Reviewer 2

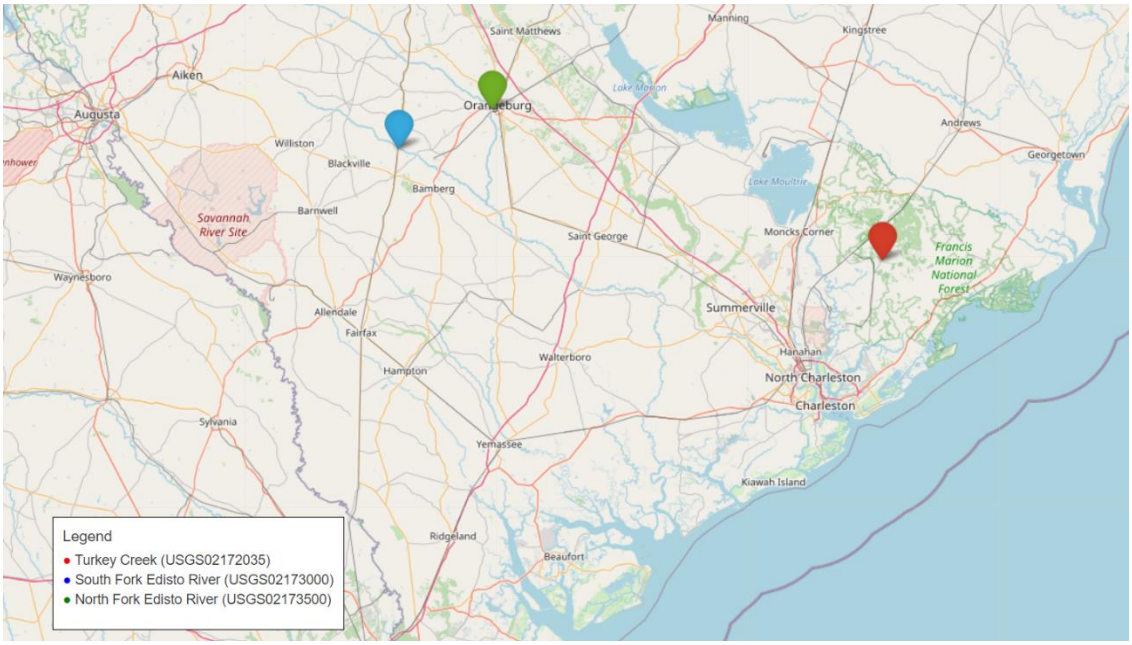
The research has clearly stated its originality on line 16-17. Line 24: The study has also been tested in the site study which validate the framework. The study aimed to providing more rapid and accurate evacuation modeling using HAC for flood evacuation decisions.

- Line 28-29: Please mention knowledge gaps or limitation in previous evacuation planning (line 28-29). Given these gaps, please clarify '*real-time flood emergency'* in term of time extent (when is the threshold of time-lag called real-time in flood event, or how previous/current emergency response)

Response: You raised a valid point. The real-time aspect in this study refers to decision-making with minimal delay. We revised this portion in the paper and added "The real-time aspect in this study refers to decision-making with minimal delay, typically when the National Weather Service (NWS) forecast is available (3-5 days in advance)" to the paper. The knowledge gaps or limitations in previous evacuation planning are already mentioned in the Introduction section.

- Line 106-107: Figure 1, there is no indication of three USGS gauging stations. Legend is better to rename following the gauging station name e.g., Turkey Creek (USGS02172035), South Fork Edisto River (USGS02173000), and North Fork Edisto River (USGS02173500).

Response: Thank you for this direction. We have now revised this figure in the paper. See below.



- Line 124-125: Please clarify line 124-125 for better readability, on the sentence 'We trained 30 models for each station (overall 180 models [2 models, 3 stations and 30 models each]). It is not clear when you mentioned '2 model' and '30 models.'

  Response: We agree with your comment. For the 3 stations, we trained 30 models with different variable parameters using two machine-learning models (LSTM and GRU). We have clarified this in the paper and added "We trained 30 models for each station (overall 180 models [2 machine learning algorithms, 3 stations and 30 models each with different parameters".

- Line 130-132: Also please adjust the line 130-132.

