



## Earth observation time series for the monitoring of droughts in Cyprus: Patterns and drivers of vegetation dynamics

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With amplified climate warming, climate extremes over Europe become more frequent. Since the 2000's, many years have been characterized by extreme events such as droughts and heat waves. For example, in Central Europe, extreme droughts and heat waves took place in the years 2003 and 2018. In comparison, Cyprus experienced strong droughts during 2003 and 2016-2018. Such extreme climate events can have severe impacts on agricultural yields, the productivity of natural vegetation, and on water resources. In this regard, long-term Earth observation (EO) time series are essential to quantitatively assess and analyse changes on the land surface, including vegetation condition. In this study, a joint analysis of geoscientific time series over the last two decades, including EO-based MODIS vegetation indices and meteorological variables is performed to assess drought events and analyse trends as well as potential drivers of vegetation dynamics in Cyprus. The analysis of drought events and vegetation trends is based on the full archive of MODIS imagery at 250 m spatial resolution covering the period 2000-2022. In detail, climate-related effects on vegetation were analysed by means of the deviations of MODIS 16-day vegetation index composites from their long-term mean. Next, trends of the MODIS vegetation index were calculated to evaluate spatial patterns of vegetation change over the investigated period. These analyses were additionally performed for geographically stratified regions, including diverse vegetation classes such as cropland and grassland. Furthermore, the application of a causal discovery algorithm reveals linkages within a multivariate feature space, in particular between vegetation greenness and climatic drivers. Preliminary analyses showed that drought patterns differ with respect to seasons and the investigated vegetation class. For example, the strong drought year 2008 is clearly reflected in the results, whereas forest areas appear to be least affected by the drought during the spring months. Moreover, considering the significant trends over the last two decades, an increase in vegetation greenness could be observed.