**Response to Second Review Comment: 'egusphere-2025-4978'**

We thank the anonymous referee for the careful reading of the revised manuscript. We agree that we can further strengthen the manuscript by incorporating the three addressed technical comments. Each comment is addressed in turn below, with the referee comments in blue.

I would like to thank the authors for taking the time to respond to my comments and for their substantial efforts in revising the manuscript and clarifying several points of confusion. This manuscript presents a series of experiments investigating techniques to improve operational data-driven flood forecasting. I believe that the new discussion of physiographic catchment characteristics and their relationship to the magnitude of domain shift has greatly strengthened the scientific significance and novelty of the study. In particular, the finding that locations exhibiting the greatest domain shift consistently benefit the least from all tested techniques is very interesting.

All my previous comments have been addressed satisfactorily. I have only three minor technical comments that I hope will further improve the clarity of specific sections. Overall, this paper presents important findings relevant to the operational deployment of data-driven hydrological forecasting systems in a methodological and clearly structured manner and is enjoyable to read.

We thank the referee for the kind words and the motivation you gave us to look more detailed into the static catchment attributes. We also believe that this analyses further strengthened the scientific novelty.

**Technical comments:**

1. Lines 22-23: It is not clear whether the statement, “This is likely because the LSTM cell state retains strong seasonal signals and thereby compensates for forecast input bias through its long-term memory mechanism,” refers to the arid and precipitation-limited catchments, the alpine and snow-dominated catchments, or both. Please clarify.

Thank you for pointing this out. The statement refers specifically to the alpine and snow-dominated catchments. We have extended the sentence to make this explicit.

2. Lines 165-168: Is the forecast only baseline generated using the 1-day lead-time ECMWF-HRES forecast for the full 365-day input sequence? Please clarify.

Yes, the forecast-only baseline uses the 1-day lead-time ECMWF-HRES forecast for the full 365-day input sequence. We have added a clarifying sentence.

3. Table 1: How were the reanalysis forcing variables selected? For example, total precipitation is available from ERA5, E-OBS and MSWEP (Appendix A) but MSWEP is selected. Please provide the rationale for selecting these variables.

The reanalysis forcing variables were deliberately sourced from multiple dedicated products to combine the strengths of different data sources, reduce cross-correlation between input features, and avoid propagating systematic biases from a single reanalysis across all variables. For total precipitation specifically, we selected MSWEP as it has been shown to consistently outperform other precipitation datasets across diverse hydroclimatic settings (Beck et al., 2017; Abbas et al., 2026). We have added a clarifying sentence to the caption of Table 1 to make this rationale explicit.

## Final remarks

We thank the referee for the valuable comments and the overall positive assessment of our work. We hope that our responses and the corresponding revisions adequately address the points raised.

## References

Abbas, A., Yang, Y., Pan, M., Tramblay, Y., Shen, C., Ji, H., Gebrechorkos, S. H., Pappenberger, F., Pyo, J., Feng, D., Huffman, G., Nguyen, P., Massari, C., Brocca, L., Tan, J., and Beck, H. E.: Comprehensive Global Assessment of 24 Gridded Precipitation Datasets Across 18 428 Catchments Using Hydrological Modeling, Hydrol. Earth Syst. Sci., 30, 3399–3423, https://doi.org/10.5194/hess-30-3399-2026, 2026.

Beck, H. E., Vergopolan, N., Pan, M., Levizzani, V., Van Dijk, A. I. J. M., Weedon, G. P., Brocca, L., Pappenberger, F., Huffman, G. J., and Wood, E. F.: Global-scale evaluation of 22 precipitation datasets using gauge observations and hydrological modeling, Hydrol. Earth Syst. Sci., 21, 6201–6217, https://doi.org/10.5194/hess-21-6201-2017, 2017.