Geophysical Research Abstracts
Vol. 17, EGU2015-9832, 2015
EGU General Assembly 2015

Improving standard practices for prediction in ungauged basins: Bayesian approach

Cristina Prieto (1), Nataliya Le-Vine (2), Eduardo García (1), and Raúl Medina (1)
(1) IHCantabria, University of Cantabria, Santander, Spain (prietoc@unican.es), (2) Imperial College London, UK

In hydrological modelling, the prediction of flows in ungauged basins is still a defiance. Among the different alternatives to quantify and reduce the uncertainty in the predictions, a Bayesian framework has proven to be advantageous. This framework allows flow prediction in ungauged basins based on regionalised hydrological indices. Being grounded on probability theory, the procedure requires a number of assumptions and decisions to be made. Among the most important ones are 1) selection of representative hydrological signatures, 2) selection of regionalization model functional form, and 3) a 'perfect' model/ input assumption. The contribution of this research is to address these three assumptions. First, to reduce an extensive set of available hydrological signatures we select a compact orthogonal set of information pieces using Principal Component Analysis. This advances the standard practice of semi-empirical selection of individual hydrological signatures. Second, we use functional-form-assumption-free Random Forests to regionalize the selected information. This allows the traditional assumption of linear regression between catchment properties and characteristics of hydrological response to be relaxes. And third, we propose utilizing non-traditional metrics to flag-up possible model/ input errors: Bayes' Factor and a newly-proposed 'Suitability' test. This addresses the typical non-realistic assumption that model is 'perfect' and the input is noise-free. The proposed methodological developments are illustrated for the empirical challenge of flow prediction in rivers in Northern Spain.