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Hydrology and Earth System Sciences Discussions

Interactive comment on "Reliability and robustness of rainfall compound distribution model based on weather pattern sub-sampling" *by* F. Garavaglia et al.

Anonymous Referee #3

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I enjoyed reading this paper very much. The robustness and and reliability criteria are different than the criteria I have seen used, which reflects my limitations.

I wish the theoretical foundation of the method were better explained; for example, why is it one can weight and then add the risk functions for the different weather patterns

I like MLEs and they have lots of advantages. However, in small samples the shape parameters for the GEV and GPD go out of control. One needs to employ some sort of regionalization. This is explored by Martins and Stedinger. We have proceeded to use Bayesian GLS regression to develop better regional models of the shape parameter

for the LP3 distribution used in the USA, and the GEV distribution used in many other parts of the world.

I think it is a very good paper and support its publication.

Minor comments

p-6760 line 8: PMF discussion could be supported by a citation.

Line 21: does Gradex work only with the exponential distribution?

I would have appreciated seeing the mathematics that clarifies this text.

p-6761 line 15. The authors may be interested in:

Martins, E.S., and J.R. Stedinger, Generalized Maximum Likelihood Pareto-Poisson Flood Risk Analysis for Partial Duration Series, Water Resources Research.37(10), 2559-2567, 2001.

This addresses the relative efficiency of AM versus PDS.

Line 19: Please define seasonal sampling.

p-6762 line 21 – MLEs can have trouble with GEV and GP. See the paper above, and citations there in, including

Martins, E.S., and J.R. Stedinger, Generalized Maximum Likelihood GEV quantile estimators for hydrologic data, Water Resources Research. 36(3), 737-744, 2000.

p-6763

I am troubled by the claim the weights will reflect the relative frequency of each type of event, where the GP distribution would describe the distribution of each event.

This model just seems incorrect overall. See any of the discussions of the distribution of the maximum of several different events, whose number is Poisson. This model just seems wrong, except perhaps in the extreme, when there is a very small probability of

HESSD

7, C4168–C4171, 2010

getting an event by any of these causes. The sum of the arrival frequencies is the

total risk, and equals the probability of an arrival. But one needs to be clear that this approximation is only valid for a specified range (works if total risk is less than 10%).

I am sure the authors know this, it is just not clear in the manuscript.

The weights are parameters. And they were estimated from some data. Just data from an expanded data set.

p-6765 The discussion of season-of-risk confused me. Was only that season modeled?

Figure 1 – I would have put the theoretical frequency on the horizontal axis.

p-6671 WHY are GEV and Gumbel identical to exponential.

Gumbel has an exponential tail, so that is possible. But GEV can have a different tail.

p-6672 See Martins and Stedinger – need to put some control on shape parameter of GPD. In small samples or else one gets this unrealistic results. Just going with Exponential is one solution.

p-6673 section 5.1

See Martins and Stedinger – need to put some control on shape parameter.

Other work, one is a journal, can be found in:

REIS, D. S. Jr, STEDINGER, J. R., MARTINS, E. S., ALVES, C. A. A. (2005), Reduction of Flood Quantile Uncertainty through the Use of Regional Shape Parameter, In: Proceedings of the XVI Brazilian Water Resources Symposium, November, 20{24, Jo∼ao Pessoa - PB, Brazil. (in Portuguese).

Reis, D. S., Jr., J. R. Stedinger, and E. S. Martins, Bayesian generalized least squares regression with application to log Pearson type 3 regional skew estimation, Water Resour. Res., 41, W10419, doi:10.1029/2004WR003445, 2005.

HESSD

7, C4168–C4171, 2010

Jeong, Dae Il, Jery R. Stedinger, Young-Oh Kim, and Jang Hyun Sung, Bayesian GLS for Regionalization of Flood Characteristics in Korea, Annual Conference of the Korean Water Resources Association, KWRA, Gangwon, Korea, May 2007. <Won a Best Paper award.>

Veilleux, A.M., J.R. Stedinger, Bayesian GLS Analysis of California Regional Skew, in World Environmental & Water Resources Conference 2010: Challenges of Change, R.N. Palmer (ed.), Amer. Soc. of Civil Engineers, paper 249, pp. 2422-31, Providence, RI, ASCE, May 16-20, 2010.

6775- Adding uncertainty into the computation of flood quantiles is an interesting idea. Some of the discussion in the following article and citations there in may be of interest.

Stedinger, J.R., Expected Probability and Annual Damage Estimators, J. of Water Resources Planning and Management, 123(2), 125-35, 1997. [With discussion, Leo R. Beard, J. of Water Resources Planning and Management, 124(6), 365-366, 1998.]

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 6757, 2010.