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Focused on the ungauged: focused pooling approaches for estimating extremes at ungauged catchments

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Pooled frequency analysis is used to estimate extreme event quantiles at catchments where the data record is either short or not available. This can be accomplished by combining (pooling) information from hydrologically similar sites to increase the available data for estimating the required extreme event quantiles. A focused pooling group is a collection of gauging stations that are used to estimate quantiles for a hydrological extreme at a target location. The target location may be either a gauging station with a short record length in comparison to the return period of interest or may be an ungauged location. This paper will address issues associated with estimating extreme event quantiles at an ungauged catchment using a focused pooling approach. Application of the focused pooling approach for an ungauged catchment requires: i) the estimation of the magnitude of the index event; and ii) the identification of the focused pooling group for the ungauged catchment. The first task can be accomplished using one of several regression-based techniques, so the emphasis herein is on the latter task. The identification of a focused pooling group generally requires the definition of a similarity measure between the target location (ungauged catchment) and each of the gauged catchments that are candidates for inclusion in the pooling group for the target location. This is a straightforward process provided that the required similarity measures can be calculated for ungauged catchments. For example, if the similarity measure is based on physical catchment characteristics (attributes), then the focused pooling group can be readily identified for the target location. However, if the similarity measure can only be calculated using measures derived from streamflow data (such as seasonality measures) then it is no longer feasible to directly identify the pooling group for the (ungauged) target location. This paper will explore and evaluate various approaches for identifying a focused pooling group for an ungauged catchment.