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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Flood Frequency Analysis supported by the largest historical flood" *by* W. G. Strupczewski et al.

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The answer to the review of

Flood Frequency Analysis supported by the largest historical flood. by W. G. Strupczewski, K. Kochanek & E. Bogdanowicz

The authors would like to thank the anonymous Reviewer for very precious remarks and comments. We hope that the new improved version of the manuscript will satisfy the Reviewer.

Question: In practice, within the case of small sample size framework, it is a very risky strategy to use Gumbel and Weibull distributions instead of to generalized extreme

value (GEV) distribution even the formal hypothesis tests and model diagnostics support these preference. This is because the corresponding decision making statistics lost their power. On the other hand the maximum likelihood return levels confident intervals based on Gumbel and Weibull models might be considerably narrow than the corresponding intervals for the GEV model because of the more precision estimation due to the reduced number of parameters, see Coles at al. (2003). This is the reason to recommend the authors to perform their simulation using GEV distribution and to compare the results with Gumbel model.

Reference: Coles, S., Pericchi, L. R. and Sisson, S. (2003). A Fully Probabilistic Approach to Extreme Rainfall Modeling. Hydrology, 273, 35-50

Answer: The Reviewer anticipated the research we currently carry out. In fact the use of three-parameter distribution functions (including GEV) in flood frequency analysis within a context of additional historical information deserves a new paper on which we work at the moment. It would be appreciated, if the Reviewer agreed to review a new paper, too. In the current article, the choice of the two special cases of the GEV function, i.e. Gumbel and Weibull (GEV type 1 and 3 distributions with two parameters, respectively) was not accidental. First of all we wanted to continue the research carried out by Frances et al (1994) where the authors provide the results for these two-parameter distributions. Besides we wanted to concentrate on the precision of upper quantiles estimation when additional non-systematic element of the sample is considered in the calculations. To find the maximal gain in accuracy of the flood quantiles estimation with historical element in the sample we considered very small systematic samples (N = 15) which could prove too small to receive convincing results for a three-parameter distribution. Besides, adding a three-parameter distribution would result in 'dissolving' of the final conclusions in the variability of CV, CS, M and N values and their mutual combinations. Once we have a clear view on the value of historical information, we are ready to analyse it within the framework of two- three-parameter distribution functions. Of course, in the next paper we will take into consideration the Reviewer's

remarks and the recommended paper.

References: Frances F., Salas, J.D. and Boes, D.C.: Flood frequency analysis with systematic and historical or paleoflood data based on the two-parameter general extreme value models. Wat. Resour. Res. 30 (6), pp. 1653-1664, 1994.

Please also note the supplement to this comment:
http://www.nat-hazards-earth-syst-sci-discuss.net/1/C2709/2014/nhessd-1-C2709-2014-supplement.pdf

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 6133, 2013.