



Streamflow Changes in the Duero River Basin using an Ensemble of Euro-CORDEX Projections

Patricio Yeste, Juan José Rosa-Cánovas, Emilio Romero-Jiménez, Matilde García-Valdecasas-Ojeda, Sonia Raquel Gámiz-Fortis, Yolanda Castro-Díez, and María Jesús Esteban-Parra
Universidad de Granada, Facultad de Ciencias, Departamento de Física Aplicada, Granada, Spain (pyeste@ugr.es)

Climate change has led to a generalized decrease of precipitation and an increase of temperature in the Iberian Peninsula during the last decades. These changes will be more intense over the course of the 21th century according to global climate projections. As a consequence, water resources are expected to decrease, particularly in the Duero River Basin.

This study is focused on the hydrological response of the Duero River Basin to the climate change. For this end, firstly, the implementation of the Variable Infiltration Capacity (VIC) model in this Basin has been carried out. The VIC model has been calibrated for the period 2000-2009 with a dataset of daily precipitation, temperature and streamflow. Precipitation and temperature data are extracted from SPREAD/STEAD, a dataset that covers the Peninsular Spain at 0.05° of spatial resolution. Streamflow data are provided by the Spanish Center for Public Work Experimentation and Study (CEDEX, Centro de Estudios y Experimentación de ObrasPúblicas). Subsequently, the VIC model has been validated for the period 2009-2011 in order to verify that the model outputs fit well with the observational data.

After the validation of the VIC model for present climate, secondly, the impacts of climate change in the Duero River Basin have been analyzed by developing several future simulations using an ensemble of 18 members from the Euro-CORDEX database and three study periods: 1975-2005 as the historical period; 2020-2050 as the short-term future period, and 2070-2100 as the long-term future period. The Euro-CORDEX simulations for the two future periods are driven under two different Representative Concentration Pathway (RCP) scenarios, RCP 4.5 and RCP 8.5.

The first results of this work show that the VIC model outputs are in good agreement with the observed streamflow, for both the calibration and validation periods. In the context of climate change, a generalized decrease of the streamflow is expected in the Duero River Basin. The results from this study could be of interest for water policy makers and practitioners in the next decades.

Keywords: Duero River Basin, VIC model, climate change, streamflow, projections.

ACKNOWLEDGEMENTS: All the simulations were conducted in the ALHAMBRA cluster (<http://alhambra.ugr.es/>) of the University of Granada. This work was partially funded by the Spanish Ministry of Economy and Competitiveness projects CGL2013-48539-R and

CGL2017-89836-390-R, with additional support from the European Community Funds (FEDER). The first author was supported by the Ministry of Education, Culture and Sport of Spain (FPU grant FPU17/02098).