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Quantifying uncertainties in hydrological models applied on Lebanese Mediterranean catchments

Cynthia Andraos (1) and Wajdi Najem ()

(1) Saint Joseph University - Beirut, Ecole Supérieure des Ingénieurs de Beirut, Centre Régional de l'Eau et de l'Environnement, Lebanon (cynthia_andraos@hotmail.com), (2) Saint Joseph University - Beirut, Ecole Supérieure des Ingénieurs de Beirut, Centre Régional de l'Eau et de l'Environnement, Lebanon (wajdi.najem@usj.edu.lb)

According to current climate projections, the Mediterranean area is at high risk for severe changes in the hydrological budget and extremes. This issue must be monitored by using hydrological models. The application of hydrological models is essential for different applications including flood forecasting and flood control planning. Under these necessities, it is important to improve our capacity in hydrological modelling. The conceptual rainfall-runoff models used in this study and developed in a Mediterranean environment, are MEDOR ("Méditerranée orientale" or Eastern Mediterranean), GR4J and HBV applied on Lebanese coastal catchments. The recognition of models imperfections leads to the integration of uncertainty analysis into the modelling process. In order to quantify uncertainties in hydrological models, probabilistic approaches have been considered. The utilized methods in this study are, first the Approximate Bayesian Computation, in which the parameters of the models have been refined, and second the multi-models approach combining the outputs of the models by using weighted averages, genetic algorithms and neural networks; Better results for the flows have been generated by this combination. This study leads to an improvement in the hydrological modelling by increasing the performances of the hydrological models and the reliability of the results.