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On the use of heterogeneous pooling groups

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Pooling of data from catchments considered similar in terms of morphology, climatology and other important hydrological factors is a widely used technique in regional frequency analysis of extreme hydrological events. An often cited key assumption of many such pooling methods is that the statistical distribution of the events is identical across sites within a region (geographically contiguous or not) except for a dimensional scaling parameter, aka homogeneity. A particular method based on these principles is the index-flood method as implemented in the Flood Estimation Handbook (FEH) for flood frequency estimation in the UK based on annual maximum peak flow series.

This paper presents a revised method for pooling of extreme flood events which has effectively replaced the FEH procedure as the standard UK method. While the new method has retained the index flood method and the use of L-moment ratios as its foundation, its approach to forming weights with the pooling group has rendered obsolete the need for identification of homogeneous pooling groups. This extension introduces a more complex relationship between the weights assigned to each pooling group member and the degree of similarity between each member and the actual site of interest. The new set of weights also depends on record-length at each individual site, and on whether the target site is gauged or ungauged.

The method has been developed and tested using annual maximum peak flow series from 602 gauged rural catchments located through-out the UK, and was found to perform better than other alternative methods, including the existing FEH methodology for prediction of flood quantiles at ungauged sites.