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Interactive comment on "Derived flood frequency analysis using different model calibration strategies based on various types of rainfall–runoff data – a comparison" *by* U. Haberlandt and I. Radtke

Anonymous Referee #1

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This paper presents an interesting assessment of the dependency of the results of derived flood frequency analysis on data-inputs and model calibration strategies. The result of the assessment, i.e., that calibrating on the flood frequency curve is the best way to estimate the frequency of floods, is not very surprising. It is interesting to see that the design storm method, widely used in practice, performs surprisingly well also in this case study. The paper is well written and clear and I am supportive of its publication after the following comments have been considered by the Authors.

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Comments:

Page 10387, lines 15-16 and page 10389, lines 19-21: for calibration of the event-based model, observed initial conditions (storage contents) are used for all events and in prediction the mean storage content over all events is used. Apparently the choice works well (Figs 9 and 12) but it is unclear from the text the rationale for this choice. As a suggestion I would point out that Pilgrim and Cordery (1993), for instance, say that "average antecedent conditions" for the catchment are the usual choice in practice and that the use of the median value, for example, is motivated by the fact that the probability of occurrence of higher and lower values of the runoff coefficient would be equal. As stated in Pilgrim and Cordery (1993, p. 9.13) the "use of these median values in design should minimize the problem of joint probabilities and produce a flood estimate of similar probability to that of the design rainfall". Viglione et al. (2009) showed also that choosing the median of the runoff coefficients that cause the maximum annual floods as design runoff coefficient is quite reasonable in wet climates, where the estimation of the design flood peak is slightly underestimated (i.e., by 10% in the hypothetical study conducted there). This is in line with the uncertainty in initial conditions selected by the authors (page 10389, line 22).

Pilgrim, D. H. and Cordery, I.: Flood Runoff, in: HandBook of Hydrology, edited by: Maidment, D. R., McGraw-Hill Companies, international edn., chap. 9, 42 pp., 1993.

Viglione, A., Merz, R., and Blöschl, G.: On the role of the runoff coefficient in the mapping of rainfall to flood return periods, Hydrol. Earth Syst. Sci., 13, 577-593, doi:10.5194/hess-13-577-2009, 2009.

Page 10387, line 27: why the median of the simulated flow time series is used in calibration? Doesn't it smooth the peaks?

Page 10395, line 10: 20 realisation are used to get the 90% confidence limits. Does it mean that only 1 value above and 1 value below the grey bands in Figs 10 and 11 have been simulated? Is this robust enough?

Page 10395, line 26: "The uncertainty can be reduced...". It is unclear here what is it meant for uncertainty. Is the uncertainty reduced because the grey shade is more consistent with the data points (and fitted curve)?

Page 10397, point 3: is this best performance to be expected because both validation and calibration use the "observed" probability distribution of peak flows? Maybe I missed something here.

Page 10398, line 18: what does the sentence "which would allow some kind of implicit bias correction". I must say I am not a big fan of bias correction: if bias could be corrected, why calling it bias?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 10379, 2013.