Geophysical Research Abstracts,
Vol. 10, EGU2008-A-08228, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-08228
EGU General Assembly 2008

Increased process understanding from modelling through a combination of error and sensitivity analysis.

D. E. Reusser, E. Zehe

University of Potsdam, Institute for Geoecology (dreusser@uni-potsdam.de, ++49 331 977 21 11)

Models are often used to evaluate our understanding of hydrological processes. However, the traditional calibration - validation approach does not tell us which processes are insufficiently represented in the model. We present a new approach where first the periods with largest model errors are determined. Then the processes dominant in the model during these periods are identified.

Model calibration is not necessary before applying this method, which is a great advantage of this new approach. Temporal evolution of parameter sensitivities are calculated with a computationally highly efficient method, requiring few model runs depending on the number of parameters to be analyzed (about 400 model runs for 10 parameters). From this set, the model runs with the best performance (best set) are assumed to roughly demonstrate the ability of the model to reproduce the observed data. Modelling errors are analyzed for the best set for every model time step with multiple objective functions. These errors are analysed graphically. Times of large errors combined with high parameter sensitivities require further analysis: Either a) the measured data can not be trusted, b) processes with sensitive parameters are insufficiently represented, or c) one or more state variables in the model are wrong.

The approach is demonstrated with a case study applying WaSiM/ETH for the Weisseritz catchment. The river Weisseritz is a tributary of the Elbe river in Saxony, Germany. It was responsible for the severe flooding in Dresden in August 2002. We found that the applied snow model was inadequate during melting periods as well as an inappropriate representation of interflow processes during summer events. These results set the foundation for subsequent model improvement and may even guide future

measurement strategies.