

## ***Interactive comment on “Effectiveness of a regional model calibrated to different parts of a flow regime in regionalisation” by H. S. Kim***

**Anonymous Referee #2**

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### GENERAL COMMENTS

The author presents a study aimed at improving model performance in a regionalization/ungauged basin context through a calibration approach that considers wet/dry catchment states. Unfortunately, the material presented is very similar to previously published material by the author and others (lacks novelty). The outlined study attempts to draw conclusions based on a small sample size (<10 catchments) and mixed results. Additionally, the idea of fixing stated model structural errors/deficiencies by manipulating the calibration process is not particularly sound. Such an approach will always be susceptible to failure under alternate conditions (i.e., the validation period) – something which was not considered at all in this study.

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### SPECIFIC COMMENTS

P7059, L24-26: It is necessary to discuss this in depth. Particularly, there have been several recent studies which utilize hierarchical Bayesian approaches to address regional calibration. See Bulygina et al., 2012 (doi:10.1029/2011WR011207) and Smith et al., 2013 (doi:10.1002/2013WR015079).

P7061, L8-11: If the model is known to be deficient, why not correct the model deficiency itself rather than using calibration restrictions to force a different model behavior?

P7061, L21-22: Again, why not address the model structure?

P7061, L22-25: How portable/reproducible is this to other settings? How intensive is the process?

P7062, L13-14: Is this a big enough sample size to draw “real” conclusions from?

P7065, L22-25: What is the “real” impact of this? If the wet period accounts for 75% of total Q, does it really matter that dry period performance is not as good (but perhaps still tolerable)? Are stakeholders overly concerned about low flows?

P7066, L5-8: Since this is a known model structural deficiency, shouldn't the goal be to fix the model rather than to fix the prediction?

P7066, L18-20: Because the wet period accounts for the large majority (75%) of the total Q.

P7067, L1: I agree, although it is also connected to the larger optimization problem. Since the wet period is responsible for most of Q, the model is predisposed to do well in those times due to the optimization problem. Because of this, can we truly state with confidence that the model is “correct” during the wet period and “incorrect” during the dry period, or could the model be perhaps “incorrect” during all periods but simply optimized to the dominant period?

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P7067, L1-5: What is the real-world importance of this shortcoming? Why does this matter?

P7067, L6-13: Again, isn't this just a consequence of the wet period having the majority of the total Q?

P7072, L7-11: Isn't this true because the the dry period has little effect (i.e., little importance to the annual streamflow)? The results are set up to show that performance is improved at low flows (you've flipped the calibration to be based solely on this period). But despite this, the impact on the overall hydrograph is minimal. So, what is the value of doing this?

P7072, L21: They are reduced, but they still overlap in your box plots. Are they significantly different? Use a different word to better convey the intent.

P7073, L1: This is, admittedly, by design.

P7073, L23-26: So, what does this say about the method? Did it do what it was intended to do? It worked well at one site and not as well at another? Is your sample size large enough to draw any conclusions about the population? It seems not.

P7073, L27: Due to its lack of relative importance to the overall system dynamics (as % of total Q).

P7073, L27-29: I would dispute this. I agree that this may be true visually for low flows, but it is not necessarily a "real" conclusion relative to total Q. And, is this improved model performance (hydrologic behavior) real or simply manufactured? I think the larger problem is that the focus is on fixing the outcome rather than fixing the model structure.

P7076, L3-4: Due to the way the calibration was constrained - essentially the author increased the weight of the low flow period in the parameter optimization causing better performance there at the expense of the high flows.

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#### TECHNICAL CORRECTIONS

P7058, L9: change "was" to "were"

P7061, L3: change "4-season" to "four seasons"

P7061, L7: change "4-season" to "season"

P7061, L15: change "was" to "were"

P7062, L7-8: change "for various reservoirs" to "of the reservoirs"

P7062, L16: change "4" to "four"

P7067, L1: delete "well"

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 7057, 2015.

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