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Mapping crop evapotranspiration by integrating vegetation indices into a soil water balance model

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The approach combines the basal crop coefficient (K_{cb}) derived from vegetation indices (VI_s) with the daily soil water balance, as proposed in the FAO-56 paper, to estimate daily crop evapotranspiration (ET_c) rates of orange trees. The reliability of the approach to detect water stress was also assessed. VI_s were simultaneously retrieved from WorldView-2 imagery and hyper-spectral data collected in the field for comparison. ET_c estimated were analysed at the light of independent measurements of the same fluxes by an eddy covariance (EC) system located in the study area. The soil water depletion in the root zone of the crop simulated by the model was also validated by using an in situ soil water monitoring. Average overestimate of daily ET_c of 6% was obtained from the proposed approach with respect to EC measurements, evidencing a quite satisfactory agreement between data. The model also detected several periods of light stress for the crop under study, corresponding to an increase of the root zone water deficit matching quite well the in situ soil water monitoring. The overall outcomes of this study showed that the FAO-56 approach with remote sensing-derived basal crop coefficient can have the potential to be applied for estimating crop water requirements and enhancing water management strategies in agricultural contexts.