

Asymptotic standard error of annual maximum flow quantile estimated by means of seasonal approach

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The case of floods occurring in two seasons in a year requires a seasonal approach for estimation of annual maxima (AM) quantiles both when there is no expressed predominance of one season while the interest is in an upper tail or when lower quantiles of AM distribution are to be estimated. The problem can be identified as an estimation of AM quantiles based on two-component distribution and assess accuracy of AM quantiles obtained in such way. It is assumed that in each year seasonal maximum flow is regarded as a flood in the flood frequency analysis and moreover that seasonal flood peak flows are mutually independent. The seasonal maxima distributions are estimated for each season separately using any estimation method. The goal is an assessment of the AM quantiles asymptotic accuracy. However the explicit formula for the standard error of quantiles is available only for TCEV and in other cases commonly the bootstrap method is applied. In practice seasonal distributions differ not only in respect of parameters but also of distribution functions and parameter estimation methods. Asymptotic standard error assessment of AM flow quantile applicable for any pair of seasonal distributions and any parameter estimation method with known variances of quantiles of the component distributions was done by two ways. The both ways lead by determination of the accuracy of the probabilities of non-exceedance in seasonal approach.