Geophysical Research Abstracts
Vol. 16, EGU2014-5992, 2014
EGU General Assembly 2014

Applying clustering approach in predictive uncertainty estimation: a case study with the UNEEC method

Nilay Dogulu (1), Dimitri Solomatine (1,2), and Durga Lal Shrestha (3)

(1) UNESCO-IHE Institute for Water Education, Delft, The Netherlands, (2) Water Resources Section, Delft University of Technology, The Netherlands, (3) CSIRO Land and Water, Highett, Victoria, Australia

Within the context of flood forecasting, assessment of predictive uncertainty has become a necessity for most of the modelling studies in operational hydrology. There are several uncertainty analysis and/or prediction methods available in the literature; however, most of them rely on normality and homoscedasticity assumptions for model residuals occurring in reproducing the observed data. This study focuses on a statistical method analyzing model residuals without having any assumptions and based on a clustering approach: *Uncertainty Estimation based on local Errors and Clustering* (UNEEC). The aim of this work is to provide a comprehensive evaluation of the UNEEC method's performance in view of clustering approach employed within its methodology. This is done by analyzing normality of model residuals and comparing uncertainty analysis results (for 50% and 90% confidence level) with those obtained from uniform interval and quantile regression methods. An important part of the basis by which the methods are compared is analysis of data clusters representing different hydrometeorological conditions. The validation measures used are PICP, MPI, ARIL and NUE where necessary. A new validation measure linking prediction interval to the (hydrological) model quality - weighted mean prediction interval (WMPI) - is also proposed for comparing the methods more effectively. The case study is Brue catchment, located in the South West of England. A different parametrization of the method than its previous application in Shrestha and Solomatine (2008) is used, i.e. past error values in addition to discharge and effective rainfall is considered. The results show that UNEEC's notable characteristic in its methodology, i.e. applying clustering to data of predictors upon which catchment behaviour information is encapsulated, contributes increased accuracy of the method's results for varying flow conditions. Besides, classifying data so that extreme flow events are individually represented helps to achieve normality in model residuals' distribution for each cluster identified. Reference: Shrestha, D. L., & Solomatine, D. P. (2008). Data-driven approaches for estimating uncertainty in rainfall-runoff modelling. *International Journal of River Basin Management*, 6(2), 109-122.