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A love story about forest drought detection: the relationship between MODIS data and Climate time series.

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The scientific community recognizes drought as an important phenomenon with important implications over many Social Benefit Areas (SBA) that GEOSS addresses and which impacts need to be managed and assessed through policy decisions.
The traditional assessment of drought has been often based on both precipitation shortages and differences between actual and potential evapotranspiration, among others. During the last fifteen years, new advances on drought indices, integrating time-scales and effortless computing, have concluded with many drought indices such the Standardized Precipitation Evapotranspiration Index (SPEI). The SPEI uses precipitation data and potential evapotranspiration to emphasize climatic anomalies along different time frames.
However, a non-traditional point of view based not only on climatic variables but also on biological data is evaluated here as an encouraging tool for drought detection analysis. Therefore, the real physiological state of the vegetation will be introduced as a new variable required in order to understand the vulnerabilities of forest ecosystems to drought, considering the existing time lag between meteorological events and biological responses.
Invaluable Earth Observation satellites provide the research community with a big data of imagery which processed as a Vegetation Indices (VI) time series, such as Normalized Difference Vegetation Index (NDVI), the Vegetation Condition Index (VCI), the Normalized Difference Water Index (NDWI), the Normalized Difference Drought Index (NDDI) and the Temperature Vegetation Dryness Index (TVDI), offer large possibilities on forest applications.
This research is focused on the global affection of droughts on forests given the invaluable ecosystem services they provide to society. In this study remote sensing and climate data to characterize drought on forests, supporting the idea that SPEI and MODIS VI clearly respond to drought situations on forests, is used. Results from the analysis of climatic anomalies time-series at 3, 6, 9, 12, 18, 24, 36 and 48 months, conferring a Big Data Climate cube set of approximately 6000 SPEI maps of 100 m resolution developed within the framework of the DinaCliVe project (CGL2012-33927) in Catalonia (NE Iberian Peninsula), together with vegetation indices derived from MODIS satellite imagery has shown to be useful to understand forest ecosystem vulnerabilities to drought events. In addition, this methodology is becoming an encouraging tool for monitoring large regions or areas with difficult access that may be vulnerable to drought.