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Concept for the estimation of flood generation in small Alpine catchments

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Floods that pose a threat to the human environment occur frequently in small torrent catchment areas in the Alpine region. This study aims at understanding the multitude of factors and their interactions respectively that play a role in the generation of rapid surface runoff and thus lead to the generation of floods. This includes taking into consideration the possibility that various temporal shifts can take place within the catchment. These shifts consist of the changes affecting the hydrological system the most, such as snow cover, frozen soil and soil moisture. In an initial step the permanent catchment features and their spatial extents are acquired and processed in a GIS (Geographical Information System). Thereby two gauged Alpine catchments serve as study areas and are investigated in regard to their influence on surface runoff. These areas are characterized by a large variety of properties. The Ruggbach catchment is a small (6.7 km^2), low lying (ca. 440 – 1,100 m. a. s.) catchment at the north western fringe of the Austrian Alps, represented by rather dense Cambisols and generally a quick and significant discharge response to the input of precipitation. In contrast the slightly larger sized Längental catchment (9.2 km^2, ca. 1,900 – 3,000 m. a. s.), located in the central Austrian Alps responds much slower and modified to precipitation events. Reasons for this can be ascribed to its catchment features dominated by large spatial extents of thick, coarse debris covered slopes, which encourage the immediate percolation of surface water. As such areas are much less subject to temporal changes in hydrological reaction, the precondition of the system plays a subordinate role in the Längental catchment in contrast to the Ruggbach catchment. The establishment of a decision support system is aided by the various published results of sprinkling

experiments in which runoff coefficients are allocated for certain vegetation/soil units. In a following step the preconditions of these units are estimated by the application of appropriate, simple and robust models. The derived runoff coefficients are finally coupled to a hydrologic discharge model, enabling actual events to be modelled and their results validated.