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Hydrology and Earth System Sciences
Discussions

Interactive comment on "The influence of methodological procedures on hydrological classification performance" *by* F. J. Pe nas et al.

Anonymous Referee #2

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The paper addresses an important topic in hydrology. It presents classifications of increasing level of detail, ranging from 2 to 20-class levels, either based on raw and normalized daily flow series and using two contrasting approaches to determine class membership: Classify-Then-Predict (ClasF) and Predict-Then-Classify (PredF).

The aim of this study is to investigate how the normalization of flow series data previous to the classification procedure and the use of ClasF and PredF influences:

(i) the classification performance, (ii) the hydrological interpretation of the classifications and their ability to discriminate different hydrological characters, (iii) their ability to reduce the bias associated to the underrepresented parts of the hydrological space and (iv) the degree of spatial correspondence between classifications.

The authors conclude that PredF is a more favorable method than ClasF, since it provides better results, however, they fail to point out why.

The paper needs major revisions.

General comments:

The paper is very difficult to read: part 2, 3 and 4 need a serious overhaul.

Page 952, line 3: Why do you select 103 indices for the raw flow series and 101 for the normalized flow series, or are they different series? Since you are going to apply statistical models, you will start already with a small bias.

Page 952, line 11: Please elaborate a bit more on the used procedure (outlined in Olden and Poff, 2003) to the reduction of the original sets of indices.

Page 953, lines 1 to 3: Please transfer the number of variables (n) to line 8. Since you are going to reduce them they are inappropriate when mentioned here.

Page 953, line 21: What relationship does the average rock hardness of a catchment have with a hydrological regime? Please explain.

Page 954, line 8: The use of synthetic indices biases the approach of the paper towards the PredF method. Moreover, since the models do not use any physically meaningful parameters, the model results are dependent on the gauges on which the models are trained. Could the model results have a different outcome in another region?

Page 954, line 13: For the ClasF the entire Synthetic River Network (SNR) is used and for the PredF only 1/3 of the SRN. Could this cause a bias in performance? Explanation is needed here.

Section 2.7 needs to be rewritten. The following points should be addressed:

1. Why is the bias of a distinctive gauge important?

2. Please explain distinct hydrological character: is this a character within a class or is

it a charter compared to all gauges? On what is this distinction based?

3. Why do you select four dissimilar gauges? Please explain.

4. Large distances do not necessarily imply a heterogeneous class. This is not true when the distinctive gauge forms an outlier. Please reconsider.

5. A low frequency of a class does not automatically imply that this class cannot represent certain characteristics of the hydrological space properly. Please reconsider.

Section 2.8

If you select a subset of 500 segments out of an entire set of 667 406 segments, your selection comprises about 0.1% of the entire set. If you select a subset of 500 segments out of an entire set of 178 297 segments, your selection comprises about 0.3% of the entire set. How representative / significant is your subset. Please elaborate on this.

Section 3.1

For the raw series you use the first five PCs and for the normalized flows you use the first six PCs as selected according to the broken stick method. However, as stated in section 2.6 you intend to use only the first five PC. Please make the text consistent.

Page 959, line 10. You state that there are no significant changes from 6-7 to 20 classes. Does this mean that approx. 60% of your classes are redundant? Please comment on this.

Please integrate part 3 into part 4 and call it Results and Discussion.

Please do not write too much of the contents of your tables in your text. Refer to the tables when you elaborate on the values and use the discussion to explain these results. This will shorten the paper and make it better to read.

Please rewrite the discussion part and make it clearer. This part is very difficult to read

and in some parts very difficult to understand. A more concise text would enhance the readability of this part.

Page 963, lines 16-20: please move this part to the introduction.

Page 965, line 10: Is “predictability” as listed in this sentence, dependent on a gauge or on a method? Please comment on this.

Page 966, line 5-10: These sentences are not clear. Please rephrase.

Page 966, line 16-20: These sentences are not clear. Please rephrase.

Page 967, line 11: Please reconsider, you cannot recommend something you do not completely understand.

Minor comments

Page 958, line 5, line 10 and line 22: should OBB not be OOB?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 945, 2014.