



Evaluating different mapping approaches of dominant runoff processes with similarity measures and synthetic runoff simulations

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The identification of landscape units with similar hydrologic response behaviour is crucial for runoff prediction in ungauged basins. An established method for catchment classification is based on the dominant runoff process (DRP) concept (Grayson & Blöschl, 2000). Different mapping approaches of DRPs exist and differ in several aspects such as time and data required for mapping. On one hand, manual approaches based on intensive field investigations and expert knowledge are reliable but time expensive. On the other hand, GIS-based approaches are easier to realize but rely on simplifications which restrict their application range. Therefore, it is important to investigate to what extent these assumptions are transferable to other catchments.

In this study, different GIS-based mapping approaches (Schmocker-Fackel et al., 2007; Müller et al., 2009; Gharari et al., 2011) were used to classify DRPs of two catchments on the Swiss Plateau and were compared to manually derived DRP-maps elaborated using the rule-based approach by Scherrer & Naef (2003). Similarity measures such as mapcurves (Hargrove et al., 2006) and fuzzy kappa statistics (Hagen-Zanker, 2009), as well as a categorical comparison, were performed. Furthermore, the different DRP-mapping approaches are evaluated through synthetic runoff simulations with an adapted version of the well-established hydrological model PREVAH (Viviroli et al., 2009).

The different mapping approaches are not unconditionally reasonable for arbitrary catchment characteristics. Generally, all approaches represent the areas where subsurface flow dominates well, whereas they exhibit difficulties with the mapping of very fast and not contributing areas.