Geophysical Research Abstracts
Vol. 18, EGU2016-15261, 2016
EGU General Assembly 2016


# Impact of climate change on Precipitation and temperature under the RCP 8.5 and A1B scenarios in an Alpine Cathment (Alto-Genil Basin,southeast Spain). A comparison of statistical downscaling methods

David Pulido-Velazquez (1,3), Antonio Juan Collados-Lara (1), Eulogio Pardo-Iguzquiza (2), Patricia Jimeno-Saez (3), and Francisca Fernandez-Chacon (1)

(1) Instituto Geológico y Minero de España, Urb. Alcázar del Genil, 4. Edificio Zulema Bajo, 18006, Granada (Spain). , (2) Instituto Geológico y Minero de España, Ríos Rosas, 23, 28003 Madrid (Spain). , (3) Universidad Católica San Antonio de Murcia (UCAM), Departamento de Ciencias Politécnicas, Escuela Universitaria Politécnica, Murcia (Spain).

In order to design adaptive strategies to global change we need to assess the future impact of climate change on water resources, which depends on precipitation and temperature series in the systems. The objective of this work is to generate future climate series in the “Alto Genil” Basin (southeast Spain) for the period 2071-2100 by perturbing the historical series using different statistical methods. For this targeted we use information coming from regionals climate model simulations (RCMs) available in two European projects, CORDEX (2013), with a spatial resolution of 12.5 km, and ENSEMBLES (2009), with a spatial resolution of 25 km. The historical climate series used for the period 1971-2000 have been obtained from Spain02 project (2012) which has the same spatial resolution that CORDEX project (both use the EURO-CORDEX grid). Two emission scenarios have been considered: the Representative Concentration Pathways (RCP) 8.5 emissions scenario, which is the most unfavorable scenario considered in the fifth Assessment Report (AR5) by the Intergovernmental Panel on Climate Change (IPCC), and the A1B emission scenario of fourth Assessment Report (AR4). We use the RCM simulations to create an ensemble of predictions weighting their information according to their ability to reproduce the main statistic of the historical climatology. A multi-objective analysis has been performed to identify which models are better in terms of goodness of fit to the cited statistic of the historical series. The ensemble of the CORDEX and the ENSEMBLES projects has been finally created with nine and four models respectively. These ensemble series have been used to assess the anomalies in mean and standard deviation (differences between the control and future RCM series). A “delta-change” method (Pulido-Velazquez et al., 2011) has been applied to define future series by modifying the historical climate series in accordance with the cited anomalies in mean and standard deviation. A comparison between results for scenario A1B and RCP8.5 has been performed. The reduction obtained for the mean rainfall respect to the historical are 24.2 % and 24.4 % respectively, and the increment in the temperature are 46.3 % and 31.2 % respectively.

A sensitivity analysis of the results to the statistical downscaling techniques employed has been performed. The next techniques have been explored: Perturbation method or “delta-change”; Regression method (a regression function which relates the RCM and the historic information will be used to generate future climate series for the fixed period); Quantile mapping, (it attempts to find a transformation function which relates the observed variable and the modeled variable maintaining an statistical distribution equals the observed variable); Stochastic weather generator (SWG): They can be uni-site or multi-site (which considers the spatial correlation of climatic series). A comparative analysis of these techniques has been performed identifying the advantages and disadvantages of each of them.

Acknowledgments: This research has been partially supported by the GESINHIMPADAPT project (CGL2013-48424-C2-2-R) with Spanish MINECO funds. We would also like to thank Spain02, ENSEMBLES and CORDEX projects for the data provided for this study.