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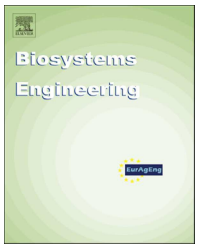

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Research Paper

Satellite-based evapotranspiration of a super-intensive olive orchard: Application of METRIC algorithms

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METRIC™ is a satellite-based surface energy balance model aimed at estimating and mapping crop evapotranspiration (ET). It has been applied to a large range of vegetation types, mostly annual crops. When applied to anisotropic woody canopies, such as olive orchards, extensions are required to algorithms for estimating the leaf area index (LAI), surface temperature, and momentum roughness length (Z_{om}). The computation of the radiometric surface temperature needs to consider a three-source condition, thus differentiating the temperature of the canopy (T_c), of the shaded ground surface (T_{shadow}), and of the sunlit ground surface (T_{sunlit}). The estimation of the Z_{om} for tall and incomplete cover is based upon the LAI and crop height using the Perrier equation. The LAI, Z_{om}, and temperature derived from METRIC after these adjustments were tested against field collected data with good results. The application of METRIC to a two year set of Landsat images to estimate ET of a super-intensive olive orchard in Southern Portugal produced good ET estimates that compared well with ground-based ET. The analysis of METRIC performance showed a quantitative improvement of ET estimates when applying the three-source condition for temperature estimation, as well as the Z_{om} computation with the Perrier equation. Results show that METRIC can be used operationally to estimate and mapping ET of super-intensive olive orchards aiming at improving irrigation water use and management.

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