ESTIMATING EVAPOTRANSPIRATION OF ORANGE ORCHARDS USING SURFACE RENEWAL TECHNIQUE

Simona Consoli 1, Alfonso Russo 1, Richard L. Snyder 2

1. Dipartimento di Ingegneria Agraria, Via S. Sofia 100, 95123, University of Catania (Italy), simona.consoli@unict.it
2. Department of Land, Air and Water Resources, One Shields Avenue, University of California, Davis, CA 95616, USA

Objective of the study

Crop evapotranspiration (ETc) and crop coefficient (Kc) values of clean-cultivated orange orchards located in Eastern Sicily (Italy) irrigated with micro-sprinklers were evaluated during July-September 2005. Surface renewal (SR) analysis was utilized to calculate sensible heat flux density from high frequency temperature measurements above the canopy. The H values were employed to estimate latent heat flux density using measured net radiation (Rn), soil heat flux density (G) in the energy balance equation. Hourly means of latent heat flux density (LE) were calculated and were divided by the latent heat of vaporization (L) to obtain ETc. Crop coefficients were determined by calculating the ratio $K_c = ET_c/ET_o$, with reference evapotranspiration (ETo) determined using the hourly Penman-Monteith equation for short canopies. The estimated Kc values showed an average of about 0.78 for canopy covers having about 70% ground shading. The Kc values were compared with Kc values from FAO 24 and FAO 56 and with Kc values from research papers that estimated reference ET from pan evaporation data using the FAO 24 method. ETc estimates were used with soil moisture data and irrigation water amounts for hydrological models improve within the study-area. Furthermore, a spatial description of the main vegetation biophysical features (leaf area index, albedo, amounts of vegetation photosynthetically active radiation, etc...) was pursued by using high resolution satellite data from the IKONOS sensor during the monitoring period.