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Delineating of topographic-based process entities for J2000 using SRTM elevation data for Prediction of Ungauged Basins (PUB) in regions with different landscape characterisations

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Distributed models are based on homogenous entities which are delineated using landscape parameters such as topography, land use, soil and geology. In ungauged basins most of these required data are only available in a coarse spatial resolution. In order to by-pass this gap the globally and free available SRTM-data will be used to obtain model entities in a finer resolution because this data have the advantage of an adequate fine resolution of 30m and respectively 90m.

The overall goal of this project is the potential investigation of SRTM-data for delineation of process relevant hydrological response units (HRU) over various scales. The main research hypotheses focus on integration of landscape components into hydrological system analysis and modelling. The first assumption relies on the close process-driven feedback between topography and landscape components as well as on runoff dynamics which can be quantified using geoinformation techniques. Secondly, an improvement of water balance estimation is expected by using the fine-resoluted SRTM-data for process-oriented delineation of model entities. These entities are implemented in the distributive hydrological model J2000.

As first, the SRTM-data were optimized in order to correct geometric and radiometric errors using new GIS procedures such as vegetation reduction, void filling, filter combinations, stream burning and upscaling. As a result, hydrological corrected elevation model data are available. In order to establish a ruled-based framework for HRU-delineation three subcatchments of the Saale catchment with different landscape char-

acteristics were analysed by discretisation into single raster entities. This approach allows an identification of different reaction patterns over a given time frame for each raster element. The reaction patterns were grouped to homogeneous units regarding the considered process. These obtained process clusters are directly influenced by the model structure of J2000. The clusters were reproduced by application of various physical topographic indices which have shown a close relation to the considered processes in numerous previous studies.

Under consideration of the scale problem several indices such as Topographic-Wetness- Index, Stream-Power-Index were investigated in the three catchments and thresholds for their classification were determined. The topography-based response units for each runoff process were overlayed and received entities were used as model input. The application of physical based indices meets the requirements of process- and problem-oriented pre-processing of spatial data. In addition, the HRU-delineation is model-adequate because of its reference to the model structure. Finally, the methodology allows the validation of the deterministic character of the applied model system.