

## ***Interactive comment on “Large-sample hydrology: a need to balance depth with breadth” by H. V. Gupta et al.***

**B. Jackson (Referee)**

bethanna.jackson@vuw.ac.nz

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General comments

This paper is

a) a call to hydrologists to embrace “large sample” studies to improve model transferability and better understand processes and their variation in importance in space and time; b) a summary of the history and emerging recognition; c) an effective discussion of the importance of such studies and how they may advance hydrology and environmental science in general; and d) a compilation of the problems faced when attempting effective large sample studies and potential ways forward to overcome these.

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Overall, this paper is a worthy contribution to the literature. The history provided is interesting (when placed in the appropriate sections), the point about the importance of progressing the area is clearly made, and steps forward are suggested that are likely to advance both the number of studies and effectiveness of these studies.

The paper is generally well written and organised, but is sometimes a little repetitive and could do with shortening /some reorganisation to draw out the key points more effectively.

It also over-stresses the point that many hydrologists are concerned with “depth”, i.e. understanding certain sites in detail, particularly given the paper recognises it is important that some studies continue down this line. There is already a rapidly increasing number of studies and researchers concerning themselves with the “breadth” issue, as also noted within the reviews by S Patil and H McMillan. The importance of this paper is more to help this already emerging community by highlighting the broad context and the varied ways in which these studies may contribute to a broad range of hydrological challenges, as well as ways forward in establishing data protocols and calling for wider availability of good quality datasets.

The paper takes a very model-centric approach, but I would argue that progress will be faster if most “large sample studies” also include some focus on how data availability/requirements vary between regions, and where and how the models are limited by data. A major issue that will impede progress in refining models, better understanding process, and improving our predictions/reducing uncertainty is the disparity of data (amount, type, quality, resolution, etc) from region to region. I do realise section 4 is partly a call for standardisation of data, but there will still be regional issues, and issues with interpreting historical datasets even when/if appropriate protocols do become fairly widely taken up.

I really did enjoy reading the history/background to large-sample hydrology in section 2. However, I found it distracting when other bits of history/quotes from researchers

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were inserted in the remaining sections, it broke up the discussion of the scientific issues. Often these quotes added little to the paper, with their content already having been clearly made earlier in the manuscript. I would suggest going through all quotes and historical mentions in the manuscript; where the authors feel they are important they could be moved to the narrative in section 2, where not the researchers could be cited/briefly mentioned

#### Specific comments

I found the introduction opening with a quote from a paper, and then jumping to a more standard introduction without a direct flow through to comment on the quote strange/jarring. I don't think the paper would lose anything from the quote being removed; the content of the quote is fairly accepted; the issue you are raising in this paper is that such testing is not properly pursued. If the quote is retained I suggest you make that point directly following the quote.

Last sentence of abstract: Surely the "ultimate" objective is to achieve your holy grail, not just get more people searching for it . Maybe replace "Ultimately, our objective" with "Our motivation".

Although I very much enjoyed reading about the history/lead up to this discussion paper in section 2, not having attended the "1999 IAHS meeting in Birmingham" made its mention in the introduction non-inspiring. It become interesting once discussed in Section 2.

Page 9149, line 6: "exclusive reliance" is too strong.

Page 9150, line 1 "by improving on a prior concept" is very vague. What exactly do you mean?

I'm not convinced lines 4 to 16 of page 9153 add much. You have already stressed the points, and acknowledged the points have already been made, many times before in this manuscript. Unless there is something specific to the Klemes four point testing

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method aside from it being an attempt to formalise evaluation- if so discuss this further.

I presume on page 9150, line 24 you mean "The latter" rather than "this is"- the comment following does not really apply to the first three issues listed.

Page 9151, line 19: why is having data sets with large numbers of catchments "The issue"?

Section 5 could be more snappy; some of its content has already been established in previous sections, and other detail could be moved to those previous sections.

No technical corrections to note- the paper is remarkably free of spelling mistakes etc, congratulations to the authors.

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