Hydrol. Earth Syst. Sci. Discuss., 7, C2425–C2429, 2010
www.hydrol-earth-syst-sci-discuss.net/7/C2425/2010/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Estimation of high return period flood quantiles using additional non-systematic information with upper bounded statistical models" *by* B. A. Botero and F. Francés

B. A. Botero and F. Francés

ffrances@hma.upv.es

Received and published: 22 September 2010

GENERAL COMMENTS

Only to say with the impulse of referees and general audience corrections and comments we hope the corrected manuscript will be enough improved to be accepted for publication. Not only because the paper deals with " ... an important issue: the use of additional prior knowledge in the estimation of return periods of floods" (in referee#1 words), but mainly because the innovation of using upper bounded distributions in flood frequency analysis.

SPECIFIC COMMENTS

Comment 1

We don't think Introduction must be reduced. Referee#1 should consider this section in the present form is only a 7% of the paper.

We also don't agree the section concerning data classification is too long. In fact, this section is crucial to understand properly equations 5 to 8 in Section 4, which referee#1 claims to be short: both sections are closely related.

On the other hand, we agree Section 4 is very important and should be enlarged. For example:

i) Adding a short review on the use of ML estimation method in flood frequency analysis with historical and/or palaeoflood information, starting with the pioneer work of Leese (1973) followed by a list of other authors (Condie and Lee, 1982; Hosking and Wallis, 1986; Cohn and Stedinger, 1987; Phien and Fang, 1989; Guo and Cunnane, 1991; Pilon and Adamowski, 1993; Frances et al., 1994; Kroll and Stedinger, 1996; Frances, 1998; Martins and Stedinger, 2001; O'Connell, 2002; Williams, 2002; Naulet et al., 2005; Calenda et al., 2005; Calenda et al., 2009; etc.).

ii) Explaining in words the meaning of each equation and

iii) Adding a general expression for the likelihood function in this Section and/or for the case study in Section 5.

It is clearly subjective what should be the content of a Conclusions section. The short partial "summary" in page 5429 lines 13-20 is located here in order to stress the applicability of the 3 different methodologies presented in the paper. And concerning the "discussion" in page 5430 lines 4-10, is a conclusion about the PMF error magnitude for the case of its statistical estimation. In our opinion, both are important for us and should be in the Conclusions section.

HESSD

7, C2425–C2429, 2010

Comment for line 12 of page 5415.

The reference to the Klemes paper will be eliminated in the final manuscript.

Comment for line 3 of page 5416.

In our experience, and we are sure it can be proven in the framework of Information Theory, true physical meaning reduces the uncertainty of any statistical or deterministic mathematical model. Of course it is possible to use models without physical meaning with enough confidence, but let's put the referee#1 argument in reverse: the use of bounded distributions is an effort to explore new frontiers in Statistical Hydrology.

Comment for line 9 of page 5416.

This idea must be understood with the non written (in this paragraph) assumption that the population is upper bounded, which is the basic hypothesis in our paper. In this case, it is clear the quantiles estimated using unbounded distributions, with return period large enough (as a rule of thumb, larger than 10 000 years), will be higher than the PMF and consequently, with large errors. For return periods producing quantiles smaller than the PMF, the error increment compared with the use of the true upper bounded distribution will depend of the fitted right tail distribution properties. In fact, this situation is one of the objectives of the robustness analysis in Section 7: see Figure 5 in the paper.

We will underline the assumption for this idea, will differentiate the two situations and will mention the robustness analysis in the final version of the paper.

Comment for line 5 of page 5421.

The sentence must be applied for the type of data presented in the previous section. We can rephrase "... any of previously presented additional data type". See also our previous comment for this section in "comment 1".

Concerning the Section of "Uncertainty Analysis", we have done a more extensive

HESSD

7, C2425–C2429, 2010

analysis within our research project, but for the sack of simplicity the type of data used in the paper is the same than for the case study. We will mention this simple reason for the data type selection in the final paper.

Comment for line 15 of page 5428.

Referee#1 is right. The word "itself" is a mistake. Should be "... the selected upper bounded distribution in the case study." As demanded by referee#1, more explanations will be given in the final version. For example, as needed for the next comment.

Comment for line 23 of page 5428.

Referee#1 is again right and there is a contradiction if we don't add additional qualitative explanations derived from previous comment for line 9 of page 5416. In this Section, some link with these qualitative explanations will be given.

Comment for line 1 (should be 8) of page 5429.

Yes, it is a mistake induced by thinking only on PMF. Proper credit will be done to the pioneer work of Eliasson in the final version.

Comment for line 2 (should be 9) of page 5429.

It should be clear the proper methodology must be used, i.e., it is not advisable to use the ML-C method in the situations it gives as PMF estimate the maximum observation (which is not always, as explained in the paper). And our "optimism" or referee#1 "pessimism" estimating PMF statistically is objetively measured in figures 3 and 4. So, the idea "relative low error" will be put in the context of these figures in the final version in order to be fairer.

Comment for line 28 of page 5429.

See our previous answer.

TECHNICAL COMMENTS

HESSD

7, C2425–C2429, 2010

Page 5420, line 19. Ok, “between” is incorrect: “within” is the proper word.

Page 4522, line 19. Ok.

Page 5431, line 11. Ok, thanks for this difficult to find typesetting mistake!

Page 5431, line 16. Ok.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 5413, 2010.