Geophysical Research Abstracts
Vol. 13, EGU2011-8809, 2011
EGU General Assembly 2011

Mapping of cost functions for the calibration of a lumped hydrological model and comparison of different minimization algorithms

Lorenzo Campo (1) and Andrea Cassioli (2)

(1) Department of Civili and Environmental Engineering, University of Florence, Florence, Italy (lcampo1@dicea.unifi.it), (2) Department of Systems and Informatics, University of Florence, Florence, Italy (cassioli@dsi.unifi.it)

The problem of the calibration of numerical hydrological models has been addressed in last years with a number of different approaches. Many studies have been published in which several algorithms (including direct search, genetic algorithms and multi-start approaches) are employed in order to minimize the selected cost-function. Such function usually derives from some kind of comparison of the simulated time series of discharge flows in one or more outlet of the watershed with the corresponding observations. The choice of a particular cost function is crucial to ensure the success in finding a feasible minimum. Physically-based functions (e.g.: comparison of Flow Duration Curves) might present a very complex structure in the parameters space, that makes the minimum search very difficult, so that it could be more convenient to adopt cost functions that allows simpler search paths. In this work several different cost-functions have been employed in the same problem, the calibration of an hydrological toy-model with four lumped parameters. Large number of simulations of the model have been performed in order to highlight criticalities, if present, in case these functions were used in a calibration procedure. Different direct search algorithms have then been applied to the problem investigating the performances when each one of the cost-functions was employed. Discussion on the comparisons between the effectiveness of the algorithms and the cost functions tested on three basins in Central Italy is provided.