

Reviewer #1:

<https://doi.org/10.5194/egusphere-2025-5039-RC1>

This is a nice work, well conceived and presented. The URSSIE approach looks theoretically sound and promising for future applications. I have some comments in the attached file.

Response: We thank Reviewer #1 for the constructive comments. Point-by-point responses to the reviewer's comments are listed below. For clarity, our responses are color-coded as follows: reviewer comments are in black, our responses are in light blue, the line numbers (corresponding to the clean version) are in red, and the texts excerpted from the manuscript are in brown.

Line 177-178: This caption misses two things:

- 1) the adopted value of m_k (I see it is in the text, but it would be better for the caption to be self-consistent)
- 2) the full stop at the end of the sentence

Response: Thank you for your suggestions. We revised them (Line 176).

Line 180: replace ", " with "="

Response: Thank you for your suggestion. We revised it (Line 179).

Line 207: "and from" reads better

Response: Thank you for your suggestion. We revised it (Line 206).

Line 274-275: Comment this choice after stating it

Response: Thank you for the helpful suggestion. We added a brief explanation on lines 274-275: "This metric captures the catchment response during high flow conditions and serves as an important indicator for constraining parameters related to rapid hydrologic processes."

Line 300 and line 303: this does not read well in my opinion

Response: Thank you for the comment. We revised the wording for clarity on Line 300 and 303 respectively:

"For catchments under arid climates ($AI > 1.0$) and with monthly PET and P in phase ($0 < PI \leq 1.0$),"

"For the catchments under arid climates ($AI > 1.0$) and with monthly PET and P out of phase ($-1.0 < PI \leq 0$),"

Line 304-307: This is not shown in Figure 4a. You could add a chart for only Category III, but with monthly data.

Response: Thank you for the suggestion. We have regime curves for P, PET, Ri, and Rs in the supplementary. To improve clarity, we have revised the wording in the manuscript to explicitly refer to this figure in **line 309-310**:

“Regime curves of P, PET, Ri, and Rs for representative catchments in all three categories are provided in Supplementary Fig. S5.”

Line 308: “catchments” to “catchment”

Response: Thank you for your suggestion. We revised it (**Line 310**).