Hydrology and Earth System Sciences Discussions

Interactive comment on "A stochastic design rainfall generator based on copulas and mass curves" *by* S. Vandenberghe et al.

Anonymous Referee #2

Received and published: 1 October 2010

GENERAL COMMENTS

In this manuscript a stochastic approach to generate design storms with a copula based method is presented. This method allows to estimate bivariate return periods. Results were validated with a 105 year hourly time series in Uccle, Belgium. This topic is highly relevant in applied hydrology and essential for water resources management.

SPECIFIC COMMENTS

In my opinion, some clarifications are required before this manuscript it is accepted for publication:

1) What is a 2-copula? I assume you mean a bivariate copula. Please use standard

notation to ease understanding.

2) L.6.P3620. Please explain why. Not clear why this is the case.

3) The empirical copula should be corrected as to have unit marginals. This is not normally the case due to sampling errors, e.g. use the method proposed by

Rueschendorf, L. (1995), Construction of multivariate distributions with given marginals, Ann. Inst. Stat. Math., 37, 225–233.

A recommendation of the sample size is given in:

Samaniego, L., A. Bárdossy, and R. Kumar (2010), Streamflow prediction in ungauged catchments using copula-based dissimilarity measures, Water Resour. Res., 46, W02506, doi:10.1029/2008WR007695

4) L6ff P. 3622 Please explain what is a A12 copula. It is not enough to give some references because it is fundamental to understand the proposed generator. Explain how the parameters of this model were fitted (e.g. Maximum Likelihood?).

5) What kind of statistical test was used to identify whether the copula "A12" is a reliable model? A non-parametric test (e.g. Bootstrap) cloud be used for this task. Why not to test other types of models? The uncertainty of the copula parameters and the efficiency of the goodness of the fit should also be investigated, for example by a jackknife crossvalidation.

6) L.20ff P.3623 The definition of the empirical copula is the basis for this method.

7) What could you do in those cases in which the A12 copula is not describing the empirical copula at a given p-value? What would happen if this happen in a real application? Should the practitioner abandon this method or should she/he try another model?

8) L.20 P.3625 Confusing notation for ranges. Remove parenthesis.

9) Indicate the sample size in Fig. 2,3,4,5,6,7,8.

10) How do you tested the independence of return periods?

11) A practical example is welcome (at the moment it is a bit long though). The method should, however, be clearly validated and tested before. I suppose this is the first objective of this manuscript. This example should clearly indicate the advantage of the proposed method with respect the standard approach. This is not done at the moment.

TECHNICAL CORRECTIONS

L.17ff P3616 and then at L.8ff contains to much detail of the structure of the manuscript. Why not just avoiding this superfluous information. The reader will find it anyway... English should be corrected in many places. For example:

L.7. P3618. " on its turn..." L.20. P.3624 " in abscis and, respectively .." L.6. P.3625 "but is beyond" ...

FINAL DECISION

Based on the comments mentioned above and bearing in mind the HESS publishing standards for a research article, I recommend major revision.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 3613, 2010.