Nat. Hazards Earth Syst. Sci. Discuss., 1, C2496–C2498, 2014
www.nat-hazards-earth-syst-sci-discuss.net/1/C2496/2014/

Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Application of a hybrid approach in nonstationary flood frequency analysis – a Polish perspective" *by* K. Kochanek et al.

Anonymous Referee #2

Received and published: 5 February 2014

The authors compared two methods of nonstationary flood frequency analysis: a two-stage (TS) method consisting in removing the linear trend in the mean and standard deviation of the investigated time series and estimating parameters of assumed distributions by L-moments, and the maximum likelihood (ML) method applied to the distributions with parameters assumed to be linearly time-dependent. The Monte-Carlo (MC) simulations were used to compare the ML and TS trends and quantiles. Both methods were applied to 31 Polish 55-year series of annual maximum flows.

The synthetic flow data used in the MC experiments were generated from the GEV distribution with two of its parameters linearly time-dependent. Two of the three adopted

options were widely analysed: option (i) with 7 competing distributions including GEV, and option (iii) with GEV only. For each option-(i) simulation the best distribution was selected by the Akaike information criterion (AIC), which resulted in that probably all the 7 distributions had their share in each of the 1000 series of both the ML trend coefficients and the TS and ML quantiles. The question arises here of what is the informative value of a statistic (e.g., of mean quantile), calculated using a series containing a mixture (e.g.,of quantiles) from the 7 distributions, and, in consequence, what is the rationale for using such a statistic for comparison with single-distribution equivalent or for other purposes.

The problem of existence of nonstationarity is in the context of climate warming very appealing. However, typical hydrological sample size is about 50 or less implying rather large uncertainty which may hide the existing time series trend, especially when its intensity is low. So in hydrological practice the problem of trend detectability is important. The Authors provided no information about how many of the estimated trends were significant, both for simulated and for Polish real flows.

Specific comments and corrections:

page 6006: the following statements in the last paragraph require explanation as no estimation method is error-free: lines 12-14: " (...) it [TS method] eliminates the estimation errors in moments (...)" lines 18-20: "(...) when the model is different from the Normal distribution function for which the estimation errors of moments are 0. Similarly, the estimation error for the mean value is 0 when Gamma and Inverse Gaussian (...)".

page 6007, lines 8, 9, 11, 12: unclear denotation of the parameters of equation (1): why not use "slope" and "intercept"?

page 6011, equation (4): the expectation symbol is lacking as the estimated quantile is a random variable

page 6012, lines 5-7: " (...) we can conclude that although the trend estimation results

using both methods are similar, the TS method proved better when calculating the time-variant flood quantiles." RRMSEs in Fig. 2 suggest the opposite, especially for hydrological-size flow samples.

page 6023, Fig. 1. "Average values of the estimated trends" - not precise; "(WLS – the thicker lines and ML)" - unclear

page 6024, Fig. 2. " (TS – the thicker lines and ML)" - unclear

---

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 6001, 2013.