



Towards improvement of stability of flood quantile assessments

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Flood frequency analysis (FFA) provides information about the probable size of flood flows and has been used for the design of civil engineering works over the century. The assessment of the flood (upper) quantiles is required for dimensioning hydraulic structures affected by high waters, such as culverts, dams, bridges, overflow channels, spillways, levees, and others. FFA plays an important role in reducing the flood risk, since the flood quantile estimates are essential in determining the limits of flood zones with varying degree of flood risk as well in estimating the risk of exploitation of floodplains.

In the classical approach, the problem of the flood frequency modeling refers to the choice from a set of candidate distributions such a probability distribution which the best describes the analyzed series of annual or seasonal maximum flows. However, the choice of the best fitting model (distribution type and its parameter values) is not unique. It depends on the discrimination procedure used (criterion for the selection of the distribution) and the method of estimation. Four discrimination procedures and three estimation methods is investigated here. When we decide on a subjective or imposed some guidelines choice of distribution, its type can change with the length of the measurement series. This may cause significant shifts in the upper quantile estimates, even every year, posing a huge problem for engineers and designers of hydraulic structures.

Due to the uncertainty of choosing the best model, the method proposed by Bogdanowicz (2010) can be applied to determine the maximum flow quantiles. Following this method, the quantile is estimated for a set of alternative models and each model contains a piece of information about the true quantile value. This piece of result should be provided with a proper weight, depending on the quality of the fit of a particular model to the data series.

The number and type of the candidate distributions is essential for estimate value of flood quantile. The analysis of above issue is investigated here with including the inverse Gaussian and generalized exponential distributions, since both these models have been found to match the number of Polish data successfully.

The study is illustrated by real data examples of series of seasonal peak flows for Proszówki gauging stations on the Raba River.

Bogdanowicz E., 2010: *Podejście wielomodelowe w zagadnieniach estymacji kwantyli rozkładu wartości maksymalnych (Multimodel approach to estimation of extreme value distribution quantiles)*, Polska Akademia Nauk, Komitet Inżynierii Środowiska, Monografia nr 68: *Hydrologia w inżynierii i gospodarce wodnej (tom 1)*, Komitet Inżynierii Środowiska PAN, 57-70.