

## ***Interactive comment on* “Exploring the physical controls of regional patterns of flow duration curves – Part 1: Insights from statistical analyses” by L. Cheng et al.**

### **Anonymous Referee #1**

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P7008 In4, why did not select more catchments? Data quality issue or time series are too short?

P7010. Use of  $R^2$  and  $Ens$  may not be appropriate for the purpose of evaluating the FDC model. The authors should consider a chi-squared test or a sensible statistical test for comparing two distributions.

P2012 In5-10. The authors calibrated equation (3) against normalized time series to optimize the three model parameters. As I understand, Figure 3 simply showed results of the model calibration. These results are not independent validation of equation (3).

P7012 In24-28. The authors should consider a chi-squared test or a sensible statistical test for comparing two distributions.

P7013 In3 – 8. Do these results indicate that the simple mixed gamma distribution is not accurate in these catchments or years? Do we know why?

P7013 In26-27. I assume what you are saying is that larger alpha values for the TFDCs and SFDCs are also found in the arid regions. Please reword.

P7014 In1-5. Please explain what you mean by “share similar region patterns”? Do you mean the PDCs and FFDCs have similar shapes? Or you mean the alpha values show similar region patterns?

P7014 In10. Replace “comparatively” “relatively”.

P7014 In10-26. Here, the authors discussed the nature of the parameter k and possible reasons for the observed spatial patterns. In my view, this belongs to Discussion.

P7015 In9-11. The shape parameter of the PDC showed some correlation with that of the FFDC, but they are not closely correlated.

P7015 In15-16. Is this shown somewhere in the paper?

P7015 In16 – 26. The discussion on precipitation and the parameter alpha of the FFDC makes sense in principle. Is it possible to quantify the relationship using some statistical measures? Is the correlation good enough for practical applications? In other words, can you infer the parameter alpha of the FFDC from the PDC?

P7016 In11-14. Shown in Figure 8?

P7016 In27-28. Examination of Fig.8a and c reveals a stronger correlation between parameter k and the baseflow index for TFDCs. I would have expected a stronger correlation for SFDCs. The authors should elaborate on this.

P7017 In5. The baseflow index (BI) was estimated from daily streamflow and you can

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estimate the k-value directly from the daily streamflow.

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