Hydrol. Earth Syst. Sci. Discuss.,
doi:10.5194/hess-2016-487-AC2, 2016

Hydrology and Earth System Sciences
Discussions
Open Access
EGU

Interactive comment on "A comparison between parameter regionalization and model calibration with flow duration curves for prediction in ungauged catchments" *by* D. Kim et al.

D. Kim et al.

d.kim@apcc21.org

Received and published: 23 December 2016

Dear anonymous referee:

We greatly appreciate your valuable contribution to our manuscript, and thank for your favorable comments. Accepting referee 3's constructive comments, we will improve the manuscript in revision, and your comments will be considered together. We will restructure the manuscript as:

(1) We will include more literatures about prediction in ungauged catchments in introduction. Additional literatures will be about FDC regionalization and signature-based calibration methods. We will also introduce the decade-long project of the IAHS in

Printer-friendly version

Discussion paper

Prediction in Ungauged Basins (Blöschl et al., 2013; Hrachowitz et al., 2013).

(2) We will restructure the manuscript from gauged to ungauged catchments. We will first show results and discussion about predictive performance and uncertainty at gauged catchment of both hydrograph- and FDC-based calibrations. Then, we will move to compare and discuss the parameter regionalization and calibration with regional FDCs.

(3) We will provide actual FDC-based calibration in combination with three flow signatures at gauged catchments. This will provide interest to readers. Once again, we thank for your contribution, and please find our response as per your comment below.

1. The authors rely often on to NSE efficiencies to assess the reliability of each model, and they conclude that, given the good results obtained with PROXreg, which is the regionalization of the parameters of the rainfall runoff model, that this model is preferable to the other given its capacity to reproduce the true idrograph in time. However, this conclusion seems to strongly contrast with other performance indices they deliver, e.g. VEQ, RQP, IBF, so I would soften a little the conclusions and would let the judgment be more flexible.

-> Accepting constructive comments from the referee 3, we will restructure our manuscript in revision. We will discuss hydrograph-based and FDC-based calibrations at gauged catchments first, and then move to the ungauged case (i.e. parameter regionalization and FDC regionalization). And, we will provide actual calibration results with combination between FDCs and other signatures. Hence, new discussion and conclusions will be provided in revision.

2. NSE is the most used performance index in literature and I agree with using it, but recently it has been criticized its capacity to understand how a model produce good result with low flows, while it emphasizes the capacity to understand high flows, so that NSE could end to be a biased index (the authors also recall this behavior at P11 L8). I wonder how the final performances vary by adopting LNSE, which is the same as

NSE but taking the natural logs of streamflows. I assume that the lesser influence of the low flow regime prediction into NSE might somehow introduce a distortion of final judgment. In case the results are substantially different I would recommend the authors to make an effort in discussing these results as well.

-> We agreed. In revision, we will use a balanced criterion between high and low flows for calibrations (e.g. Zhang et al., 2015). Evaluation will be done for both high and low flows too (e.g. using NSE and log NSE).

3. I would suggest to change the title including the word “streamflow” somewhere. In this way, the topic is clearer. Perhaps “A comparison between parameter regionalization and model calibration with flow duration curves for prediction of streamflows in ungauged catchments” ?

-> The manuscript will be retitled after revision. We will consider this comment when retitling.

4. Table 1 reports for each model two columns in which the author say whether or not NSE efficiencies are greater than 0.6 or 0.8 respectively. I think that would be of more interest for the reader to see all the values for each catchment as well as the cut-off at 0.6 or 0.8. For instance, they can report efficiencies for each catchments and let the numbers above the cutoff in bold face. Reporting “Y” or“N” only might result uninformative and, at the very end, useless.

-> In revision, we will use all catchments regardless of performance measures for having more proximity between gauged and ungauged catchments. The table will be updated with new performance measure as you recommended.

5. I would recommend to extend paragraphs 3.3.1 and 3.3.2 to introduce some more details of the two proposed approaches. Furthermore, I would move those two paragraphs before the evaluation indices adopted.

-> This part will be moved to introduction. We will provide more details about two

approaches in revision.

Technical notes and misspellings

1. P3 L7. “Siberian high pressure”, perhaps is “low pressure”.

-> “high pressure” is correct because we intended to explain cold and dry weather conditions in winter seasons in South Korea.

2. P8 L19. Please add the word “between” in between the words “coefficients” and “CPI”.

-> The manuscript will be restructured. We will globally check grammatical errors in revision.

3. P10 L3. Please remove the article “the” between the words “values” and “between”.

-> We will globally check technical and grammatical errors in revision.

4. P10 L4. “Based on the high [. . .]” is perhaps “Based on the highest [. . .]”?.

-> We will globally check technical and grammatical errors in revision.

5. I have not completely understood what the author mean with “orthogonal” referring to streamflow signatures, please consider to add some more details arguing what does this word mean for them into the context of the sentence.

-> In our study, an “orthogonal” signature is one that can supplement the FDC for parameter calibration independently. Hrachowitz et al.(2013) used this expression for hydrologic observations that seem to be independent each other, albeit not all variables are strictly independent. We will more clearly define this term in revision.

References

Blöschl, G., Sivapalan M., Wagener, T., Viglione, A., Savenije, H., 2013. Runoff Prediction in Ungauged Basins. Synthesis across Processes, Places, and Scales. Cambridge University Press. New York, USA.

Hrachowitz, M. et al., 2013. A decade of Predictions in Ungauged Basins (PUB)âĂŤa review, Hydrolog. Sci. J., 58, 1198-1255, doi:10.1080/02626667.2013.803183.

Zhang, Y., Vaze J., Chiew, F.H.S., Li, M., 2015. Comparing flow duration curve and rainfall-runoff modelling for predicting daily runoff in ungauged catchments. J. Hydrol., 525, 72-86.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2016-487, 2016.

Printer-friendly version

Discussion paper