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Certainties and uncertainties when mapping dominant runoff processes

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Conceptual and physically based distributed models need the definition of homogeneous areas where almost similar conditions are found. A widespread method applied nowadays is the identification of areas with defined dominant runoff process (DRP). They are defined mainly using a stepwise approach including the information about land-use, topography and a deep knowledge about the soils.

These contributions explore the depth of the information needed for defining areas with the same DRP. For this, small catchments (4-9 km^2) in Germany and Luxembourg have been mapped. With the aid of a discriminant analysis the factors leading to the differentiation of DRPs are defined for all mapped units.

The results show that some of the runoff process types are well identifiable by means of geomorphological features defined with GIS, always in combination with a raw differentiation of the underlying lithology. These are especially the types defining no superficial runoff (deep percolation, DP) as well as very fast and very slow saturation overland flow (SSF1 and SSF3, respectively) and moderate sub-surface flow (SSF2). Their distribution within the first two canonical discriminant functions represents the corners and margins of a triangle enclosing the data. Inside the triangle, we find the processes defined as fast Hortonian overland flow (HOF1), moderate saturation overland flow (SOF2) and slow sub-surface flow (SSF3).

These process types mentioned last have to be identified for this with deeper knowl-

edge of the investigated area and a higher information density. This may concern e.g. surface and soil characteristics. On the other hand, the first group of processes is mainly defined by the topographical characteristics and reflects a) their dependence on soil development which is determined by lithology and topography and b) the mapping technique applied in the field.

Concluding, the analysis of the maps of DRPs allows to identify process types, where clearly a deeper insight is needed into the studied area or where the DRPs separation from each other is not well done by the available data.