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Comparison of different approaches of spatial discretization for modelling the natural discharge in a subcatchment of the river Spree (125 km2) in Lusatia (Germany)

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Even under current climatic conditions, the water balance of Lusatia is profoundly disturbed due to lignite mining activities. Both the enormous interventions in the landscape due to mining activities as well as the sudden abandonment of mines in the early 1990s caused severe problems concerning the water and mass balance of the region and resulted in manifold user conflicts.
Resource conflicts may tighten due to future climate and land use changes (rising groundwater table, formation of large-scale artificial lakes, and cultivation of energy crops).

Within the scope of the „Innovation Network Climate Change Adaptation Brandenburg-Berlin“ (INKA BB), our working group aims at defining strategies and options for action in order to alleviate possible negative consequences of climate change on the water balance of Lusatia .

In order to achieve this, first the natural (uninfluenced) discharge of the catchment has to be determined as essential input data for subsequent water balance modelling using the Water BALance Model, WBALMO.
A subcatchment of the river Spree (A=125 km^2) which is hardly influenced by water management and lignite mining was chosen as the study area and is therefore applicable for both calibration and validation of rainfall runoff models.
In order to reduce the uncertainties of the hydrological impact model used, a model comparison was performed using the physically-based, distributive water balance model WASIM-ETH and the ecohydrological, semi-distributive model SWIM. The model comparison focuses on the influence of different approaches of spatial discretization (WASIM-ETH: Raster, SWIM: hydrological response units).
The comparison was conducted with homogeneous as well as heterogeneous soil and land use properties.

Considering homogeneous soil and land use properties, the simulated discharge of both models are similar. Considering heterogeneous soil and land use properties however, the simulated discharges differ. The differences are a result of the different approaches of spatial discretization as well as the different approaches of process description.

In order to also evaluate the model's performance for a large scale catchment, the catchments of the rivers Spree (ca. 9700 km^2) and Schwarze Elster (ca. 5700 km^2) will be the focus of future investigations. This will also include climate change and land use impact studies and constitute the input data for the Water BALance Model, WBALMO.