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www.hydrol-earth-syst-sci-discuss.net/10/C972/2013/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Regionalization of patterns of flow intermittence from gauging station records" *by* T. H. Snelder et al.

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Re: Hydrol. Earth Syst. Sci. Discuss., 10, 1511-1551, 2013, www.hydrol-earth-syst-sci-discuss.net/10/1511/2013/. doi:10.5194/hessd-10-1511-2013

Tittle: Regionalization of patterns of flow intermittence from gauging station records Authors: T. H. Snelder, T. Datry, N. Lamouroux, S. T. Larned, E. Sauquet, H. Pella, and C. Catalogne

We sincerely thank the reviewers and your constructive comments on our paper. These have helped us to improve the scientific content of our paper.

We have replied to the anonymous reviewer in the order of their the comments. We have attached as supplementary material a marked up copy of the revised manuscript

to show how the changes have been made where not explicit here.

Specific comments Anonymous Referee #3

2. Materials and methods

Page 1516 Line 7: The use of latitude only is hardly adequate to locate the study area

Yes, we have added longitudes.

Page 1517 Line 2: the choice of 20 days needs to be qualified. Why choose 20 days as the threshold?

This was a subjective decision that was based on a pragmatic compromise: a lower value would have led to fewer qualified years. The choice of 20 days resulted in gaps (of any duration) accounting for only 0.14% of the days in the entire flow record (i.e., all 628 sites). This was similar also for intermittent gauges (0.2% of the day in the entire flow record for these 123 sites). We have included these figures in the first paragraph of the results section. We consider it unlikely that the results are strongly influenced by gaps.

Page 1517 Line 8: ".. the frequency of zero-flow periods". Does this mean that a period of 1 day would be treated in the same manner as a period of 19 days?

Yes.

Page 1517 Line 22: use words rather than this symbol . I suppose that means 'about' or 'roughly'. There are a few more places in the text where this symbol is used.

Changed to "approximately "throughout.

Page 1518 Lines 24-25: Why use a "drainage density that was independent of our DEM-based network"? I would have expected that the same network used in the study would be used for estimation of the drainage density. There is need for consistency here, especially given that the two are likely to give different densities. The authors

need to justify why they used a different network for the drainage density.

The DEM-based network is defined automatically and has a network density that is determined by computational criteria (primarily catchment area). The 1:250,000 scale BD Carthage® river-channel map is based on the observed network using a different mapping procedure. We considered that the observed (rather than automatically produced) drainage network density may reflect relevant soil and geological characteristics such as perviousness of the surficial material and that this may provide a useful predictor variable. We have clarified this in the manuscript.

Page 1519 Line19: delete 'retained for analysis'. There is no need to have that phrase and it is a repetition as it has already been mentioned in the sections before this one.

Changed.

Page 1519 Lines 23-26: the line beginning 'In the intermittence. . .' is difficult to follow. Rephrase

Changed.

Page 1519 Line 26: 'We grouped the 123 gauging. . .', The figure 123 just pops out of nowhere. There is no mention of 123 gauging stations being on intermittent segments in the text before this. Some statement relating to this should be inserted somewhere in the text.

We have removed the number completely – this is a result and is not needed to understand the methods.

Page 1520 Line11: Delete the first 'dissimilarity' so that the statement reads 'Our first matrix described the dissimilarity. . .'

Changed.

Page 1520 Lines 14-15: A brief explanation of how the permutation procedure would establish the significance of the statistic would be desirable here.

A brief description of the method has been added.

Page 1520 Lines 19-21: Replace 'due to' with 'as a result of'. Also here I do not understand how "... station record had not commenced or had ended" is a problem. Some justification is required here.

To be more clear we have reorganized this as: "The calculation of dissimilarities was complicated by missing data for some years as a result of gaps or because the station records had differing durations within the analysis period".

Section 2.7: this section is rather too long and over-detailed with a lot of descriptions of the methods but very little reference to the subject of the paper. Such detail is not necessary and should be reduced. Relate the descriptions to the intermittence subject at hand.

This is really an editorial decision. The description of Random Forests provides only the essential elements of the method. These are need for the reader to understand the modeling process, the importance measures, partial plots and the variable reduction procedure.

Page 1525 Lines 9-10: Difficult to follow. Rephrase. "At least one station had its highest zero-flow frequency or longest zero-flow duration in 10 almost every year (i.e. at least one value of 100% occurs in most years in Fig. 3)."

We deleted this sentence and edited the preceding sentence to read: "However, the year in which the highest zero-flow frequencies or longest zero-flow durations occurred at each station was variable and there was no common year in which the highest frequencies or longest durations occurred (Fig. 4)."

Page 1525 Lines18-20: What is the justification for assigning the three outliers to the closest subclasses? How important are these outliers? Is there any common thread running through the outliers? These outliers should be discussed a bit more as they could be significant in assessing the methods used.

These are not outliers. They are sites that fell outside the nominated boundaries. Given these boundaries are nominated for the purpose of defining groups of broadly similar sites, our assignment to the closest group is pragmatic and sound. Statistical grouping procedures such as clustering are based on similar processes (assigning objects to their closest group).

Page 1526 Line1: See my comment above with regards permutations. The method is mentioned in passing but it seems to have a bearing on the results. A statement describing the method would suffice.

Done in the methods section.

Page 1526 Lines 25-27: Delete the second 'river' to read " 39% of river segments represented by our network"

Done.

Page 1527 Line 1: What does 'higher level of accuracy' really mean? The statement on its own is meaningless and should be qualified by an additional statement.

We have edited this to say that they were well predicted. The following sentence quantifies this with a test of the observations versus the predictions.

Page 1527 Lines 6-20: Very good results. This is a significant part of the study. My concern is that the discussion of these results is missing even in the discussion section.

We have dealt with these results in the discussion. We have slightly altered the discussion to acknowledge that were expected relationships (i.e., they are not surprising).

Page 1528 lines 1-6: it seems to me that this paragraph is a repetition. Check that the same thing has not been said in the preceding sections.

We have reduced this and removed results.

Page 1529 Lines 7-9. The statement beginning 'The probability of: : :.' does not read

well. Rephrase.

We edited this to read: "The probability of intermittence had significant but more complex relationships with the environmental variables SumWinRain and Perm."

Page 1533 Line 4: The use of the word 'accurately' must be qualified. What does 'accurately' mean?

Edited this to read: "Although predictions of intermittence were not accurate at the segment scale, when aggregated by HER they produced good estimates of the proportion of intermittent segments at regional scales (Fig. 10)."

Page 1533 lines 10-12: Rewrite the line to read " preliminary estimates of how climate change could impact the frequency of "

Corrected.

Table 1: variables Allu, Chalk, Lime all have the same description.

Corrected.

Figures 1 & 6: the captions are not informative enough. One would have to go back to the text to understand the figures.

We have replaced the caption for Fig. 1 with: France showing the Hydro-EcoregionR (HER) boundaries (Wasson et al., 2002). The number of gauging stations included in this study in each region is shown in parentheses in the legend. We have edited the caption for Fig. 6: (Now Fig. 7) to read as follows: Receiver operating curves (ROC) plot (left) and threshold plot (right) for the flow-regime classification. The black circles on the threshold plot indicate the probabilities thresholds that maximize the classification performance as measured by Cohen's kappa and the percent correctly classified (PCC).

Figure 3: is squashed and difficult to read. An increase in size may help, or a relabelling of the x-axis.

We have improved the readability of Fig. 3 (Now Fig. 4) by rotating the x-axis labels.

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/10/C972/2013/hessd-10-C972-2013-supplement.pdf

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