Categorization of small catchments for modeling the precipitation response

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This contribution presents partial results of the project, which is focused on hydrological modelling as a tool for designing small water management construction and soil conservation measures and in the landscape. For the hydrological response, design rainfall and the initial condition, the current state of the river basin as well as the characteristics of the area under consideration are important. For the hydrological response, design rainfall, the current conditions of the catchment area as well as the characteristics of the solved area are important.

Design precipitation in relation to initial conditions (soil moisture and surface condition) is one of the project goals. This data are important for hydrological modelling that is a tool for designing water management measures on small watercourses and in river basin areas is relevant for catchment size where long-term measurements and possible analogy cannot be used. The design of small hydrotechnical buildings based on hydrological modelling is used for catchments up to the area of 5 km².

Basic categorization of small catchments in the Czech Republic is presented. At present, the Czech catchments are categorized into four levels. From the main river catchment to the catchment of the category IV. order (small catchments). There are considerable differences in size in the fourth category. From catchment areas of over 20 km² to supplementary catchment areas of less than 1 km². The categorization of these catchments in terms of their potential hydrological response is described in the past. For the categorization of the territory of the Czech Republic at the level of small catchment areas in terms of hydrological response, the different size of the area is one of the hardly definable parameters.

For these reasons, the project addresses also the delimitation of small catchments in the Czech Republic, which fall into the category of areas up to 5 km² and significant areas outside the watercourse and their subsequent classification in terms of possible hydrological response. The activities were in this ongoing project focused on delimitation of these catchments and research of suitable data for their classification.

Detailed model of terrain in the resolution 5x5 m and watercourse layer were used as input data for delimitation of small catchments. ArcGIS tools and Python scripting language were used for
processing. As it is a relatively large data set, the following analyses were gradually repeated for the catchment III. order with the extension of the boundary, so as to ensure possible discrepancies between the delimitation of the basin and the distribution boards defined on the basis of a detailed terrain model.

Nine categories were selected as significant areas ranging from contributing areas of 0.3 to 5.5 km². In the category of the smallest catchments (categories from 0.3 to 0.7 km²) there are over 70 thousand areas defined in the Czech Republic. In the category from 4.5 to 5.5 km² there are over 4 thousand catchments. A categorization both for individual classes and overall for the territory of the Czech Republic according to the largest contributing area is presented.