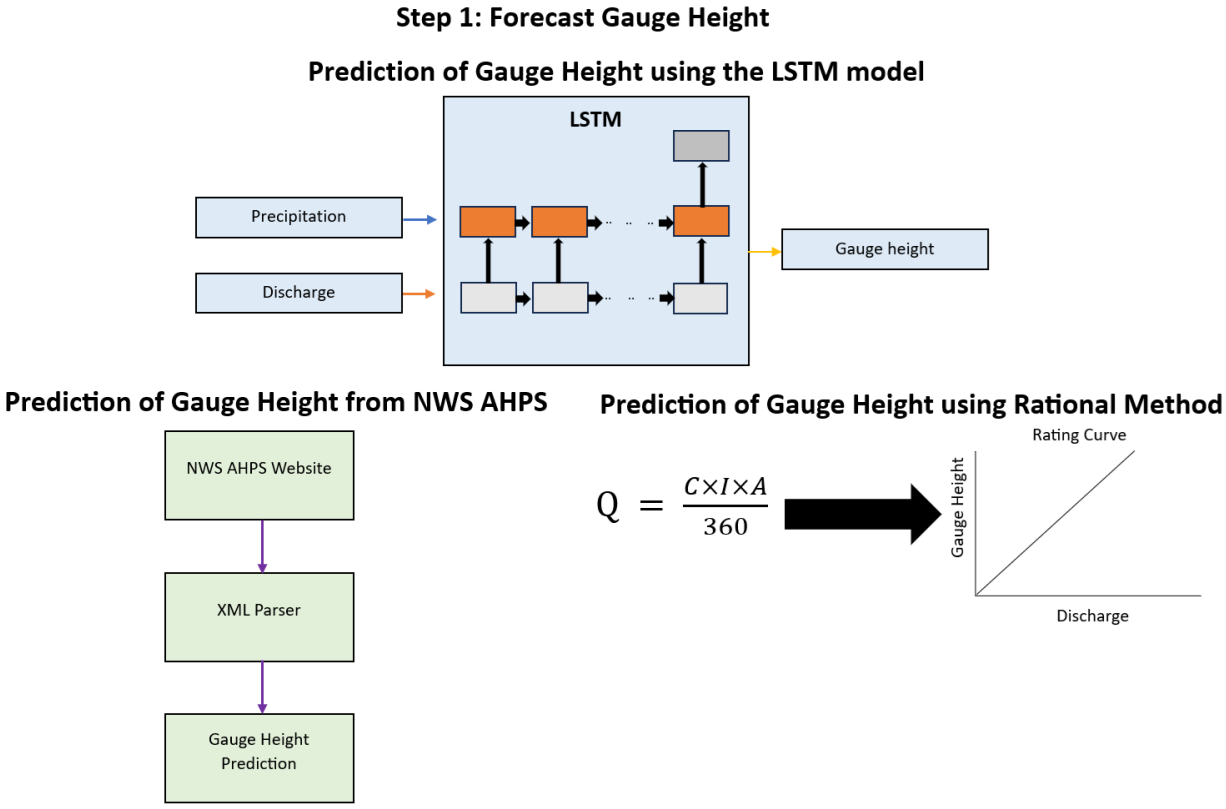
Response: Thank you for your comment, and we made that adjustment. 180 models are accurate numbers, based on the previous answer. For the 3 stations, we trained 30 models with different parameters using two machine learning models (LSTM and GRU) each [3 * 30 * 2 = 180 models].

- Line 160: Equation should be well-presented (Figure 2) and consistent.

Response: Thank you. We fixed the equation and revised the figure to ensure consistency.

- Line 160: typo Gage or Gauge in Figure 2.

Response: Thank you for the comment. We corrected this in Figure 2. See below, please.



- Line 200: The Rational method (Equation 6) should be Equation 5 instead of 6

Response: That was a great catch. Thank you. We have updated it to equation 5 instead of 6.

- Lines 240-243: The introduction of the HAND model and its purpose is clear. However, the repetition of "HAND model" could be reduced for conciseness.

Response: Thank you for the great suggestions. We have revised the paper and corrected the repetitions.

- Lines 249-253: The process of generating a HAND model using a DEM and flow accumulation map is described accurately. However, the description could benefit from a more concise explanation of each step.

Response: Thank you for your comment. We revised this portion where we describe each step of the HAND modeling procedure along with equations, etc. in a more concise way.

- Lines 257-262: The normalization of the terrain and creation of the nearest drainage chart is explained well but could be split into shorter sentences for better readability.

Response: Thank you for the great suggestions. We have updated the sentence for better readability.

- Lines 271-279: The step-by-step example of HAND calculation is detailed, but some steps could be simplified for clarity.

Response: The HAND model is now simplified into 8 steps for clarity, and some of the example steps were further simplified.

- Lines 285-293: The description of the initial data acquisition and integration process is comprehensive. However, the explanation of the amalgamation process and subsequent steps could be more succinct.

