



Effect of the water stress on gross primary production modeling of a Mediterranean oak savanna ecosystem

Pedro Gómez-Giráldez (1), Elisabet Carpintero (2), Mario Ramos (2), Cristina Aguilar (1), and María Pat González-Dugo (2)

(1) Fluvial dynamics and hydrology research group, Andalusian Institute of Earth System Research, University of Córdoba, 14071 Córdoba, Spain, (2) IFAPA, Consejería de Agricultura, Pesca y Desarrollo Rural. Centro Alameda del Obispo, Apdo. 3092 14080 Cordoba, Spain

Dehesa ecosystem consists of widely-spaced oak trees combined with crops, pasture and Mediterranean shrubs located in the southwest of the Iberian Peninsula. Drought is a recurrent natural hazard in this region, severely affecting the multiple productions and services of the ecosystem. Upscaling in situ Gross Primary Production (GPP) estimations in these areas is challenging for regional and global studies, given the significant spatial variability of plant functional types and the vegetation stresses usually present. The estimation of GPP is often addressed using light use efficiency models (LUE-models). These models relate the incident solar radiation with the photosynthetic activity of the plant, or canopy, through a LUE parameter, which is the amount of biomass that can be produced per unit of radiation absorbed. In the presence of water stress, biomass production is reduced below its potential rate, but this effect is usually addressed only indirectly by these models.

The objective of this work is to provide some insights about the effect of the water stress of dehesa vegetation on GPP estimations using a LUE-model. Ground measurements of GPP are performed using an Eddy Covariance (EC) system installed in a dehesa ecosystem located in Cardena (Córdoba, Spain). GPP is estimated with a LUE-model in the footprint of the EC tower using Sentinel-2 images, radiation data, and several LUE approaches: a fixed value taken from previous literature; a fixed value modified by daily weather conditions; and both values with an additional coefficient to explicitly consider the vegetation water stress. The results are compared along two years, focusing on specific events of rainfall and drought.