

## Assessment of daily reference evapotranspiration in Sicily by means of POWER-NASA agro-climatology archive

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The importance of evapotranspiration,  $ET$ , processes has long been recognized in many disciplines, including hydrologic and drainage studies as well as for irrigation system design and management. A wide number of equations have been proposed to estimate crop reference evapotranspiration,  $ET_0$ , based on the variables affecting the process. When a full data set of climate variables is available, the Food and Agriculture Organization (FAO) of the United Nations recommended to use the physically based FAO-56 Penman-Monteith equation. The lack of climate variables and particularly of solar radiation has led several researchers to propose simplified  $ET_0$  estimation equations using a limited number of climate variables. These equations, however, need site-specific validation prior to their use and cannot be generalized. Recently, the American National Aeronautics and Space Administration (NASA), created an efficient and open access agro-climatology archive in the frame of the Prediction Of Worldwide Energy Resource (POWER) project containing, on global scale, a long-series of meteorological variables and surface solar energy fluxes.

The main objective of the research was to assess the suitability of POWER-NASA open access archive to estimate daily reference evapotranspiration,  $ET_0$ , in Sicily, for the period 2006-2014. Daily  $ET_0$  were evaluated according to FAO-56 PM equation, by considering the POWER-NASA database characterized by a grid resolution of  $1^\circ$  latitude  $\times$   $1^\circ$  longitude, as well as the climate data measured on the ground, by a network of 36 meteorological stations installed in Sicily and belonging to the Agro-meteorological Information Service (SIAS).

After comparing the climate data available in both databases (minimum, maximum and average air temperature and relative air humidity, wind speed, solar radiation and air pressure), a statistical comparison was also carried out on  $ET_0$  values estimated with the FAO-56 PM equation. The analysis showed a good correlation between the climate variables of both the databases; in addition,  $ET_0$  values estimated with POWER-NASA database resulted comparable to those obtained by using the SIAS records, with bias and root mean square error equal, on average, to 0.18 mm and 1 mm, respectively.

The results support the possibility to obtain suitable estimations of daily  $ET_0$  based on the POWER-NASA agro-climatology archive, even to other Mediterranean countries where most of climate variables are not measured.