**Hydrology and
Earth System
Sciences
Discussions**

Interactive comment on "Effects of intersite dependence of nested catchment structures on probabilistic regional envelope curves" *by* B. Guse et al.

Anonymous Referee #3

This paper studies the effect of nested catchments on probabilistic regional envelope curves (PREC). The study is of interest for the readers of HESS, but a major revision is necessary before possible publishing.

First of all, the presentation needs to be improved, both structure and text. Although one should appreciate the authors' attempt to discuss all possible sides of the problem of interest, the red path through the manuscript is sometimes lost in details and repetitions. The authors should therefore try to focus more on the main message of the study. Below are some comments that might help them in doing so.

The number of tables and figures could be reduced. Possible candidates for removal

are Tables 5 and 6, Figure 4, and some of the figures 6-13. Figures 12 and 13 seem to give very similar information as some of the earlier figures. Are they all necessary? Sections 4.8 and 4.9 could then be merged, as differences between homogeneity measures are already discussed in 4.8. Are both 6a and 6b necessary as 6b shows same information as in 6a, divided by the number of observations?

I think there are too many sub- and subsub-sections, some of them with misleading names. 2.4 is an example, where almost every paragraph has its own heading. The section also contains lots of repetition, which can be removed by merging some of the sub-sections.

The description of PREC in 2.2 is not very clear, particularly the last part of it. If I understand it correctly, PREC is a method to regionalize, to different catchment sizes, the flood size with a recurrence interval that is defined from the number of efficient observation years. Where does the 2 come from in Eq. 4? I could not find it in Castellarin (2007). Make it very clear which recurrence interval it is referred to.

The result section contains parts that would be better in the data section, and parts that would be better as a part of the conclusions. As examples, section 4.2 seems to belong to the data section, parts of 4.3 and 4.8 to the discussion.

The language needs to be improved. Below are some suggestions, general ones first:

Remove unnecessary words, such as "in order to", where "to" would be enough.

"Next" is overused.

Many places in the text, it is necessary to add "number of", for example to "total observations" on P2861, L15. Other places it would be helpful.

The following is an example of a sentence construction appearing several places in the manuscript (this is from P2867, L4) "Only gauges were used, which . . ."

I am not sure if this is formally correct English, anyway, it does not read well. A possible

reformulation could be "We only used gauges that …"

Maybe a matter of taste, but I prefer to see equations immediately after they have been described. As an example, Eq. 2 appears almost a paragraph after it is mentioned.

Detailed comments (-> means a suggestion to replace)

P2848 L2 "… pointed out that quantile estimates are already affected by a relatively low intersite correlation…" -> pointed out that quantile estimates are affected by intersite correlations as low as…

L6 affirm -> confirm

L6 must not -> should not

L11 is negatively related -> decreases as a function of

L28 unnested conditions -> unnested catchments

P2850 L19 "An information content …" This is for the information content definition of Matalas and Langbein, this is not clear.

P2852, L 11 "… was estimated by a regression analysis of the index flood…" -> "… was estimated by regression analysis." – remove unnecessary text.

P2853, L13 I do not understand what "predictor space" refers to. Could it be physiographical space? The use of Euclidian distance for a non-geographical distance is a bit confusing. The text should mention that variables need to be standardized to reach values in the magnitude of the possible thresholds.

P2854, L2 "… in the test deemed to be independent …" -> "… in the test are independent …"

P2854, L7 "All regions below two are seen …" -> a bit confusing

P2854, L17 This paragraph contains repetition.

P2855, L12 Remove subheading, replace the complete paragraph with something like: "This can also be described through T:"

P2856, L3 "All pairs of catchments …" -> unnecessary sentence, remove

P2858, L13 " time length" -> "record length"? "by using 453 stations" -> "from 453 stations"

L14 "and endured at least up to 2002" -> "and still existed in 2002"

L15 "it is useful to include this year" – say why it is useful The presentation in this paragraph is generally a bit confusing, see if it is possible to clarify.

P2858, Section 3.1 This section is unclear, please rewrite

P2859, L2 "In this context, this study" unnecessary sentence, remove

P2860 The example could be clarified.

P2862, L24 "… lower than 0.2, and therefore, for pooling groups …" -> "…lower than 0.2, i.e., for pooling groups…"

L25: a couple -> a few

L25 "A closer look at the calculation" -> unclear, rewrite

L18 "The estimation of…" -> unclear, rewrite. The rest of the paragraph should be shortened. The rest of the subsection is also unclear,

P2863, L10 "checked in" -> "examined in"?

P2865, L15 It is not clear what NRC means by consideration here. Also, make sure that the use of apostrophes is consistent.

L23 "hydrological parameters" -> "hydrological variables"?

P2866, L1 "distinction in" -> " separation in"?

L3 First two sentences are not clear, particularly "a more detailed consideration . . . was realised"

L9 "The result is comprehensive" -> Unclear

L21 "In regions, which are . . ." -> "In regions that are . . ."

P2867, L6 and 7 Write "local floods" and "widespread floods" before citations

L9 "were affected" -> I think "have been affected" is more correct in this context

Table and figure captions

Table 2. unclear, consider: "Correlation coefficient (COR) between the index flood of the annual maxima series of all gauges and the subsets of catchment descriptors (CD).

Fig 1. Should it be "probabilistic regional envelope curve" also in the key?

Fig 2. Unclear caption. The figure show gauging stations, not catchments. What does "extended until the last available gauge" mean?

Fig 4. (If not removed) Change differentiation to separation

Fig 5. "Cross-correlation functions using different . . ." -> "Cross correlation functions fitted to global, . . ."

Fig 6. ". . . in relationship to the total observations . . ." -> ". . . as a function of the total number of observations . . ."

Fig 7. ". . . between different cross-correlation functions . . ." -> ". . . between a single cross-correlation function (global) and separated cross-correlation functions (nested-unnested)"