



## **A priori predictions with initial development phases in an artificial catchment**

Hartmut Holländer and the SFB/TRR 38 C2 Team

Brandenburg University of Technology Cottbus, Chair of Hydrology and Water Resources Management, Cottbus, Germany;  
now at: State Authority of Mining, Energy and Geology, Hanover, Germany (hartmut.hollaender@lbeg.niedersachsen.de,  
++49 511 643 532485)

We used ten conceptually different models to predict discharge from the artificial “Chicken Creek” catchment in North-East Germany. The catchment was built as an environment in its initial state allowing an undisturbed ecological and hydrological development. The hydrological models had to deal with the transient catchment conditions (e.g. development of a groundwater body and vegetation) without calibration data.

Meteorological, soil texture, and topography data were given to the modellers, but discharge data were withheld. We compare the predictions with the measurements from the 6 ha catchment and discuss the conceptualization and parameterization of the models at two different predictions:

- (i) without any process understanding
- (ii) after a field visit and a workshop

The first predictions vary in a wide range, e.g. the predicted actual evapotranspiration ranged from 88 to 579 mm/y, the discharge from 19 to 346 mm/y and the storage changes were often negative. One important reason was the non-equilibrium state of the catchment. Initial conditions of a literally “empty vadose zone” (very low water content of the repacked soil) were difficult to handle by all modellers. One result of the underestimated soil water storage was the overestimation of actual evapotranspiration and/or discharge.

The modellers got a better catchment and process understanding from the modelling workshop in early December 2008, and especially from the on-site inspection of the catchment and knowledge transfer during the manuscript preparation (Holländer et al., 2009). Most important were the improved characterization of the initial conditions and the possibility to predict infiltration excess. The results of the prediction and their implications for modelling initial phases will be presented.

### References:

Holländer, H. M., Blume, T., Bormann, H., Buytaert, W., Chirico, G.B., Exbrayat, J.-F., Gustafsson, D., Hölzel, H., Kraft, P., Stamm, C., Stoll, S., Blöschl, G., and Flühler, H.: Comparative predictions of discharge from an artificial catchment (Chicken Creek) using sparse data, *Hydrol. Earth Syst. Sci.*, 13, 2069-2094, 2009.