

MedCLIVAR: Mediterranean Climate Variability - Drought impacts on vegetation dynamics in the Mediterranean region

Célia Gouveia[†]; Ricardo Trigo; Santiago Begueria; Sergio Vicente-Serrano

[†] Instituto Dom Luiz - Science Faculty of Lisbon University, Portugal

Leading author: cmgouveia@fc.ul.pt

Climatic droughts are relatively frequent in the Mediterranean region as a consequence of the large temporal variability of precipitation. The strong dependence of vegetation dynamics on water availability has been for long recognized in the Mediterranean regions. Very intense drought episodes are relatively common, with prolonged periods without precipitations. Large drought episodes are responsible for the most negative impacts on the vegetation, resulting in significant crop yield losses, increasing the risk of forest fires, forest decline and triggering processes of land degradation and desertification. The aim of the present work is to analyze in detail the impact of drought episodes on vegetation during the last three decades over Mediterranean region. For this purpose we use the Normalized Difference Vegetation Index (NDVI) from Global Inventory Modeling and Mapping Studies (GIMMS) dataset, as obtained from NOAA-AVHRR sensor and the multi-scale drought index Standardised Precipitation-Evapotranspiration Index (SPEI). The study has analyzed in detail the drought impacts on vegetation since the early 1980s over the entire Mediterranean region, with the purpose of determining the most sensitive areas and land cover types, as well as the seasons and drought-time scales more prone to cause negative effects on vegetation. Correlation maps between fields of monthly NDVI and SPEI for time scales ranging between 1 and 24 months were computed in order to identify the regions and seasons most affected by climatic droughts. Vegetation affected by drought presents high spatial and seasonal variability, with a maximum in summer and a minimum in winter. Summer vegetation is mostly sensitive to the 3 month time scale, while in spring the time scales of 3, 6 and 12 months are significant. On the other hand, the development of maps presenting the vegetation most affected by droughts should improve drought management plans in the region and play a relevant role in mitigating the impact of such episodes.