Response: Thank you for the suggestion. We have further made the explanation of the amalgamation process and subsequent steps concise. We revised this portion as below.

Then, the NHD data was amalgamated with terrain information to extract the hydraulic properties of the river reach and generate an all-encompassing dataset. Subsequently, the map algebra approach in Python was employed to compute the HAND value for each raster grid. Next, the HAND map was categorized into several classes to reflect flood depth and severity, as explained above.

- Line 282: It is strongly suggested to change the Figure 3 to more understandable. Indicate number legend.

Response: Thank you for the comment and we can see how that could be confusing. Figure 3 should not have any number legend. Those numbers in a matrix are the elevation to represent terrain in a digital elevation model (DEM). We added more details to the caption to clarify confusion. We add the below language to the caption.

Figure 3. The workflow of HAND model. Those numbers in a matrix are the elevation to represent a terrain in a DEM.

- Lines 361-364: The introduction to the section is brief but could benefit from a clearer outline of the key findings and their significance.

Response: We revised Results and Applications, and Conclusions parts and discussed more key findings and their significance in these two sections. For avoid confusion, we decided to remove those few sentences in the Results and Applications Section. Thank you for the comments.

- Lines 366-377: The description of the model training process is detailed but somewhat cluttered. The inclusion of specific details about the Optuna algorithm and hyperparameters tuning is informative but could be streamlined.

Response: That's a great catch. We have revised this portion and streamlined the details.

- Lines 379-387: The comparison between LSTM and GRU models is useful, but the reasoning for focusing solely on the LSTM model should be more explicitly justified. Mentioning specific performance metrics in Table 1 helps, but the discussion could be deeper.

  Response: Thank you for the feedback. The GRU and LSTM results and performances are the same since they have almost the same structure. For more info, we refer the reviewer to Karanjit' thesis here: https://open.clemson.edu/cgi/viewcontent.cgi?article=5200&context=all_theses

- Lines 391-399: The visualization results (Figures 6, 7, and 8) indicate the LSTM model's strengths and weaknesses. The review of its performance is insightful, but the discussion on low gauge height values is somewhat repetitive and could be more concise. Better to provide argument/discussion why Figure 7 is different compare other stations.

  Response: We agree with your assessment. We have revised this portion and also discussed Figures 7 and 8 predictions and results.

- Lines 413-418: The discussion on vanishing or exploding gradient problems is relevant, but it lacks specific examples or evidence from the study. The comparison of performance between gauging stations is useful, but the conclusions drawn should be supported with more detailed analysis.

Response: Thank you for this direction. We have included more details of vanishing problems in LSTM.

Another general point:

- The significance/effectiveness a proposed HAC approach is better to compare prior to after implementation of HAC in the case study.

Response: Thank you for this direction. The purpose of HAC was to combine all the simulation results, data analysis, text info, etc., and then add a human dimension to the analysis to create an evacuation route. We have now followed the step-by-step instructions of how the HAC system works from step one of data collection to gauge height simulation, text analysis to evacuation route computation. We hope you agree with this assessment.

- All figures should be provided in a proper way as mentioned by previous reviewer's comments.

Response: We refer the reviewer to our answer to Reviewer 1 comments. Thank you for the feedback.

- Section 2.4 the clarity of the text could be improved by shortening some sentences and avoiding redundancy.

Response: Thank you for the suggestions. We have revised this section. We tried to consider the content balances simplicity with comprehensiveness.

- It is better to provide information on how to address the information on X is a fake or miss information regarding the flood occurrence (Section 3.2).

Response: Thank you for your comments. Although some X posts can be fake, and a machine has no method to validate them, with ground truth validation (searching for local news, validation with National Weather Service tweets, etc.) we found that the

percentage of the false X posts was very low in our study. We have discussed this in this section and added the language below to the paper.

It is interesting to note that some X posts can be false or disinformation. However, we checked the posts with other reliable information such as local news, NWS posts, etc. and we found that the percentage of the false X posts was insignificant.

- In addition to revise the Figure 10, in the section 3.3 should discuss the effectiveness of the routes, or add the cost induced by the floods.

Response: Thank you for your comment. This could be a great addition to the HAC system in the future. We did not do that type of research in this study, so we have added it as a suggestion for future research. Specifically we suggested incorporating social and economic factors into HAC and evacuation decision making processes.

- The conclusion effectively summarizes the study's key findings and highlights the potential and importance of the HAC system. It could benefit from more concise language and a clearer focus on the main points.

  Response: Great point. We have revised the paper.