



Lithology and vegetation as environmental controls of EVI in Mediterranean drylands

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The response of aboveground net primary production (ANPP) to precipitation represents an effective and straightforward approach to evaluate drylands status and trends. However, there exist differences between the spatial and temporal models that relate ANPP to climate factors. This suggests that other biotic and abiotic factors are involved. In this study, the aim was to evaluate the role of vegetation structure and lithology as environmental controls of regional spatial and inter-annual response of the Enhanced Vegetation Index (EVI - our proxy for ANPP-) to climate. Differences in vegetation structure between scrublands and grasslands explained part of the variation in the spatial pattern and inter-annual trends of EVI annual mean. Grasslands, with lower capacity to store and use water from the deeper soil than scrublands would be more dependent on the recurrence of rainfall events. Scrublands, on the contrary, showed higher inertia in the EVI response to the climate trends, showing how more woody and deeper roots communities displayed weaker EVI increases with precipitation rises than the less woody and shallow roots vegetation. Lithology also modulated both the effect of mean annual precipitation on the spatial patterns of EVI annual mean, and the EVI mean response to inter-annual trends in temperature and precipitation. This effect showed how the differences in soil texture account for the EVI response. In Mediterranean drylands, where temperature and precipitation are out of phase, the greater water holding capacity of finer soils could offer greater water availability after summer drought to start a new growing season. Finally, the study revealed the importance of analyzing the seasonal timing of trends in Mediterranean drylands. During the period 2001-2010, the observed earlier rain-arrival after summer drought and cooler early-autumn in SE Spain, caused very strong EVI increases at the beginning of the growing season that may favor the rest of the season.

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