Hydrol. Earth Syst. Sci. Discuss., 7, C1992–C1997, 2010
www.hydrol-earth-syst-sci-discuss.net/7/C1992/2010/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Introducing empirical and probabilistic regional envelope curves into a mixed bounded distribution function" *by* B. Guse et al.

A. Castellarin (Referee)

attilio.castellarin@unibo.it

Received and published: 27 August 2010

REVIEW OF MANUSCRIPT HESS-2010-148

INTRODUCING EMPIRICAL AND PROBABILISTIC REGIONAL ENVELOPE CURVES INTO A MIXED BOUNDED DISTRIBUTION FUNCTION

by B. Guse, T. Hofherr, B. Merz

1. OVERALL EVALUATION

The manuscript presents a sensible and original procedure that combines at-site data, regional information through the recently proposed probabilistic regional envelope curves and an estimate of the upper bound of flood flows to improve the reliability and accuracy of the 1000-year flood at a given location. A comprehensive sensitivity analysis investigates the impact of some choices that have to be made while applying the proposed procedure.

I find the manuscript particularly interesting for the scientific community working in the fields of frequency analysis of hydrological extremes and design-flood estimation. I also find the proposed procedure to be original and useful for practical applications.

I really enjoyed reading this manuscript, which I find to be technically sound, concise and to the point. I also find the presentation of the study to be well organized and particularly clear. I acknowledge, though, that I might be a bit biased concerning the clarity of the presentation, as I am familiar with some previous work that has been used in this original analysis (i.e., Guse et al., 2009 and 2010).

The procedure and ideas conveyed by the manuscript are suitable for HESS. I report below a few minor remarks that, in my opinion, should be discussed or addressed prior to publication. I sincerely hope the authors of the manuscript will find them useful while revising their manuscript.

With warm regards,

Attilio Castellarin

2. RECOMMENDATION:

Return to authors for (minor) revisions

3. SPECIFIC POINTS

p. 4260, l.18-19

Regional homogeneity in the classical index-flood hypothesis (constant Cv and higher

order moments) and scaling of the index-flood with catchment area are two separate hypotheses, the manuscript is not clear on this point.

p.4260, l.22-23

The REC intercept is fixed by the largest standardized record flood (flood of record at a given site divided by the index-flood of that very site) and not by the largest unit flood of record (which is defined in the text as the flood of record divided by the drainage area of the catchment of interest).

p.4260, l.27

Consider substituting "cross-correlated sites" with "cross-correlated and concurrent flood sequences"

p.4262, l.22-24

"given that the EC has an exceedance probability of zero". This is actually an assumption of the study, and the authors should highlight this point also in this statement.

p.4263, l.1

"PRECs approach the ECs with increasing catchment size. PREC discharges which were larger than the upper bound derived by the Stanescu envelope curve sites were removed."

These are two important aspects that, in my opinion, need to be further discussed in the text.

a) How meaningful are the considered EC for the study region? How depended on the catchment area is the hypothesis of upper-bound coincident with ECs?

b) Can the site removal be considered an element of subjectivity?

p.4265,l.14-4266,l.4

The illustration of this original procedure should be crystal clear in the manuscript, as

it may be of interest and useful for other case studies. The authors may consider to include a flow-chart or a bulleted list or a figure to improve the clarity of the presentation.

p.4266,l.16

"The GEV was fitted to the new flood series, denoted as $GEV_{sim-prec}$".

a) Is the GEV still a good candidate parent distribution for the new series (sim-prec)? It would be worth testing (e.g., in an L moment framework) .

b) Also, the sim-prec series is constructed from a series of data generated from a GEV estimated using at-site information only (on average 50-60 years of observation) and then mixed with flood quantiles retrieved from PREC that can be associated with T as large as 500 and 1000 years or more. I believe that the manuscript would benefit from the inclusion of a brief additional discussion (maybe in the "discussion" section) on the representativeness of the synthetic sim-prec series of the true and unknown frequency distribution for intermediate recurrence intervals.

p.4266, l.23

I suggest to repeat here "T_t = 1000 yr".

p.4267, l.9

"higher" than what?

p.4267, l.17

Why do the authors use the term "optimization"? Given that three equations in three unknowns can be written using the three constraints it would be probably be more accurate to say a numerical solution method, if the analytical solution is not viable.

p.4270, l.1-4

This sentence could probably be anticipated at the end of section 4.2. How many k were positive for the at-site estimation?

p.4270 and Fig. 5 and 6

Authors may consider to use directly the at-site distribution in the figures as a reference instead of GEVsim. Differences among the two are very limited by construction (less than 3

“Discussion” section

Probably some repetitions with other parts of the manuscript could be removed without detriment of the presentation. Also, the section could discuss how the proposed procedure relates and compares to traditional regionalization approaches (advantages/disadvantages, complementarities, etc.), which would be a common choice among practitioners for estimating the 1000-year flood also for a gauged site. At-site analysis is definitely not a good reference approach for this task.

p.4275, l.11-12

“recurrence intervals of 1000 years” would probably be more accurate. The procedure can evidently be generalized relative to other (high) T values, but this should be stated in the text.

Fig.4-6

[a] should be replaced with [yr] or [years] in the y-axis label

Fig.10

The meaning of the fraction reported in the y-axis should be better clarified in the caption and also in the text p.4272.

REFERENCES

Guse, B., A. Castellarin, A.H. Thieken, B.Merz, Effects of intersite dependence of nested catchment structures on probabilistic regional envelope curves, Hydrology and Earth System Sciences HESS, 13, 1699-1712, 2009.

Guse, B., Thieken A.H., Castellarin A., Merz B., Deriving probabilistic regional envelope curves with two pooling methods, Journal of Hydrology, 380, 14–26, 2010.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 4253, 2010.