Geophysical Research Abstracts
Vol. 12, EGU2010-13006, 2010
EGU General Assembly 2010
© Author(s) 2010

Application of a Bayesian Processor for Predictive Uncertainty Assessment in Real Time Flood Forecasting

Gabriele Coccia (1), Felix Francés (2), Juan Camilo Múnera (2), and Ezio Todini (1)

(1) Department of Earth and Geo-Envinromental Sciences, University of Bologna, Bologna, Italy, (2) Research Institute of Water Engineering and Environment, Polytechnic University of Valencia, Valencia, Spain

The work aims at presenting and discussing the results of a Bayesian method, the Model Conditional Processor (MCP), for assessing predictive uncertainty in real time flood forecasting.
Real time flood forecasting requires taking into account predictive uncertainty due to a number of reasons. Deterministic hydrological/hydraulic forecasts give useful information about real future events, but they can't be taken and used as real future occurrences, as usually done in practice, since they are affected by a number of errors, ranging from observation, boundary conditions and modelling errors. Model forecasts are inherently uncertain and they must be used in order to reduce the uncertainty of decision makers on future occurrences. Predictive uncertainty (PU) is in fact defined as the probability of occurrence of a future value of a predictand (such as water level, discharge or water volume) conditional upon prior observations and knowledge as well as on all the information we can obtain on that specific future value from model forecasts. PU must be quantified in terms of a probability distribution function which will be used by the emergency managers in their decision process in order to improve the quality and reliability of their decisions.
The proposed MCP approach allows to assess predictive uncertainty, combining both the meteorological and hydrological uncertainties, by deriving, at various forecast lead times, the joint probability density function of the observations and of one (or several) model(s) forecasts. This is performed by converting observations and model forecasts in a multi-Normal space using the Normal Quantile Transform. This work also shows the possibility of using a joint Truncated Normal Multivariate distribution, with the aim of improving adaptation to low flows and high flows. The work also deals with the combination of model forecasts with different nature, including meteorological, hydrological and hydraulic models, with the aim of taking advantage of their different capabilities. The work concludes by showing the improvements that can be obtained in terms of reliability of flood alerts using different sets of data on different real case studies.