



Evapotranspiration estimate in the Mediterranean: the comparison between different methods and possible impacts of climate change

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This work focused on the performances of different methods to estimate evapotranspiration (ET) across the Mediterranean climates. Two types of monthly weather data were used in the analysis: CLIMWAT historical database for 577 meteorological stations located in the Mediterranean countries and data derived from the ENSEMBLES project (EC-FP6-ENV) Regional Circulation Model (RCM) simulations. The performance of two temperature based approaches for the estimation of reference evapotranspiration (Hargreaves-Samani – HS and the FAO Penman-Monteith with temperature data only – PMT) was assessed against the Penman-Monteith approach (PM) using a full input climate data. Data were grouped according to climate: hyper-arid, arid, semi-arid, dry sub-humid, moist sub-humid and humid zones. For almost all zones, the statistical parameters indicate slightly better performance of PMT than HS method. Both methods tend to underestimate ETo in hyper arid areas and to overestimate ETo in humid areas. The reduction of either minimum air temperature or dew temperature by 2°C under arid conditions (when the ratio between precipitation and ETo is smaller than 0.4) improves ETo estimation especially for interior locations and in hyper-arid and arid regions. The analysis performed for the future referred to the A1B SRES scenario for the period 2036-2065 using the results of RACMO₂ driven by ECHAM5. The overall results indicated the redistribution of climatic zone over the Mediterranean with the further extension of arid zones towards higher altitudes. Accordingly, the variation in the performances of ET models was observed. Moreover, the climate change had an impact of the peak monthly evapotranspiration of Mediterranean crops which, in turn, affected the climatic water balance over the whole region.