



Identifying subsurface karstic drainage areas with a continuous hydrological model in the Austrian Kalkalpen

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Hydrological processes, subterranean drainage and geomorphology play an essential role in the formation of karst topography. The dissolution of karstifiable rocks very often leads to different orographic or subsurface catchment boundaries, which are difficult to identify. Yet determining the areas contributing to the total runoff is of great importance for the analysis of karst geomorphology, water balances and in context of the presented studies for continuous hydrological surface runoff modelling. The objective of this study is to demonstrate that continuous hydrological models, which are to a large extent based on physical principals, provide an attractive alternative to identify catchment boundaries in karstic regions.

In the presented study areas, which lie in the Salzach and the Enns river basin in the Austrian Kalkalpen, a semi-distributed hydrological model is applied. Based on the position of runoff gauges and orographic features the entire catchment area is divided into subbasins and then into hydrological response units based on land-use, soil type and altitude. By comparing the water balance derived from hydrological modelling based on the orographic catchment area and the measured water quantity for each sub-catchment it is possible to find the appropriate drainage basin area contributing to the gauge. By integrating additional information from geology, also as an overlay in GIS, it is then possible to adapt the orographic catchment by redirecting a defined proportion of the simulated runoff from hydrological similar zones from or to neighbouring catchments.

The results show that the encountered water-balance discrepancies due to orographically based assumptions of catchment boundaries in karst-areas can be resolved and that the representation of the observed hydrograph can be improved by this method. Using this approach it is possible to verify the existing geological and geomorphological information. Moreover, the presented method can be used as a basis for further investigations, where sparse information on geomorphology is available.