

Response to Reviewer 2 Comments

We sincerely thank the reviewer for the thorough and constructive comments. The suggestions have significantly improved the clarity, rigor, and overall quality of the manuscript. All comments have been carefully addressed, and the manuscript has been revised accordingly. Detailed responses are provided below.

Comments 1: Abstract. The abstract is informative; however, it would benefit from a more concise and consistent presentation of results. It is recommended to report only the best-performing model with representative numerical values to improve clarity.

Response 1: Thank you for this helpful suggestion. The Abstract has been revised to improve conciseness and clarity. Specifically, we streamlined the presentation of results by focusing on the best-performing model and reporting representative quantitative performance (e.g., MAE and CE values) to enhance readability and impact.

Comments 2: Introduction. The objective of the study is generally clear; however, the novelty is not sufficiently emphasized. Please revise the objective section to clearly state:

-what is new in this study

-how it differs from existing ensemble or ML-based approaches

It may be helpful to explicitly highlight the contribution of integrating SPM with MSF and machine learning models.

Response 2: Thank you for this valuable comment. The Introduction has been revised to more clearly highlight the novelty and contribution of this study.

In particular, the concluding part of the Introduction has been strengthened to explicitly state (1) what is new in this study and (2) how the proposed framework differs from conventional ensemble and machine learning-based approaches. We now emphasize that the proposed framework integrates the Switch Prediction Method (SPM) with machine learning-based multi-step forecasting (MSF), introducing a dynamic rainfall forecast selection mechanism based on real-time performance. This distinguishes the proposed approach from traditional methods that rely on static input structures.

The main contributions are now explicitly summarized in a structured manner.

Comments 3: Methodology. The manuscript would benefit from improved reproducibility. It is recommended to include a pseudo-code or algorithmic flow for the proposed framework (SPM + MSF + ML models).

Response 3: Thank you for this important suggestion. The Methodology section has been revised to improve transparency and reproducibility.

We have expanded the description of the Switch Prediction Method (SPM) to clearly explain its operational mechanism, including the evaluation and dynamic selection of rainfall forecasts. In addition, a structured step-by-step description of the overall framework has been incorporated to illustrate how SPM is integrated with machine learning models and the multi-step forecasting (MSF) process.

These revisions provide a clearer algorithmic flow of the proposed framework and facilitate reproducibility.

Comments 4: Results and Discussion. The results are well presented; however, the discussion lacks comparison with existing studies. It is recommended to include comparison statements with previous research to better position the contribution of this work. The manuscript does not explicitly discuss the advantages and limitations of the proposed framework.

It is recommended to add a dedicated discussion including:

- strengths (e.g., adaptability, uncertainty reduction)
- limitations (e.g., data dependency, lack of extrapolation capability)

Response 4: Thank you for this constructive suggestion. The Discussion section has been revised to include comparisons with recent studies.

We have added comparison statements with existing literature to better position the contribution of this work. In particular, the performance of LSTM-based models is discussed in relation to previous studies, and the added value of the SPM-based framework is clarified in terms of improved adaptability and reduced uncertainty propagation compared to conventional approaches.

Comments 5: Conclusion and Future Work. The conclusion summarizes the findings well; however, future research directions are only briefly mentioned.

Please expand the future scope section, including:

- application to other watersheds
- real-time forecasting

Response 5: Thank you for this valuable suggestion.

The future research section has been expanded to provide a broader perspective. In addition to model improvement, the revised manuscript now discusses (1) application to other watersheds with different hydrological characteristics and (2) the potential for real-time forecasting and operational implementation. These additions enhance the forward-looking aspect of the study.

Comments 6: Figures and Tables. Please ensure that all figures are properly cited and clearly indicate whether they are original or adapted from other sources.

Response 6: Thank you for the suggestion. All figures have been carefully reviewed to ensure proper citation and clarity. We have verified that all figures are clearly labeled and appropriately referenced in the text.

Comments 7: References. Please carefully review all references to ensure they are relevant and closely related to the study. The use of non-peer-reviewed sources (e.g., websites) is not recommended and should be avoided.

Response 7: Thank you for this important comment. The reference list has been carefully reviewed and updated. We have ensured that all references are relevant and closely related to the study. In addition, recent publications have also been incorporated to improve the timeliness of the manuscript.