

Dear Reviewer,

Thank you very much for your positive assessment of our manuscript and for recognizing the value of our focus on dataset design in AI-based urban flood prediction. We greatly appreciate your constructive suggestions, which have been highly helpful in refining the clarity, consistency, and academic rigor of our paper.

Below, please find our detailed, point-by-point responses to your comments:

1. The manuscript should improve consistency in the statistical terminology. Section 2.6 refers to MANOVA, whereas Section 4.3 describes the analysis as multi-factor ANOVA. The authors should clarify which method was actually used and ensure the terminology is consistent throughout the manuscript.

Response: We sincerely apologize for the inconsistency in the statistical terminology in the previous draft. We have clarified and corrected this throughout the revised manuscript. The actual method used was **Multi-factor Analysis of Variance (Factorial ANOVA)**, as we independently analyzed the main and interaction effects for three separate dependent variables (training time, NRMSE, and R^2), rather than conducting a joint multivariate analysis. We have thoroughly reviewed Sections 2.6, 3.3.4, and the Discussion to ensure that the term "Multi-factor Analysis of Variance" is used consistently and correctly.

2. The target variable should be described more consistently. In some places the manuscript defines the prediction target as inundation area, while elsewhere it discusses peak water level, runoff volume, and water depth.

Response: Thank you for pointing out this ambiguity. We have carefully revised the manuscript to ensure absolute consistency. To clarify: the ultimate and sole prediction target of the LSTM model in this study is the Inundation Area (m^2). The terms "runoff volume," "water depth," and "pipe flow" are intermediate physical variables generated during the mechanistic simulation process within InfoWorks ICM (as described in Eq. 7 and Eq. 8, where instantaneous runoff is mapped to the final inundation area). We have combed through the entire manuscript to strictly differentiate between the intermediate physical variables of the hydrodynamic model and the final predictive target of the deep learning model. Any confusing references to predicting "water depth" or "peak levels" by the LSTM have been uniformly corrected to "inundation area."

3. Some of the conclusion wording is stronger and more conversational than is typical for a scientific paper. Phrases such as "respect the 14k-sample ceiling" and

“start lean, enrich later” may be better rephrased in a more formal academic style. The ideas are useful, but the tone could be made more precise and neutral.

Response: We completely agree with your feedback regarding the tone. We have thoroughly revised the Discussion and Conclusion sections to remove conversational phrasing and ensure a formal, precise, and objective academic tone.

Phrases like "respect the 14k-sample ceiling" have been formally rephrased to: "performance gains plateau once the sample size reaches a critical threshold of approximately 14,400 sequences under the current experimental setup." * Phrases like "start lean, enrich later" have been replaced with precise methodological recommendations, such as: "under data scarcity conditions, a minimalist input structure should be maintained... whereas introducing auxiliary features is an effective strategy only when data resources are abundant."

4. In addition, I do strongly recommend authors consider citing the following recent and relevant paper, which is closely related to AI surrogate modeling in urban drainage networks and prediction of node-level hydraulic states: Zafarmomen, N., Samadi, V., and Borgomeo, E. (2026). Spatiotemporal SWMM-LSTM surrogate modeling for efficient node-level water depth and inflow prediction in urban drainage networks. Cambridge University Press, published online 13 January 2026.

Response: We are very grateful for this excellent literature recommendation. This recent publication is indeed highly relevant to our work and provides critical, up-to-date context regarding the application of SWMM-LSTM surrogate models for fine-scale spatiotemporal and node-level hydraulic predictions. We have incorporated this citation into the Introduction (Section 1) when discussing the latest advancements in deep learning-based data-driven models and spatiotemporal prediction techniques, as well as in the Discussion to contextualize our findings within the broader trajectory of AI surrogate modeling in urban drainage systems.

Thank you once again for your insightful and encouraging review. We believe these minor revisions have significantly strengthened the professional presentation of our work, and we hope the revised manuscript now fully meets your expectations.