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How Runoff Process Maps can be used to improve Predictions in ungauged Basins

P. Schmocker-Fackel (1), F. Naef (2), M. Margreth (2)

(1) Group of Water, Soil and Rock movements, Swiss Federal Institute for Forest, Snow and Landscape Research (petra.schmocker@wsl.ch), (2) Institute of Environmental Engineering, ETH Zurich.

Flood runoff is formed either by Hortonian overlandflow, saturated overlandflow, subsurface stormflow or deep percolation. The processes differ in the way water infiltrates and flows in the soil and in their water storage capacity. Runoff processes can be determined on the plot scale through soil investigations and with sprinkling and tracer experiments. However, upscaling the process distribution to the catchment scale is difficult and work intensive, especially for large catchments.

Therefore, we developed a set of rules for an automated GIS based determination of the dominant runoff process (DRP), based on data from a detailed soil map and maps of geology, topography and land-use. This set of rules was developed and tested with data sampled in two small experimental catchments (2 km^2) on the Swiss plateau and was used to determine the spatial DRP distribution for two larger catchments (46 and 22 km^2 respectively) in the region.

A rainfall runoff model that considers the spatial distribution of the runoff processes in a catchment was used for flood discharge simulations. The parameters describing infiltration into and water storage in the soil were determined directly from the DRP maps. The parameters describing the soil drainage were estimated based on soil water level measurements conducted in one experimental catchment. Runoff was successfully estimated in all four catchments based on the respective DRP distributions obtained with the set of rules.

By mapping and modeling dominant runoff processes, important model parameters can be determined from field or soil data only. The concept additionally offers a possibility for parameter regionalization based on process knowledge. Therefore, it con-

tributes to a better prediction in ungauged basins.