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Suitability of sample size for identifying distribution function in regional frequency analysis

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Regional frequency analysis has got much importance in estimating the hydro-metrological extremes at the sites where there is no data or is of very short length. The well-known conventional method of moments or recently developed L-moment approach is brought in use for identification of distribution function for each region. Such identification is made from the plot of sample coefficient of skewness versus sample coefficient of kurtosis for each station as well as regional average against various population distribution functions. The incorrect selection of distribution function takes place if the sample size is small, as the coefficients of skewness and kurtosis varies with the size of sample until the sample size is not large enough. It is intended to explain the variation nature of conventional and L-moment coefficient of skewness and kurtosis with the sample size by examining departure pattern of these coefficients for each sub-sample of various size with that of whole large sample. Annual maximum daily precipitation data of some precipitation stations having a record length of about 100 years lying in the Yodo River Basin, Japan has been used for analysis in the study. Ten numbers of sub-samples were made randomly for each sub-sample size ranging from 20 to 80 for each considered station. Average skewness and kurtosis coefficient error decreased from about 50% to 20 % as the sample size was increased from 20 to 50 at one of the station as shown. The results are also intended to provide guidance for determining suitable sample size while applying the conventional or L-moment method for identifying distribution function in regional frequency analysis.

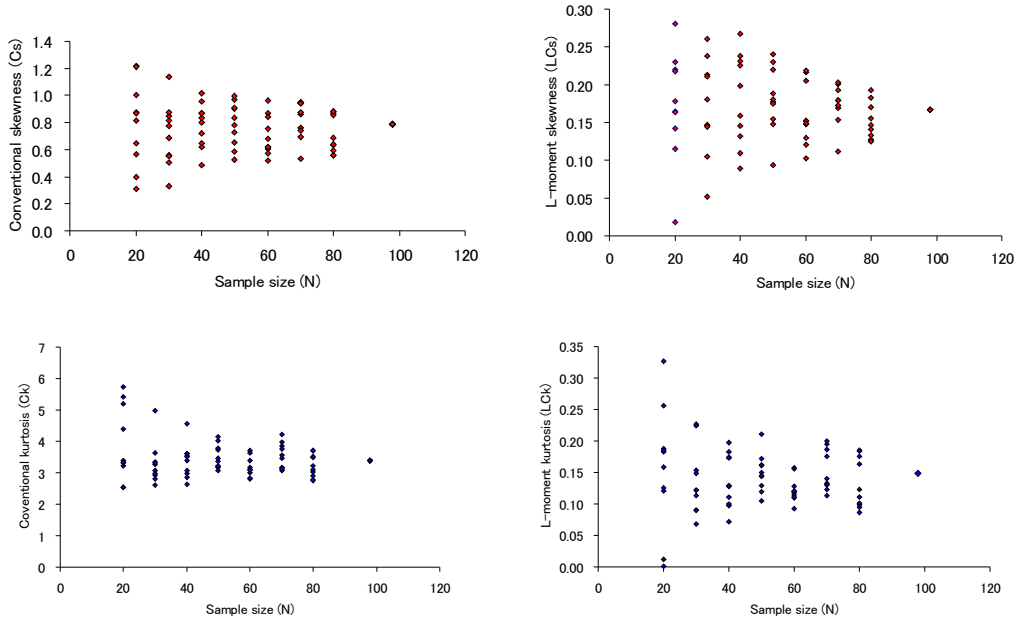

Figure: Variation of skewness and kurtosis with sample size at Gojyou, Yodo river basin, Japan