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MODIS time series analysis as a tool for forest drought detection in Catalonia (NE Iberian Peninsula): integration of remote sensing and climatic variables.

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Climate warming may accelerate the hydrological cycle as a result of enhanced evaporative demand in some regions where water is not limiting. However, the combination of warmer temperatures with constant or reduced precipitation in other regions may lead to a large decrease in water availability for natural and agricultural systems as well as for human needs, especially in arid or semiarid areas such as the Mediterranean basin, increasing drought occurrence. Nowadays drought remains a phenomenon that affects a wide variety of natural areas in many parts of the globe. Droughts are considered the abiotic factor with most harmful effects on forest areas, thus it is especially important to identify the locations with highest potential impact. Its temporal and spatial distribution, as well as the different types of drought defined, makes difficult its prediction and the impact degree that their appearance involve. Climatic drought, characterized by a temporal sequence with a higher frequency of atmospheric conditions that are unfavorable to the development of precipitation over a region, is the trigger of the process associated with the risk of biological drought.

One methodology used to identify periods of climatic drought is mainly based on the analysis of climatic variables such as precipitation or temperature. However, these analyses don't take into account the physiological state of vegetation, a highly important variable that should be used to monitor the status of forest ecosystems vulnerable to droughts.

In this work we evaluate the potential of satellite images regarding the identification of Mediterranean forest areas that could potentially have had a maximum affection during drought periods. A long temporal series of images of MODIS sensors onboard TERRA satellite, for the period 2000-2011 together with climatic data from the Digital Atlas of Catalonia were integrated to detect drought in forest canopies. This integration may provide a readily applicable methodology for identifying the most vulnerable areas affected by droughts.