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# Improving the evaluation of climate change impacts on water cycle, incorporating ET-retrieval from remote sensing

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The geographical and socio-economic characteristics of Spain, making it vulnerable to climate change (CC) and variability. The population growth and intense consumptive uses in South-East of Spain, where agriculture constitutes the 80% of use of water, generate pressures on water resources. This is the case of the Segura River Basin, where a future scenario of water shortage is projected.

The main objective of this work is the assessment of climate change impacts on water cycle processes at basin scale, considering an ensemble of Regional Climate Models (RCMs). The study basin corresponds to a head basin of Segura River Basin (South East of Spain). For improving the spatial calibration of monthly hydrological model used, algorithms for actual evapotranspiración (ET)-retrieval from remote sensing were considered.

The monthly times series of ET were estimated from daily products of MODIS sensor, applying a A residual algorithm named single-source method, was considered for retrieving ET. This method is based on the direct estimation of the evaporative fraction from the analysis of NDVI-land surface temperature.

The observed meteorological datasets corresponded to grids with spatial resolution of 20 by 20 km, for the time period 1961-2007. While the RCMs were provided by the European project ENSEMBLES, for pixels of 25 by 25 km. Then, algorithms of a continuous hydrological model, named TEMEZ, were incorporated below a GIS. TEMEZ model, at monthly scale, presents few parameters.

From the results, divergent trends of simulated rainfall from the RCMs were observed in comparison with observed data. Therefore, ensemble methodologies of RCMs are justified for increasing the reliability of climate and hydrological projections. The evaluation of RCMs goodness for the building of ensemble is based on empirical probability density functions (PDF) at each site analyzed, extracted from the periods 1961-1990 from both datasets (observed and simulated). The ensembles were built both for rainfall and temperatures, for time period 2021-2050. Therefore, considering the application of the conceptual model with few parameters, the impacts on runoff and its trend from historical data, and climate projections from the ensemble of RCMs, were assessed.

Increasing knowledge about plausible impacts of CC on components of the hydrological cycle at basin scale, is a important step for building adaptive capacity to the impacts on Sourthern Spain.