, $\sim$65% of forest occupation ; the second one (LTER Armorique) is an Atlantic coastal landscape, 0-360 m ASL, $\sim$70% of agricultural field. Climatic data are SAFRAN-France reanalysis which are developed to run SVAT model and come from the French meteorological service 'Météo-France'. All atmospheric variable needed to run a hydrological model are available (air temperature, rainfall/snowfall, wind speed, relative humidity, incoming/outcoming radiation) at a 8×8 km^2 space resolution and with a daily time resolution. The phenological data are extracted from SPOT-VGT product 1×1 km^2 space resolution and 10 days time resolution) by time series analysis process. Such of study is particularly important to understand relationships between environmental and ecological variables and it will allow to better predict ecological reaction under climate change constraint.