

Climate Change Effects in a Mediterranean Island and Streamflow Changes for a Small Basin Using Euro-Cordex Regional Climate Simulations Combined with the SWAT Model

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Abstract : Climate change effects on the hydrologic cycle are the main concern for the evaluation of water management strategies. Climate models project scenarios of precipitation changes in the future, considering greenhouse emissions. In this study, the EURO-CORDEX (European Coordinated Regional Downscaling Experiment) climate models were first evaluated in a Mediterranean island (Sardinia) against observed precipitation for a historical reference period (1976-2005). A weighted multi-model ensemble (ENS) was built, weighting the single models based on their ability to reproduce observed rainfall. Future projections (2071-2100) were carried out using the 8.5 RCP emissions scenario to evaluate changes in precipitations. ENS was then used as climate forcing for the SWAT model (Soil and Water Assessment Tool), with the aim to assess the consequences of such projected changes on streamflow and runoff of two small catchments located in the South-West Sardinia. Results showed that a decrease of mean rainfall values, up to -25 % at yearly scale, is expected for the future, along with an increase of extreme precipitation events. Particularly in the eastern and southern areas, extreme events are projected to increase by 30%. Such changes reflect on the hydrologic cycle with a decrease of mean streamflow and runoff, except in spring, when runoff is projected to increase by 20-30%. These results stress that the Mediterranean is a hotspot for climate change, and the use of model tools can provide very useful information to adopt water and land management strategies to deal with such changes.

Keywords : EURO-CORDEX, climate change, hydrology, SWAT model, Sardinia, multi-model ensemble

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