Geophysical Research Abstracts, Vol. 8, 02343, 2006
SRef-ID: 1607-7962/gra/EGU06-A-02343
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Comparison of two approaches to the regionalization of model parameters

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Relationships between catchment characteristics and model parameters are important prerequisites for predictions in ungauged basins, assessment of land use changes and the parameterization of semi-distributed hydrological models. This study presents a semi-distributed modification of the HBV model concept and two regionalization approaches using widely available catchment characteristics in the meso-scale Neckar catchment. The HBV model was adapted to allow for the simulation of catchment runoff and daily groundwater recharge in a high spatial discretization. The resulting large number of model parameters requires the use of a regionalization method which also ensures consistent parameter estimation. Therefore functional relationships between catchment characteristics and model parameters have been defined a priori. These established relationships were used to calibrate the model by modifying the parameters of the transfer functions instead of the model parameters themselves. The results are compared to relationships derived from individually calibrated model parameters constrained to form a function of catchment characteristics by a derivation of the Lipschitz condition. Through this reduction of the available parameter space for optimization the problem of equifinality is avoided which often results in weak regression relationships between model parameters and catchment characteristics.