IAHS2022-574
IAHS-AISH Scientific Assembly 2022

Bluecat: A Local Uncertainty Estimator for Deterministic Simulations and Predictions

Demetris Koutsoyiannis[2] and **Alberto Montanari**[1]
[1]University of Bologna, DICAM, Bologna, Italy (alberto.montanari@unibo.it)
[2]National Technical University of Athens, Zographou, Greece

We present a new method for simulating and predicting hydrologic variables with uncertainty assessment and provide example applications to river flows. The method is identified with the acronym ``Bluecat'' and is based on the use of a deterministic model which is subsequently converted to a stochastic formulation. The latter provides an adjustment on statistical basis of the deterministic prediction along with its confidence limits. The distinguishing features of the proposed approach are the ability to infer the probability distribution of the prediction without requiring strong hypotheses on the statistical characterization of the prediction error (e.g. normality, homoscedasticity) and its transparent and intuitive use of the observations. Bluecat makes use of a rigorous theory to estimate the probability distribution of the predictand conditioned by the deterministic model output, by inferring the conditional statistics of observations. Therefore Bluecat bridges the gaps between deterministic (possibly physically-based, or deep learning-based) and stochastic models as well as between rigorous theory and transparent use of data with an innovative and user oriented approach. We present two examples of application to the case studies of the Arno river at Subbiano and Sieve river at Fornacina. The results confirm the distinguishing features of the method along with its technical soundness. We provide an open software working in the R environment, along with help facilities and detailed instructions to reproduce the case studies presented here.