Geophysical Research Abstracts
Vol. 16, EGU2014-14116, 2014
EGU General Assembly 2014


# Parameterization of rainfall-runoff models by using utility functions for the reproduction of low and average flows

Emanuele Baratti, Alberto Montanari, and Elena Toth
School of Civil Engineering, Department DICAM, University of Bologna, Bologna, Italy (emanuele.baratti@unibo.it)

In the majority of rainfall-runoff modelling applications, the objective function to be minimised in the parameterisation procedure is the mean square error or another quadratic function (such as the Nash-Sutcliff efficiency). Since the use of squares forces an arbitrarily greater influence of large errors, generally corresponding to large streamflow values, such choice may prevent the identification of an adequate input-output relationship for the reproduction of low and average flows. This contribution presents the results of a series of calibration/validation experiments with a conceptual rainfall-runoff model, applied over several case-study catchments, where the performance function is based on the expected utility of the rainfall-runoff model. The method is based on the evidence that the performances of a hydrological model closely depend on the purpose of the application. For instance, in a flood forecasting system, the model could be used to estimate peak flow conditions (e.g. peak time and peak flow rate), whereas in a water resources management system, it could be particularly appreciated the capability of the model to reproduce the discharges for the entire year, or, in particular, those of water scarcity periods. In the proposed method, at each time step, the comparison between simulated and observed data is carried out by using an "ad-hoc" utility function. The calibration is performed by maximizing the overall estimated utility of the simulated data. Different utility functions are tested and the results are compared, over validation data, against those obtained with traditional squared functions. The results reveal that an adequate utility function allows an improvement of the model performances in the reproduction of low and average flows, with a moderate deterioration of the simulation of high flows. It is also pointed out as the traditional calibration procedures may be considered as a particular case of the presented approach.