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Impact of modeler's attitude in catchment modeling: stage from priori prediction to calibration

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Ten investigators (modelers) were invited to predict, independently from each other, the discharge of the artificial Chicken Creek catchment in North-Eastern Germany for a simulation period of three years. Tools or information provided to the investigators were soil texture, terrain and meteorological data. The modelers were given the opportunity to visit the experimental catchment and to inspect the aerial photos of the catchment at its initial development stage if needed. This study was focused on how different modelers approach and solve the problem of predicting discharge in ungauged catchments. Of particular interest were (1) the choice of the model structure; (2) the selection and identification of model parameters; (3) defining the initial and boundary conditions.

The first lesson learned from this study was that the modeler per se is part of the modeling process and has a major impact on the modeled results, particularly if discharge is predicted a priori for catchments that have a high degree of freedom in making modeling decisions. The modelers' decisions made in the course of model implementation and parameterization are strongly influenced by the modeler's experience. The modelers primarily applied process-based models to exploit the available data concerning the physical conditions of the catchment. Doing this they were better prepared to handle missing information on internal state variables and fluxes.

The second lesson learned from this study was the role of identifying the dominant processes in the catchment. We anticipated that the a priori modeling task would be easier using an artificial catchment, where heterogeneity was expected to be rather negligible and process dynamics simpler than in catchments that have evolved over a longer period of time. The modeled results converged with a stepwise supply of more information, but the prediction differences remained amazingly large. This model comparison showed also that even small artificial catchment exhibits heterogeneities, which lead to similar modeling problems as in case of natural catchments and, above all, the assumptions largely, determine the outcome of the prediction.

Thus, the influence of modeling experience, the impact of field evidence and insights gained during a workshop on the prediction results and on the results with calibration data from first prediction up to the situation of exhaustive calibration will be presented.