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On the response of the EU phenology to hydrometeorological anomalies

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Climate change is expected to alter vegetation and carbon cycle processes, with implications for ecosystems and feedback to regional and global climate. Hence, understanding the sensitivity of vegetation to anomalies of climate forcing and corresponding temporal reaction is essential for improved climate prediction. In this study, we analyze vegetation dynamics using Fraction of Absorbed Photosynthetically Active Radiation (FAPAR) derived from Sea-viewing Wide Field-of-view Sensor (SeaWiFS) data (1998-2002) and MERIS (2003-2011) at 1 km resolution. The study is centered over Europe, considered one of the most sensitive area regarding to global warming and future climate extreme conditions. Based on land use and pixel-scale analysis, we quantify the extent of the dependence between phenology and anomalies of hydrometeorological variables such as precipitation and temperature. Statistical tests are performed to establish where this correlation may be regarded as statistically dependent. In addition, we have assessed a statistical link between climate variables and a set of phenological metrics defined from FAPAR measurement over the same time period. Variation in the phenological response to unusual values of precipitation and temperature can be interpreted as the result of balanced opposite effects of water and temperature on the phenology processes. The degree of observed coupled behavior suggests that European ecosystems may be quite sensitive to perturbations in precipitation and temperature regimes induced by climate change.