**Beyond Runoff Coefficient: Revealing Global Patterns of Process Connectivity in Runoff Generation through Intensity Integration (Minor Revision)**

The authors have made substantial revisions to the manuscript and have addressed many of my previous concerns. However, I still have several comments that I think should be further addressed before the manuscript can be considered for publication.

**General comments**

1) The authors have improved the Introduction a lot, and it is now much clearer why a global-scale analysis was conducted. However, the two indices, RI and RE, which go beyond the runoff coefficient and appear to be an important focus of the study, are introduced only very briefly. It would be helpful if the authors could further explain what additional insights can be gained from RI and RE.
2) Although the authors have explained why they embedded a hydrological model in this framework, I still do not fully understand the necessity of using this model in the study. Quickflow can be directly derived from observations through baseflow separation, and there are also many methods for identifying runoff or rainfall–runoff events without relying on a hydrological model, such as Tarasova et al. (2018, WRR). In addition, the model fluxes and states, such as interception and soil moisture storage, are not further discussed later in the manuscript to help understand process connectivity. Therefore, it seems that the information needed to calculate RC, RI, and RE could be obtained without using a hydrological model. The only clear reason I can see for using the model is to extend the analysis back to the 1950–1980 period (Figure 1). However, the authors should clarify whether this benefit justifies building a hydrological model and introducing additional model uncertainty.

**Specific comments:**

- Line 56: what the sentence of "the heterogeneity and coupled climate-landscape gradients may increase with scale" presents is not clear. Please clarify what type of heterogeneity is being referred to, and explain what is meant by "coupled climate-landscape gradients".
- Line 119: I think this modified equation is still not correct. When the soil is very dry, for example when soil moisture is below 1%, INF would become higher than the maximum infiltration rate.
- Line 137: show a map of KGE distribution in the supplementary information.
- Line 160: show these varaibles (e.g., R, P, especially ΔtR) in Figure 1c.
- Line 161: I feel that the term "net-rainfall duration" may not accurately describe what the authors intend to express. The runoff generated during this period is not necessarily produced only by the rainfall occurring within the same period.
- Line 162: Please clarify whether "the event" is defined based on rainfall or runoff, and revise the terminology accordingly.
- Line 175: Please specify what kind of RCs is explored by the random forest. the temporal mean of RCs?
- Line 226: Effective rainfall is generally defined as the difference between total rainfall and actual (or potential) evapotranspiration. Therefore, it is not clear why an effective rainfall of 10 mm supports the selection of a precipitation intensity of 10 mm/day.
- Line 239: Fillting out KGE < 0.5 has already been mentioned in Line 138, so I suggest

removing this repeated information.

- Line 298: where do the authors obtain the data of actual evapotranspiration? What is the meaning of high precipitation?
- Line 394: According to Figure 5, the dominant influential factors for RI are P_mean and aet_mm_syr, rather than average duration and frequency of high-precipitation events.
- Line 412: use “process connectivity” instead of “runoff generation connectivity”.
- Line 452-454: it has been already discussed in the previous paragraph.
- Table S1: It would be better to move this table into the main manuscript, as it would help readers better understand Figure 5.