Geophysical Research Abstracts,
Vol. 11, EGU2009-12172-1, 2009
EGU General Assembly 2009

Parameterisation of rainfall-runoff models for forecasting low and average flows, II: System-theoretic modelling

E. Toth and S. Castiglioni
University of Bologna, DISTART, Bologna, Italy (elena.toth@unibo.it, +39-(0)51-331446)

The parameterisation (or calibration) procedure is crucial in any kind of rainfall-runoff transformation model, independent of the degree of conceptualisation, but it is particularly important for system-theoretic models, like Artificial Neural Networks (ANNs), due to their data-driven nature. The reliability of the parameterisation, and therefore the reliability of a streamflow forecast issued by the model, is strictly linked to the dominant hydrological processes that the hydrologist wants to reproduce. In the large majority of artificial neural network applications for streamflow forecasting, the learning function (or objective function) to be minimised during the training (or calibration) phase is the mean square error. But the use of squares forces an arbitrarily greater influence on the statistic by way of the larger error values: since large error values generally correspond 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 an ANN rainfall-runoff model, applied over several real-world case-studies, where the learning function (objective function) is chosen so to highlight the fit of average and low flows. The experiments will be carried out for a set of case-study watersheds in Central Italy, covering an extremely wide range of geo-morphologic conditions and for whom at least five years of contemporary daily series of streamflow, precipitation and evapotranspiration estimates are available. Different objective functions will be tested in calibration and the results will be compared, over validation data, against those obtained with traditional squared functions.
A companion work presents the results, over the same case-study watersheds and observation periods, of a simple conceptual model, again calibrated for reproducing average and low streamflows.