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Improvement in calibration strategy of a conceptual distributed hydrological model using spatial data analysis

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Using Hydrological Models is the most common way for forecasting, water management or design to provide information for decision making. The most difficult and, at the same time, challenging part is the identification of model parameters. The calibration based on temporal investigations has been under study by many researchers, but less important has been given for spatial similarities. The purpose of this study is to investigate how a critical HRU (Hydrological Response Unit) can be formulated using catchment characteristics. Data depth function was used to identify critical HRU. Mostly calibrating the parameters for big catchments is time-consuming and costly computation. To compensate these difficulties, we would focus on grids which have the biggest effect on the catchment area and which influence model parameters most. Using Tukey's half space depth function depth of all grid cells for N catchments properties were calculated. The grid cells which have lower depth are critical for identifying the model parameters. A comparison was made by calibrating a distributed conceptual HBV model using all the grid cells and also on only selected critical grid cells. It has been found that Model calibrated only on Selected critical grid cells have very similar performance as we could have calibrated on all grid cells. This has reduced the complexity in parameter estimation and decrease the time of computation. The Upper Neckar catchment located in south west of Germany was used in order to demonstrate its methodology.