Geophysical Research Abstracts
Vol. 17, EGU2015-9065, 2015
EGU General Assembly 2015

Hydrological changes over France in the next decades and associated uncertainties

Gildas Dayon (1), Julien Boé (1), and Eric Martin (2)

(1) Climate Modelling and Global Change Team, CERFACS/CNRS Toulouse, France (dayon@cerfacs.fr), (2) GAME/CNRM, Météo-France, CNRS, Toulouse, France

The uncertainties in climate projections over the next decades generally remain large, with an important contribution of internal climate variability. To correctly quantify the impacts of those uncertainties in hydrological projections, multi-model and multi-member approaches are essential.

To have a large ensemble of climate simulations, the study is based on Global Climate Models (GCMs) simulations from the Coupled Model Intercomparison Phase 5 (CMIP5). For computational cost reasons, GCMs simulations are downscaled with a statistical method developed in a previous study (Dayon et al. 2015) in order to obtain the atmospheric variables on a 8 km grid over France necessary to drive the Isba-Modcou hydrological system. Isba is a land surface model that calculates the energy and water balance and Modcou is a hydrogeological model that routes the surface runoff given by Isba.

Based on a large ensemble of simulations on the historical period (28) and multiple simulations from the same model with different initial conditions, a robust evaluation of the internal variability is made. The variability simulated by the hydrological model with dowsncaled climate simulations is compared with observations on the 20th century. Long-term trends in simulated river flows are also compared with observations. Potential changes of the continental hydrological cycle in the last century are also explored.

Future impacts of climate change on the hydrological cycle of the main French rivers basins are evaluated with downscaled climate simulations driven by the Radiative Concentration Pathway (RCP) scenarios 4.5 and 8.5. This large ensemble of simulations (20 for the RCP4.5 scenario and 18 for the RCP 8.5 scenario) allows to evaluate the respective importance of uncertainties from the internal climate variability, climate models and emission scenarios.

References :

Dayon et al. (2015), Transferability in the future climate of a statistical downscaling method for precipitation in France, Journal of Geophysical Research : Atmosphere, in press.