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Identification of critical time periods for the efficient calibration of hydrological models

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Hydrological models are used for forecasting, water management or design to provide information for decision making. Due to the simplification of the complex natural processes and the limited availability of observations the parameters of these models cannot be identified perfectly. The length of the observation period used for model calibration has a great influence on the identification of the parameters. In this contribution model parameters are estimated from so called unusual time periods. These are identified from discharge observations using data depth. Four different depth functions are used to identify unusual events from four days lagged discharge data. Data with low half-space depth are considered as unusual. The depth is calculated using the observations, their natural logarithms, their rank and their first differences. Model calibration is only slightly worse then using all data if one uses the selected critical periods only. The transferability of the parameters for different time periods is for the rank based depth significantly better than using all data. Two different models are used to demonstrate the methodology for the Neckar catchment in South-West Germany.