Assessment of future water resources availability under climate change scenarios in Portugal

André Fonseca and João Andrade Santos

UTAD, CITAB, School of Sciences and Technology, Physics Dep., Vila Real, Portugal (jsantos@utad.pt)

Climate change is expected to increase both the frequency and magnitude of extreme events, this will affect the balance between water demand and availability. Changes in water availability will depend on changes in the volume, variability, and seasonality of runoff. This work aims to assess trends in monthly rainfall and temperature and its impacts on surface runoff and water availability in the Sousa River catchment (northern Portugal) under different climate change scenarios. To reach this goal, data from EURO-CORDEX simulations are used as input for a rainfall-runoff model, HSPF (Hydrological Simulation Program – FORTRAN) for short (2021–2050), mid (2041–2070) and long (2071–2100) term periods, under the Representative Concentration Pathway 4.5 scenario (RCP4.5). For the recent-past (1950–2015) simulation (baseline period), a high resolution (∼1km spatial resolution) climatological dataset of daily data over Portugal is used. The model is calibrated and validated for this baseline period and the same parameterization input is used for the future simulation scenarios. Monthly mean values of the meteorological data of three different projected periods (2021–2050, 2041–2070 and 2071–2100) were compared to their values in the baseline period. The results of calibration and validation of the output flowrate of the model against the observed flowrate at the mouth of Sousa River show satisfactory criteria performances (Nash-Sutcliffe coefficient of efficiency above 0.7 on a daily scale). Furthermore, a comparison of daily and monthly flowrates was assessed for all simulation term periods. The results indicate predominantly drying trends in spring, while weak wetting trends are detected in autumn, while annual temperature may increase from 1.2 to 3 ºC.