



Seasonal and spatial response patterns of catchment runoff in a low mountain range in Central Europe

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Water resources protection and flood prevention needs secure knowledge on catchment response on both, rainfall and drought. The urban expansion during the 60's and 70's of the last century lead to an intensification of the use of surface and ground water in the low mountain range in the west of Germany. For ensuring their sustainable management the installation of runoff gauges was obliged and for this it led to a set of runoff data of small and mid-scale catchments with different geological underground and land-use patterns. Due to be destined only for documentation, data resolution is only low and for this available as average daily discharge in $\text{m}^3 \text{s}^{-1}$.

Such is the case of the Kyll catchment, a northern tributary of the Mosel-river and part of the Rhine system. Within its 834 km^2 catchment (length of the river 142 km) there can be found devonian schists, but also mesozoic formations like Muschelkalk and Buntsandstein. They may induce a highly differentiated runoff behaviour of the Kyll-river at different segments as well as at its tributaries.

Statistical analysis of the rainfall-runoff relation during the registered period (max. 1967-2006) allows to identify periods different response of the catchments. The frequency and magnitude of different flood events and their seasonal variability may be detected as well as the duration of low flow and the consequent required rainfall amount to lead the catchments into the next runoff reaction pattern.

As first results, an extreme seasonality of rainfall-runoff reaction types of all observed catchments could be detected at all observed catchments, which is independent of location and basin size. Highest variability could be observed in duration of different catchment reaction patterns, and for this, the duration of their susceptibility for storm-flow events or to extreme droughts.

The detection of these similarities and dissimilarities of the catchments provides valuable information to clump tributaries and rivers sections to units with analogous behaviour, and is for this a valuable tool for integrated catchment management.