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# Digital Mapping of runoff processes using artificial neural networks and expert knowledge

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Due worldwide lack of high resolution soil and hydrological maps fast and accurate predictions of soil-hydrological properties are needed to face the changes of the hydrological regime resulting from global change.

Based on a hydrological process mapping scheme developed by Scherrer et al. in Switzerland, a hierarchical decision system was developed to derive the relevant runoff processes at a scale of 1:25.000. The approach consists of two major parts: first an artificial neural network prediction based digital terrain analysis, and second a rule based system to classify soil maps in terms of hydrological processes. The final inference can be applied including land use/cover to calculate scenarios of runoff changes.

The study area which is frequently affected by flood events, is located in Rhineland Palatinate, Germany, and comprises over 500 $km^2$. Five sub-catchments had been mapped by Scherrer et al. at a scale of 1:10.000. Three were used for learning and two for validation.

The prediction is based on bagged resilient backpropagation neural networks and 25 terrain attributes derived from a 20 m DEM. The hydrological interpretation of the existing soil map (1:50.000) was conducted by a soil surveyor with local experience.

The results, with high accuracies of about 60 to 85 %, are very promising and provide the basis for high resolution soil-hydrological process maps for large areas. A hydrological model based on these datasets is under development.