



Contribution of the meteorological conditions during the nocturnal period to daily values of Potential Evapotranspiration

Vicent Altava-Ortiz (1,2), Aleix Benaiges (1), Yolanda Sola (3), Jaume Casadesús (4), Jéssica Amaro (1), and Abdel Sairouni (1)

(1) SMC-Meteorological Service of Catalonia, Area of Applied Research and Modelling, Barcelona, Spain (valtava@meteo.cat), (2) Servei de Prevenció d'Incendis Forestals (SPIF), (3) Group of Meteorology, Dpt. Applied Physics, Univerity of Barcelona., (4) IRTA - Institute of Agrifood Research and Technology

A good estimation of daily Potential Evapotranspiration (ET_o) using observational meteorological data is helpful for the planning and optimization of agricultural activities (smart irrigation, water saving, production increase etc.). In addition, the calculation of ET_o values at site locations is necessary for the calibration of products derived from satellite or lidar measurements and NWP models. However, ET_o values may differ considerably depending on the selected method-equation, the number of measured meteorological variables used into the calculation and the temporal resolution of such variables.

Within this context, we calculated the ET_o values for more than 140 stations of the Automatic Weather Station Network (XEMA) managed by the Meteorological Service of Catalonia (SMC), using the Penman-Monteith method proposed in FAO98, for both hourly and daily time resolution. The ET_o was estimated for the period 2000-2017 and the calculation involved the use of temperature, relative humidity and wind speed at 2m and solar radiation measured with pyranometers. Among other objectives, we focused on the ET_o differences using hourly or daily meteorological data and the contribution of the nocturnal period to the total daily values. Differences among calculations and the nocturnal contribution were split and analyzed according to the seasonal cycle and under different meteorological synoptic situations.

Results showed that ET_o's derived from daily and hourly calculations were similar during summer at inland stations and under stability meteorological conditions, but differences arose and were relevant (up to 20-30%) during the rest of the year, especially in the Pyrenees in anticyclonic subsidence situations and in the Ebro Valley and Empordà (North-east corner) under northerly and northwesterly advection situations. In such situations, nocturnal contribution can reach the 50% of the total daily ET_o values in many stations.