

Spatio-temporal patterns of rainfall-runoff event and baseflow characteristics and their potential drivers in Germany

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Event and baseflow characteristics are an important source of information to reveal how much of rainfall transforms into runoff and how fast does it happen, and to shed a light on the temporal variability of the rainfall-runoff event characteristics. A new event separation method allows fast and continuous separation of rainfall-runoff events and provides a formal framework for judging their independence. We analyze more than 190,000 events for 378 German catchments, using event and baseflow characteristics for uncovering regional pattern of hydrologically similar catchments with Self-Organizing Maps. Event and baseflow characteristics reveal a clear spatial pattern in Germany and can be associated with reasonable climatic and landscape drivers. A large dataset of catchment descriptors representing climate, geology, hydrogeology, groundwater and aquifer properties, geomorphology, topography, soil types and properties, soil water properties, land use, characteristics of dry and wet spells were used for iterative selection of catchment descriptors based on the measure of cluster similarity, which avoids subjectivity of their choice. Principal Component Analysis has shown that climatic drivers and soil properties are principal descriptors for majority of clusters. Geological and hydrogeological properties contribute mostly to the variability of baseflow characteristics, while wet and dry spells properties are important for resembling spatial pattern of event characteristics.