EMS Annual Meeting Abstracts,
Vol. 6, EMS2009-398, 2009
9th EMS / 9th ECAM

9th EMS Annual Meeting
9th European Conference on Applications of Meteorology
High resolution meteorology
- applications and services

Assessment of actual transpiration rate in olive tree field combining sap-flow, leaf area index and scintillometer measurements

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Models to estimate the actual evapotranspiration (ET) in sparse vegetation area can be fundamental for agricultural water managements, especially when water availability is a limiting factor. Models validation must be carried out by considering in situ measurements referred to the field scale, which is the relevant scale of the modelled variables. Moreover, a particular relevance assumes to consider separately the components of plant transpiration (T) and soil evaporation (E), because only the first is actually related to the crop stress conditions.
Objective of the paper was to assess a procedure aimed to estimate olive trees actual transpiration by combining sap flow measurements with the scintillometer technique at field scale. The study area, located in Western Sicily (Italy), is mainly cultivated with olive crop and is characterized by typical Mediterranean semi-arid climate. Measurements of sap flow and crop actual evapotranspiration rate were carried out during 2008 irrigation season.
Crop transpiration fluxes, measured on some plants by means of sap flow sensors, were upscaled considering the leaf area index (LAI).
The comparison between evapotranspiration values, derived by displaced-beam small-aperture scintillometer (DBSAS-SLS20, Scintec AG), with the transpiration fluxes obtained by the sap flow sensors, also allowed to evaluate the contribute of soil evaporation in an area characterized by low vegetation coverage.