Geophysical Research Abstracts, Vol. 7, 10353, 2005
SRef-ID: 1607-7962/gra/EGU05-A-10353

WHAT CAN WE LEARN BY TRANSPOSING THE CALIBRATION – VALIDATION PARADIGM INTO A MULTI-OBJECTIVE CONTEXT?

B. Schaefli, A. Musy

Laboratory of Hydrology and Land improvement, Swiss Federal Institute of Technology, Lausanne, Switzerland (bettina.schaefli@a3epfl.ch)

The classical single-objective model calibration and validation paradigm using different time periods for each of them is known not to be sufficient to judge whether the model predictions are consistent or to detect model structural deficiencies. It is however interesting to test this classical method in a multi-objective model optimization framework. Multi-objective model calibration has been recognized as being a possible solution to reduce the predictive uncertainty of hydrological models by constraining them to more than one observed signal. The result of such a model optimization is a set of Pareto-optimal model structures approaching the true Pareto-optimal frontier (POF). We make the basic assumption that if the identified model structures were consistent, they should map into another approximation of the POF if they are simulated for another time period.

We use a clustering evolutionary algorithm to optimize a conceptual reservoir-based model. This algorithm enables the joint estimation of decision variables referring to the model structure and the model parameters themselves. The algorithm has the main advantage that it finds and retains several local optima and the corresponding local POFs. The solutions composing the identified local POFs are simulated for a different time period. The type of dependence structure of the corresponding objective-function values enables interesting conclusions about the consistency of the model structures.