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# *Interactive comment on* "Exploring the physical controls of regional patterns of flow duration curves – Part 2: Role of seasonality and associated process controls" *by* S. Ye et al.

**Anonymous Referee #1**

Received and published: 2 July 2012

General comments:

This paper attempted systematically explaining hydrological diversity of watersheds in the United States in terms of regime curves and flow duration curves. Toward the goal, authors specified dominant and necessary hydrological processes of watersheds by means of a simple hydrological modeling scheme in which model structures are reasonably determined introducing by the "downward approach", the Akaike Information Criterion, and an automatic parameter calibration scheme. Secondly they showed spatial patterns of dominant/necessary hydrological processes. Then they explained the

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patterns from the viewpoints of climate, potential hydrological processes, and vegetation activity of the watersheds in different regions.

I have to admit that there could be potential improvements in their process modeling, but their figures on the spatial patterns on dominant/necessary hydrological process and their explanations on the patterns along with the climatic aridity and seasonality seems very interesting and I suggest accepting this paper for publication in HESS after necessary revisions.

Specific comments:

1. P.7040, L.10-11.

Why did you select this algorithm among other algorithms? How does this algorithm separate base-flow from total flow? Your brief explanations on these points may be helpful for readers.

2. P.7044, L.19-20.

Why did you use the same mean residence time? What would be the possible effects? Can you justify it? Please explain for the above point.

3. P.7047, L.21.

Do you need calibrations for Tmin and Tmax? Please add explanations.

4. P7048, L.20-21.

I suggest citing an original or suitable literature on the AIC.

5. P.7050, L.18.

We cannot clearly understand the meaning of "chain". A brief explanation would be helpful for readers.

6. P.7051, L.7-8.

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SQobs and SQsim suddenly appear in the main text without appearing in Eq.(16). So we reader are forced to search where they are. Hence I suggest closing the sentence before this part and defining them in a difference sentence after explaining Eq. (16) to calculate SQobs and SQ sim. Or, I would recommend explaining Eq.(17) first then you introduce Eq.(16) followed by the explanations of variables used in the equations.

7. P7053, L.24-25.

Why can you claim that "This discrepancy was attributed to the absence of saturation 25 excess runoff"? I suggest you explain more.

8. P.7043, L.10-11.

Why can you hypothesize "they could be reduced by adding canopy interception"? I suggest you explain more.

9. P.7056, L.11-12.

Are there any reason for selecting MSE=0.53 for the criterion? A brief explanation would be helpful.

10. P.7057, L.1-23.

These model-based interpretations of your results are very interesting but I would suggest citing existing literatures that support or deny your interpretations. I believe such citation would enrich your interpretations and you would be able to convince the readers more.

11. P.7059, L.19, P.7062, L.17-18.

Why these catchments are easily modeled by the base-model? Such catchments would have vegetation. Your explanations must be helpful even with potential reasons.

12. P.7064, L.7.

"four level 3 models". This expression sounds not straightforward tome. A more careful

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expression is preferable.

13. P.7065, L.4-P.766, L.22.

I think a comparison with Keppen's climate classification map would potentially enrich or support your discussion. But this is not mandatory. I am just suggesting it if it is easy for authors.

Technical corrections:

1. P.7048, L.15.

What the MCMC stands for? Please write in full then use its abbreviation in parentheses.

2. P.7049, L.16-17.

I think commas would be necessary in front of "given" and after "input" for readability.

3. P.7052, L.2.

"The" may be necessary in front of "AIC".

4. P.7052, L.6.

Pleaseconsider to insert a comma after "discharge".

5. P7059, L.22, P.7065, L.20.

"snowmelt" should be "Snowmelt".

6. Figs.1, 2, 5, 6-14.

The font sizes of these figures are too small to read for me. I suggest enlarging the size bigger in publication.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 7035, 2012.

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