



Scale – dependent effects on the surface energy fluxes modelling in Iberian oak-savanna (dehesa) using the Two-Source Energy Balance (TSEB)

Ana Andreu (1), Hector Nieto (2), Pedro Gómez-Giráldez (3), and Maria P. González-Dugo (3)

(1) UNU-FLORES, Dresden (GERMANY). (anandream@openmailbox.org), (2) IRTA, Lleida, SPAIN, hector.nieto@irta.cat, (3) IFAPA, Cordoba, SPAIN, (mariap.gonzalez.d@juntadeandalucia.es), (4) IFAPA, Cordoba, SPAIN, (pjpgomezgiraldez@gmail.com)

Iberian semi-arid oak-savannas (dehesas) are complex ecosystems where bare soil and different layers of vegetation (grass/scrubs/trees) are distributed following heterogeneous patterns. An assumption of the two source energy balance models is that the effective source/sink for turbulent flux exchange at the surface (canopy/soil) is described by a bulk radiometric surface temperature (TRAD) and resistance. Therefore, the agreement of the TRAD used as an input to these models, with the “bulk” concept (determined by the spatial resolution), will influence the final energy fluxes estimations. The representativeness of the field-ground measurements, the spatial resolution of sensors, the averaging and the up-scaling of TRAD and the ecosystem vegetation parameters, will be crucial for the precision of the results, more than in homogeneous landscapes.

The aim of this study is to analyze the scale-effects derived from TSEB application, comparing the observed energy fluxes and the estimated ones obtained from multiple TRAD data sources of different nature: tree/grass/soil ground-based observations, tower footprint, hyperspectral reflectance imagery acquired with an airborne platform, medium (Landsat) and low spatial resolution satellite data (Sentinel 3, MODIS), and how the up-scaling of the vegetation structural characteristics contribute to the discrepancies. The study area selected for this purpose is a dehesa site (Santa Clotilde, Cordoba), which present canopy mosaics (oak, annual grasses and bushes) differing in phenology, physiology and functioning, and bare soil, all of them influencing the turbulent and radiative exchanges.