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Bias Corrected L-Moment Index Flood Procedure

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The Index-Flood Procedure is a widely used method for regional frequency analysis. Early variations date from the 1960's. More recent variations use L-moments to obtain unbiased estimates of parameters of flood characteristics. Others have shown that L-moment estimators exhibit many desirable properties when working with annual maximum flood series. For instance, they are much less biased than product moment estimators, especially in small samples; this is a defining argument for their use within index flood procedures. This paper points out that small sample (n<50) L-moment estimators of L-CS still exhibit bias. Assuming a Generalized Extreme Value (GEV) Distribution, the bias in estimating its shape parameter [U+F06B], L-Skewness and L-Kurtosis is illustrated. A linear correction factor is derived and shown to reduce the bias for the parameters over the range of interest, corresponding to realistic configurations of the GEV distribution. The correction factor increases the variance of an at-site estimation of a single statistic of interest by perhaps 20% for L-CS. But, for regional analysis that average over many sites with almost unbiased at-site estimators an almost unbiased regional estimate is obtained. L-Kurtosis is not used to estimate parameters of three-parameter distributions; however, in the context of the Index-Flood procedure it is often used decide on a distribution for the population, which gives merit to the bias correction. The robustness of the derived correction is tested by applying the results to samples drawn from the Generalized Logistic Distribution. In this case, the bias is reduced as well, supporting the utility of the bias correction, even if GEV is not the population distribution.