Geophysical Research Abstracts
Vol. 18, EGU2016-3040, 2016
EGU General Assembly 2016

Influence of hydrological modelling strategies on the diagnosis of the impact of climate change on water resources

Grégory Seiller (1,3), René Roy (2,3), and François Anctil (1)

(1) Civil and Water Engineering Department, Laval University, Quebec, Qc, Canada, (2) Institut de Recherche d'Hydro-Québec, Varennes, Qc, Canada, (3) Ouranos, Montreal, Qc, Canada

Uncertainties related to the assessment of the impacts of climate change on water resources are large, from multiple sources, and lead to diagnoses sometimes difficult to interpret. Therefore, the quantification of these uncertainties is a key element to yield confidence in the analyses and to provide water managers with valuable information. This research specifically evaluates the sensitivity of future water resources projections to the choice of hydrological modelling strategies, on thirty-seven watersheds in the Province of Québec, Canada. These modelling strategies mainly focus on calibration and hydrological model choices, as well as individual versus ensemble approaches. Twenty lumped hydrological models, representing a wide range of operational options, are calibrated with three objective functions on six historical calibration periods. The hydrological models are forced with 122 climate simulations corresponding to four RCP and twenty-nine GCM from CMIP5 (Coupled Model Intercomparison Project phase 5), provided by the Canadian consortium Ouranos. Two bias correction techniques are also evaluated and lead to future projections in the 2041-2070 period.

Results show that the diagnosis of the impacts of climate change on water resources are quite sensitive to the hydrological models selection and calibration strategies. This statement is particularly true when evaluating changes in an absolute way. Multimodel approaches offer the best options in terms of calibration performance and robustness on contrasted climate conditions. Hydrological indicators, dedicated to water management, are sensitive to the calibration objective functions and period selection. Overall, these results illustrate the need to provide water managers with detailed information on relative changes analysis, but also absolute changes values, especially for hydrological indicators acting as security policy thresholds.