Hydrology and Earth System Sciences Discussions

Interactive comment on "Technical Note: The Normal Quantile Transformation and its application in a flood forecasting system" *by* K. Bogner et al.

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Received and published: 10 December 2011

The extrapolation problem is indeed a major limitation of the Normal Quantile Transform (NQT) and therefore the study by Bogner et al. (2011) is very much welcome, as it provides an useful insight into different alternatives.

I think this study suffers from the lack of an objective validation. In fact, the performances offered by the different alternatives are evaluated subjectively, by assessing the quality of the results on the basis of expert knowledge. For instance, the POT approach is deemed to be not satisfactory because the resulting uncertainty estimates

would be impractical for end users, although they might be correct. Ideally, the performances of different extrapolation methods should be evaluated by using a jack-knife procedure. Namely, by reducing the data range covered by the data through the elimination of selected extremes and finally checking how they are fitted by each extrapolation method. However, the problem would remain that the results would depend on the statistical behavior of each data set and therefore would be again not general. Therefore this limitation is difficult to overcome. I would suggest to the authors to better stress the subjectivity of the conclusions, because the problem of the selection of the most appropriate extrapolation method is actually not resolved. The indication of combining the linear regression with the POT approach is an interesting conclusion which is nevertheless not final, because it could lead to underestimating uncertainty.

I do not have a final opinion on the opportunity to include the R commands in the paper. On the one hand, they are extremely useful. Being R widely used, I think HESS readers would gain a clearer view by reading them, as I did. Moreover, R is a free software and therefore I particularly appreciate encouraging its use. For sure, R commands facilitate understanding of what has been done. On the other hand, including operational details in a scientific paper is not standard practice. However, I have a slight preference for keeping them.

The paper does not provide any discussion on the most important limitation of the NQT, namely, its limited ability to make the probability distribution of bivariate random variable multivariate Gaussian. In fact, practical application of the HUP often shows that the residuals of the regression of one normalized random variable against the other are non Gaussian and affected by heteroscedasticity (for details see Montanari and Brath, 2004; Montanari and Grossi, 2008). Did the authors experience this problem? I think a discussion of this issue would be appropriate in the paper, because this limitation heavily affects uncertainty estimation.

I believe a minor revision would suffice to address my comments above. I think this paper is an interesting contribution for HESS readers.

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References

Montanari, A.e Brath, A., A stochastic approach for assessing the uncertainty of rainfall-runoff simulations, Water Resources Research, Vol. 40, W01106, doi:10.1029/2003WR002540, 2004

Montanari, A., Grossi, G., Estimating the uncertainty of hydrological forecasts: A statistical approach, Water Resources Research, 44, doi:10.1029/2008WR006897, 2008