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Empirical relations between catchment characteristics and discharge patterns in Sweden

G. Lindström, J. Dahné, and B. Arheimer
SMHI, 601 76 Norrköping, Sweden

In hydrological modelling it is often assumed that catchment characteristics, such as soil type, vegetation, land-use, slope, altitude and climate influence both the magnitude and dynamics of the water discharge characteristics. This presentation demonstrates an inter-site comparison on similarities and dissimilarities in hydrological response from Swedish unregulated catchments with an area less than 2000 km2. Observed daily time-series for about 20 years from 198 sites were analysed to search for and quantify statistical relationships between catchment characteristics and flow characteristics. A number of flow characteristics were calculated, such as the mean, mean annual maximum, peakiness, skewness and percentiles. The catchments were grouped dependent on catchment characteristics (for example >80% forest). The differences between the discharges from different catchment types were analysed both graphically and statistically. A T-test was performed to see if the mean value for the flow characteristics was significantly different from the rest of the catchments. Following the t-test, a set of box-whisker diagrams were made for visual inspection of the results.
The results showed that lake percentage is the most important catchment characteristic for most of the flow characteristics. The effect of lakes was therefore treated separately. For lake-free basins soil type was in general more important than land-use. For instance, coarse soils exhibit a sustained base flow, whereas thin soils and bare rock are characterised by peak flows with short duration.
Finally, the presentation will give some examples on how the retrieved empirical information was included in a national modelling approach to simulate spatial variability in Swedish water discharge patterns.