



Catchment classification based on spectral signatures

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Hydrology aims at predicting the hydrological behaviour at places, moments and scales that are not observed. Good hydrological predictions therefore require the inference of this unobserved behaviour based on the observed behaviour and some organizing principles. From this viewpoint, classification of the observed hydrological response is a very valuable tool for prediction at ungauged sites (or for future situations or for unobserved scales) if classification explicitly aims at linking easily observable catchment structure or response to difficult to observe or unobserved behaviour.

In the present research we focus on developing methods to explicitly link the observed discharge to the filtering characteristics of the catchment and to its structure on one hand, to the driving climatology on the other hand. We use wavelet spectral analysis that yields a time and frequency resolved representation of an observed time series and that, therefore, can reveal how the system input (e.g. rainfall) frequencies are propagated to the response. Based on virtual experiments, we identify spectral signatures of typical hydrological behaviour (e.g. threshold behaviour).

These signatures will then be used to answer the question which frequency features of the hydrological behaviour are related to the climate, which features are related to easily observable catchment characteristics and which ones are related to some internal, difficult to observe characteristics (such as preferential flow). Only if we are able to relate the dominant frequency features to easily observable catchment characteristics, we can judge them as being sufficient to characterize the hydrological behaviour of a catchment and hence develop a classification system.