Geophysical Research Abstracts
Vol. 16, EGU2014-12689, 2014
EGU General Assembly 2014

Uncertainty analysis in building ensemble of RCMs, on water cycle in South East of Spain

Sandra García Galiano (1), Patricia Olmos Giménez (1), and Juan Diego Giraldo Osorio (2)

(1) Technical University of Cartagena. CIF Q8050013, Department of Civil Engineering, Cartagena, Spain (sandra.garcia@upct.es), (2) Pontificia Universidad Javeriana, Bogotá, Colombia

The population growth and intense consumptive uses, generate pressures on water resources on South East of Spain. In catchments such as the Segura River Basin, the agriculture constitutes the 80% of use of water. Increasing knowledge about plausible impacts of climate change on hydrological cycle at basin scale, is an important step for building adaptive capacity to the impacts in this region where water shortages are expected for the next decades.

For reaching this objective, the modelling of future hydrological scenarios at basin scale was addressed by a spatially distributed water balance model developed below a Geographical Information System (GIS). The study basin corresponds to a head basin of Segura River Basin (South East of Spain).

Divergent trends of the simulated meteorological data considered from the RCMs were observed in comparison with the observed data. Therefore, ensembles of the several variables considered (rainfall and temperatures) from Regional Climate Models (RCMs) were built, as input to the distributed hydrological model. The observed meteorological dataset corresponded to grids (Spain02 dataset with spatial resolution of 20 by 20 km), for the time period 1961-2007. While the RCMs, were provided by the ENSEMBLES European project (pixels of 25 by 25 km).

The assessment of RCMs goodness-of-fit in building of the ensemble, was based on empirical probability density functions (PDF) at each site for the story line (1961-1990 time period). The ensembles were built at monthly scale, both for rainfall and maximum, minimum and mean temperatures, for the time period 2021-2050. Then, the time series of evapotranspiration were estimated from the ensembles applying a modified version of Hargreaves method.

Although, the RCMs ensembles are justified for increasing the reliability of climate and hydrological projections, the selection of methodology applied presents strong influence on the results. The ensemble method applied in this work, is considering the influence of seasonal and annual variation of the corresponding variables, and is built at each site. A sensitivity analysis of ensemble building method of meteorological variables, is addressed for justifying the more robust and parsimonious methodology.

Finally, the impacts on runoff and its trend from historical data and climate projections from the selected method of RCMs ensemble, were assessed. Significant decreases from the plausible scenarios of runoff for 2050 were identified, with the consequent negative impacts in the regional economy.