

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

Anonymous Referee #1

Received and published: 17 August 2010

This paper deals with the question how the uncertainty of flood frequency analysis can be reduced by inclusion of additional information. This is a relevant and very actual question of hydrology and water resources management, perfectly fitting in the scope of HESS. The authors propose a novel approach which allows using regional information of extreme floods, gained by probabilistic envelop curves to better model the upper tail of the extreme value distribution. In addition, a bounded behaviour of the EV distribution is assumed, and information from PMF considerations is used to give further guidance about the shape of the upper tail.

C1848

The paper is generally well structured. However, the overall presentation of the paper could be improved. After a nice introduction, the paper merely reads like a report, focusing on many pieces of results, rather than presenting the story to the reader. The writing could be more fluent. Some sections are not concise and need to be rephrased to transport the ideas of the authors more clearly (especially most parts of section 3). Section 4.1 gives extensive information, which could be condensed.

. Specific comments

(addressing individual scientific questions/issues)

4261 (6-9) Unclear how to calculate probability of PREC

4261 (19) – 4262 (9). The section is difficult to read, consider rephrasing. Focus on the main information for this paper. Use the term “cross-validation” instead of “jack-knifing” (many statisticians differentiate between the terms cross-validation (of model performance, like in this case) and jack-knifing (parameter testing. . .)).

Section 3.4: Again, you could present the story more clearly! What are the differences (in theory) and how they are fulfilled / or consequences for Saxony. Line 23: Where do results come from?

4271 (9-14) Comparison of GEVsim and GEVsim-prec: Why can inclusion of regional information lead to an increase all over the region? Where does this information come from, if not from observed data? Could this point to a possible bias of PREC?

Section 5.4: This is a nice analysis. Can you also include quantifications of the individual effects?

Section 6: The studies yields that the choice of the inflection point has a major effect on the estimated flood quantile. Can you give guidance how to choose the inflection point?

. Technical corrections

C1849

(compact listing of purely technical corrections, e.g. typing errors)

4254 (6) The large flood quantiles . . .

4256 (6): extreme flood events

4256 (13): For instance, the two-component. . .

4257 (1): The key question is then how to derive an estimate of the upper bound. This should be highlighted in the text.

4257 (16-21) unclear

4257 (21) Include a sentence like: This is the basis for including ECs in unbounded distribution fct.

4259 (10) rephrase and better explain: "floods of record of regional sites"?

4260 (18-23): This is partly not correct (18-19), partly redundant (22-23) and partly not easy to understand. You could say something like: The index flood method assumes similar higher moments. The mean of A.M.S. is commonly used as the index, which is closely related to catchment size. Hence, the slope . . . can be determined by . . . (Fig. 3). In addition, the maximum floods of each record are plotted, and the intercept a is estimated by shifting the regression line up to the largest unit flood of record (Castellari et al., 2005).

4260 (28) In this paper, (?) the cross-correlation. . .

4261 (1-3) Please explain why!

4261 (4) I did not understand why so many (up to 127) PREC realisations emerge.

4261 (6) replace "for the pair of the unit flood of record and its corresponding catchment size" with for each unit flood of record

4271 (3) You could note that vast majority of basins follow the "Gera" type.

C1850

4271 (5) Change past tense to present tense (I first thought you are referring to an antecedent analysis rather than introducing the structure of the section. . .)

4271 (26) Include 1-2 sentences how Fig. 9 is organised.

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

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