Title: Does Homogeneity Matter in RFFA: A case study in NSW, Australia

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Regional flood frequency estimation (RFFE) method can be adopted to estimate design flood where quality stream-flow data is unavailable. L-moments based index flood method (IFM) is one of the widely used RFFE methods to estimate design floods in ungauged catchments, which is explicitly dependent on 'homogeneous region'. However, homogeneity cannot generally be achieved in case of Australian flood data as found by previous studies. For the present study, homogeneity of 88 selected catchments in New South Wales (NSW), Australia is explored based on Hosking and Wallis (1993) criteria; however, no homogeneous regions are found. Therefore, an approximate IFM is developed and tested in both fixed region and region of influence approaches where the index flood is taken as 10% annual exceedance probability (AEP) flood (Q_{10}). Several statistical evaluation measures are adopted to test the validity and performance of the developed approximate IFM. The approximate IFM gives a median relative error in the range of 30% to 37% for flood quantile estimation, which is comparable to the relative error reported in case of the RFFE technique recommended in Australian Rainfall and Runoff (2016). This demonstrates that strict adherence to 'homogenerous region' assumption may not be needed in IFM.