

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1  
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## Comment on hess-2022-195

Anonymous Referee #1

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Referee comment on "A mixed distribution approach for low-flow frequency analysis – Part 1: Concept, performance, and effect of seasonality" by Gregor Laaha, Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-195-RC1>, 2022

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This work presents an innovative formulation for the low-flow frequency analysis which accounts for the seasonal behavior of the low-flow that characterizes some regions.

The manuscript is very well written and organized and the research is of significant scientific interest. To my opinion, the work can be published after some minor revisions that could make it clearer.

Please, read in the following my suggestions.

- The title suggests that a part 2 exists. If so, please refers to it in the manuscript. What does it deal with?
- I suggest to include a figure that synthesizes the seasonal characteristics of the analyzed dataset, e.g. empirical cumulative distribution of the observed low-flow values, mean monthly series, so to appreciate the effectiveness of the mixed proposed approach.
- Sometimes variables are not explicitly defined. Please, make sure of that. For example, at line 129, define clearly the utilized circular seasonality index ( $r$ ) and the seasonality ratio (SR). I see the reference to Laaha and Blooschl (2006b), but I suggest to make the manuscript self-structured.
- The values of the relative frequency in Figure 3 are very low; the discussion cannot be appreciated very much. Maybe I would add the cumulative relative frequency or the CDF
- Comments to table 2 at lines L241-245 are a bit confusing. What does it mean 32 to 34 cases? I don't have the total number of gauges to verify the 10%. Please, refer also to the syntax used in the header of the table, i.e. 1<sup>st</sup> and 3<sup>rd</sup>
- Please, make clear in the text among which variables the correlations are computed (section 4.2.1)
- Please, note that Figure 4 is neither recalled nor discussed in the text. Add comments. Define the Relative error. Which return period does it refer to?

- Figure 6: be consistent with the shown variables (relative error not defined, performance gain not defined)

## **TECHNICAL CORRECTIONS**

Please see in the following technical observations:

- L70: "Extreme events"
- Figure 1: make consistent the red colors (line and circles)
- Figure 2: please add the total number of the analyzed gauges, even in the text.
- Table 1: please add the symbol  $rd_T$  of the relative deviation.
- I would swap Table 1 and Table 2, since this last is discussed earlier.