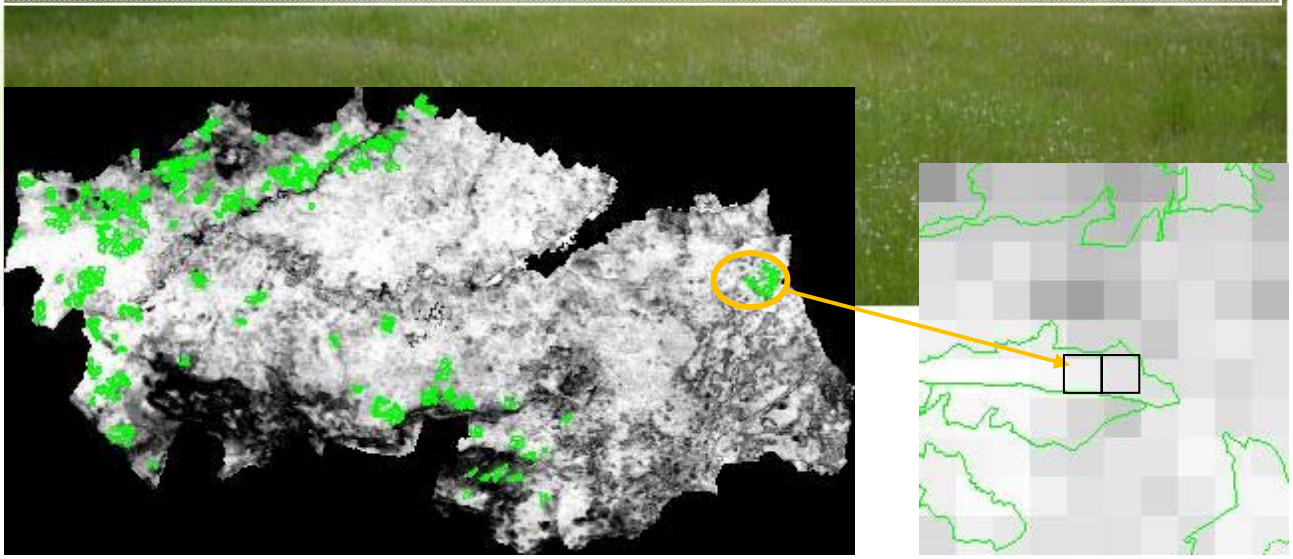
"EVALUACIÓN Y MODELIZACIÓN DE LA DINÁMICA DE LA PRODUCCIÓN DE LOS ECOSISTEMAS AGROFORESTALES MEDITERRÁNEOS MEDIANTE EL ANÁLISIS ESTADÍSTICO DE SERIES DE TIEMPO IMÁGENES DE TELEDETECCIÓN DEL SENSOR MODIS. RELACIÓN CON LAS VARIABLES METEOROLÓGICAS".



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1. ABSTRACT

Carbon cycle in the Mediterranean Holm Oak open forest called as “Dehesa” has hardly been studied owing to their particularity. However, in some regions of the world and specifically in the Iberian Peninsula this type of ecosystem occupy an important part of the forest area and has a significant impact on the development of some areas. Furthermore, the dynamic of the dehesa is related to the high variability of the Mediterranean climate and it is important to quantify whether this ecosystem acts as a sink or as a source of CO_2 (estimate its production) over the years depending on the various factors that can interact on them (climate, plagues, fires, natural and human factors, among others). In this study our overall objective is to assess the influence of the meteorological variables in the production dynamics of a “Dehesa” ecosystem (“Las Majadas del Tietar”) in the Iberian Peninsula by analyzing time series of Remote Sensing Images of the Gross Primary Production (GPP). To achieve this objective, an assessment of the MODIS Gross Primary Production (MOD17A2) has been made by implementing a Site Specific Light Use Efficiency Model to obtain the production of the dehesa. Mainly, we have focused on developing a model which takes into account the local climatic and ecological characteristics of the ecosystem (PAR, LUE maximum, $T_{MINscalar}$ and VPD_{scalar}). Both models have been compared with the Production provided by an Eddy Covariance flux Tower that is located in our study area. Finally, dynamic relationships between the meteorological variables and the GPP during the study period in the dehesa (2004-08) have been investigated by means of Granger causality tests. Our results indicate that MODIS GPP overestimates the production of the “dehesa” in a Mediterranean climate, while our Site specific Model has given more similar values to those from the Eddy covariance tower. In general terms, both time series of GPP have shown a typical dynamic of the “dehesa” where there are primarily two layers, the arboreal and the herbaceous strata. Finally, the Granger causality tests indicate that the GPP can be predicted better with Precipitation and Soil Water Content. In conclusion, we have managed to avoid the main source of overestimation that has MODIS model, which it seems to be the local climatic and ecological characteristics of the ecosystem.

Keywords: *GPP, LUE, Remote Sensing, dehesa, Site Specific variables, Time Series, Flux Tower.*