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## Estimation of actual evapotranspiration of Mediterranean perennial crops by means of remote-sensing based surface energy balance models

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**Abstract.** Actual evapotranspiration from typical Mediterranean crops has been assessed in a Sicilian study area by using surface energy balance (SEB) and soil-water balance models. Both modelling approaches use remotely sensed data to estimate evapotranspiration fluxes in a spatially distributed way. The first approach exploits visible (VIS), near-infrared (NIR) and thermal (TIR) observations to solve the surface energy balance equation whereas the soil-water balance model uses only VIS-NIR data to detect the spatial variability of crop parameters. Considering that the study area is characterized by typical spatially sparse Mediterranean vegetation, i.e. olive, citrus and vineyards, alternating bare soil and canopy, we focused the attention on the main conceptual differences between one-source and two-sources energy balance models. Two different models have been tested: the widely used one-source SEBAL model, where soil and vegetation are considered as the sole source (mostly appropriate in the case of uniform vegetation coverage) and the two-sources TSEB model, where soil and vegetation components of the surface energy balance are treated separately. Actual evapotranspiration estimates by means of the two surface energy balance models have been compared vs. the outputs of the agro-hydrological SWAP model, which was applied in a spatially distributed way to simulate one-dimensional water flow in the soil-plant-atmosphere continuum. Remote sensing data in the VIS and NIR spectral ranges have been used to infer spatially distributed vegetation parameters needed to set up the upper boundary condition of SWAP. Actual evapotranspiration values obtained from the application of the soil water balance model SWAP have been considered as the reference to be used for energy balance models accuracy assessment.

Airborne hyperspectral data acquired during a NERC (Natural Environment Research Council, UK) campaign in 2005 have been used. The results of this investigation seem to prove a slightly better agreement between SWAP and TSEB for some fields of the study area. Further investigations are programmed in order to confirm these indications.

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