14 August 2025

Dr Rohini Kumar
Handling Editor
Hydrology and Earth Systems Sciences

Reference: HESS-2024-188

Dear Editor,

Thank you for handling our manuscript and for reopening the review process.

We appreciate Referee #3's thoughtful comments and are broadly in agreement with their assessment of the manuscript. However, undertaking all of the suggested additional analyses, particularly those involving alternative methodologies, would substantially alter the paper's focus and significantly increase its length. To address these comments within the current scope, we have taken two key actions:

1. Addition of a new paragraph in the discussion in 6.1.2 which addresses some of the specific comments from Referee #3, and a new Figure S10 which presents both confidence and prediction intervals for our recommended design equations. We considered adding Figure S10 the main manuscript but have decided that this would add length, but it will be readily available to readers who wish to utilise this information. The data are openly available, and other researchers are welcome to undertake analyses to build upon our contribution.
2. Inclusion of some additional commentary in section 6.4 to further specify potential alternative analytical approaches and directions for extending this work. Some further minor edits have been incorporated elsewhere in the paper to emphasise these issues.

Following the comments of Referee #3, we have updated the manuscript in several places. Details are in Table 1 which includes Referee #3's comments and suggestions. In addition, referring back to previous referees' comments, we have undertaken the following:

- Some minor editing throughout the manuscript to ensure clarity of meaning and to correct some minor typos; note that Figure 6 has been revised due to incorrect axis limits on the previous version which led to some data being omitted from the figure
- The notation *A* is used for catchment area mostly rather than *AREA* (previous reviewers comment on notation), but *AREA* is explained for consistency with the FEH methodology
- Table 2 – rows re-ordered to emphasise final choice of 466 sites, which has been a source of continued confusion in earlier reviews

Table 1. Referee #3 comments and responses

Comment	**Response**
Uncertainty Quantification The manuscript presents residual plots (Figures 5 and 6), residual mapping (Figure 7), and summary statistics, including R^2 and standard error (Tables 6 and 7), as indicators of uncertainty. While informative for model diagnostics, these are not substitutes for a formal uncertainty analysis.	Noted and agreed

A robust treatment of uncertainty in flood design requires: - Confidence or prediction intervals for Q estimates (e.g., Q2, Q10, Q100) - Sensitivity analysis to evaluate how changes in AREA, RMED, and other predictors affect outcomes - Uncertainty propagation to assess how uncertainties in input data, model parameters, and structural assumptions influence the final flood estimates across regions	We have included a commentary and new figure S10 as described above. Further sensitivity and uncertainty analyses have not been incorporated due to the considerable additional length that these would add to the paper. We have noted that multi-variate sensitivity analysis will be a useful way of extending our analysis, although with the caveat that the reliability of some of the input variables remains uncertain (as already noted in previous versions of the manuscript).
For instance: Dashed lines in Figure 5 are visual guides (1:1, 1:2, 2:1) and do not represent statistical intervals. Figure 8 includes approximate 95% prediction intervals (±2σ) for selected points, but these are only applied to the DREAM model comparison and not to the core regression framework. While steps such as data screening, exclusion of unreliable records, and residual inspection show good methodological care, they do not quantify how uncertainty in inputs translates into uncertainty in outputs. Without prediction intervals or sensitivity diagnostics, practitioners cannot assess the confidence of the resulting design estimates—an essential requirement for engineering or policy use.	These observations are all correct. Note that Figure 8 only shows confidence intervals for selected points to maintain clarity on the plot, and these intervals apply to all points. To avoid lengthening the paper, additional figures have not been included. However, Figure S10 has been added which shows the regression equations from Table 5 with 95% confidence intervals. Comments have been added to the text to direct readers to this figure.
Overall Assessment This study addresses a significant problem in a complex data environment and makes a valuable contribution to the field. However, the lack of quantitative uncertainty analysis and the quality of the figures restrict its practical applicability. I recommend a focused revision addressing the following: - Inclusion of prediction intervals for design estimates - Clarification or expansion of the uncertainty framework - Consideration or discussion of alternative statistical approaches	Without adding excess length, we have addressed each of these suggestions as explained above.
Figures	
Some supplementary figures (e.g., S3–S7) remain hard to interpret due to dense overlays or unclear legends. Improving their clarity would enhance the presentation and facilitate the interpretation of the results.	All figures have been revised, noting these comments and taking into account colour-blindness considerations.

The figures lack visual consistency in terms of font style, axis scale, and label size. A uniform formatting standard across all figures would improve readability and presentation quality.	
Methodological Choices The continued reliance on linear regression—despite suggestions to consider more flexible or robust methods such as quantile regression—is a missed opportunity. Given the goal of estimating extremes and the relatively low R^2 values reported, this limitation should at least be acknowledged and addressed as a direction for future work.	The previous version of the paper had noted alternatives, including spatio-temporal modelling for example. The new discussion section considers opportunities for quantile regression, and notes how the limitations of this data set may limit the potential of using other methods.
Data Limitations The manuscript rightly notes that many sites have short records (7–10 years), and data are pooled across sources and decades. However, it does not assess how these factors affect flood frequency estimation or prediction accuracy. Similarly, the use of annual maxima overlooks possible seasonal structures or secondary peaks, which may lead to underestimation in some basins. Please reflect on these points in the manuscript text.	A new paragraph has been added at the start of section 6.4 to note how further analysis of streamflow may be useful to enhance understanding.

Overall, we believe this revised version is substantially improved as a result of the reviewers' input and the refinements we have made.

Finally, we affirm that this manuscript is original, has not been published previously, and is not under consideration for publication elsewhere. We have no conflicts of interest to disclose. All authors have read and approved the manuscript, and agree to its re-submission.

Thank you for your consideration.

Yours sincerely,

Pamela Tolentino
On behalf of the Catchment Project research team