Geophysical Research Abstracts
Vol. 14, EGU2012-8704, 2012
EGU General Assembly 2012

Comparative evaluation of different rainfall runoff models

P. Stanzel and H.P. Nachtnebel

Institute of Water Management, Hydrology and Hydraulic Engineering, University of Natural Resources and Life Sciences, Vienna, Vienna, Austria (philipp.stanzel@boku.ac.at)

Recent research applying ensembles of hydrological models shows the potential for improved runoff simulations and comparative model diagnostics. The objective of this presentation is a comparative evaluation of four model structures, expanding the analysis from runoff to runoff components.
Starting from an HBV-type conceptual model, the components controlling fast runoff generation are replaced by more physically-based elements. The implementation of alternative model components for overland flow routing and runoff separation leads to four competing model structures. Their runoff simulations are tested against runoff observations in two catchments. Parametric uncertainty is considered with in a GLUE uncertainty analysis framework, varying the main parameters governing runoff generation. In addition to the analysis of runoff, the simulation of runoff components – surface runoff, interflow and base flow – is analysed.
All four models yield satisfying results in the simulation of catchment runoff. Systematic deviations in some parts of the hydrograph – e.g. runoff peaks, non-driven event runoff, base flow – are diagnosed applying specific performance measures and visual analysis, allowing the inference of model structural errors. Although the models show similar runoff simulations, there are large variations between simulated runoff components. The results of parameter variations reveal systematic differences, especially in the simulated contributions of overland flow and interflow, which imply a high significance of the model structure for the deduction of relevant catchment processes. In this study, no experimental observations of runoff components were available. The presented results show, however, that even coarse information on runoff components can be valuable for the selection of adequate model structures and parameters.