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Reply on RC2

Zongjia Zhang et al.

Author comment on "A Multi-strategy-mode-waterlogging-prediction Framework for Urban Flood Depth" by Zongjia Zhang et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2022-36-AC3, 2022

Dear Reviewers:

Thank you for your letter and for the reviewers' comments concerning our manuscript entitled *A Multi-strategy-mode-waterlogging-prediction Framework for Urban Flood Depth (ID: nhess-2022-36)*. Those comments are all valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our research. We have studied comments carefully and have made the correction which we hope meet with approval. The main corrections in the manuscript and the responses to the reviewer' s comments are as flowing:

Comment #1: **First, the paper should be more clarified and concise. The introduction and literature review sections are lengthy, but fail to identify both the research gap in the current literature and the research questions to be addressed in this paper. I recommend to integrate the two sections, and clarify the research questions based on the literature review.**

Reply: We have rewritten the introduction and literature review sections. On the one hand, we focus on the strengths and weaknesses of the previous literature studies, find the urgent research questions and define our research objectives in this way. On the other hand, we mainly focus on flooding risk prediction and exclude the part of the literature on risk identification and risk assessment that is not very relevant. The introduction and literature review sections are more concise and logical.

Comment #2: **Second, other sections should also be shortened and presented in a more direct way. For instance, I did not get the information I expected from a conclusion section although length is enough. There are 10 tables and 15 figures, exhausting the readers to get the key information.**

Reply: Sorry for the misleading content. We have carefully considered review comments, shortened the length of the data processing and result analysis sections, and removed some of the non-core bases for conclusions that may be confusing and misleading to the reader. The conclusions and the basis of the experimental results supporting the

conclusions are highlighted. The results of figures 13 to 15 are briefly presented in the text, and the three figures are placed in the appendix section to make the text more concise and readable.

Comment #3: **Third, I cannot understand why the authors did not include elevation data in the methodology, which should be a critical factor in determining urban floods.**

Reply: Elevation data is important for flood hazard prediction and simulation because elevation directly affects surface runoff flow direction and velocity. It helps researchers to delineate catchment areas, determine watersheds and outlets, etc. The above mainly applies to flood risk prediction and simulation based on hydrodynamic methods. The manuscript is mainly devoted to solving the problem of predicting the future waterlogging depth of urban flood-prone points (determined by municipal management based on historical flooding events). It can solve the problem of the temporal distribution of urban flooding. In lines 154-156, we illustrate that the variables affecting the temporal distribution of flooding depth are mainly rainfall and previous moment flooding depth for sensor sites. The elevation data, surface type data, drainage network distribution data, etc. are constant in these flood-prone points. Hence, they can be regarded as static factors in the machine learning black box model, where the input variables are real-time rainfall data and previous waterlogging depth data, and the output variables are future waterlogging depth. Considering that the current urban ponding waterlogging sensors mainly perform limited real-time monitoring functions and lack prediction functions. Combining the historical flooding depth data of these points and implementing the model configuration, training and correction under this framework can enhance the prediction capability of future waterlogging depth at flood-prone points, which is crucial for the government to release early warning information and carry out emergency dispatch in a timely manner.

Comment #4: **Finally, grammatical errors are throughout the manuscript.**

Reply: Considering the reviewer' s suggestion, we have revised the grammar and word throughout the manuscript to enhance the grammatical accuracy.

Based on the review comments, we rewrote the results analysis and conclusion sections of the manuscript to make the key messages of this study clearer and easier to read for the reader. In the case study section, a framework flowchart step-by-step approach was also used for the progressive study. The section is more clearly organized overall from data description and processing to the application of the research methodology. Some of the conclusions and their arguments that were not highly relevant to the research questions were removed from the manuscript to allow the reader to better focus on the various tasks that were conducted with the research objectives in mind. We have revised the wording and grammar of the manuscript and corrected some grammatical errors.

It was thanks to the professional comments of the reviewers that we were able to quickly target the problems and make targeted corrections. We tried our best to improve the manuscript and made some changes in it. Special thanks to you for your good comments.

Yours sincerely,

Corresponding author: Lili Yang

E-mail: yangll@sustech.edu.cn

Please also note the supplement to this comment:
https://nhess.copernicus.org/preprints/nhess-2022-36/nhess-2022-36-AC3-supplement.pdf