Dear Sir or Madam,

We thank Professor Erion Periku and the other two anonymous reviewers for their very constructive comments and suggestions. Major revisions have been made based on these comments, especially we made a great change on section Introduction, Overview of the Area Study, Research Idea, Original Data, and Discussion. We added two new graphs and one new section called Decision Analysis. The following is our point-to-point response, and Reviewer's original comments are shown in **Bold** and *italic*.

Sincerely yours,

Authors

Reviewer: Erion Periku

In basic reporting part:

1. …The number of initial data in this study/studies is relatively large, that is why it is necessary to explain how much of this data has been used, and at the same time which one of the initial data has the highest reliability and which ones need further interpretation.

Answer: This paper aims to predict the open water area (OWA) by daily precipitation data of the Napahai wetland during the rainy season (May - October) from 1987 to 2018 so as to achieve the purpose of flood prediction. The reason why only the rainy season data is considered here is because the rainy season in summer is the main source of flood in the Napahai wetland. (Paragraph 1 in Research Idea). The original data includes OWA, date and daily precipitation. Daily precipitation was observed every day during the rainy season from 1987 to 2018 and reliable. Only 47 OWA data was available from Landsat images in the corresponding period. We also made some corrections the image data in order to get a more reliable data. Details were shown on the first and second paragraph of Original data.

2. Research ideas, Original data collection, and Empirical model construction are the essential/main part of this article, if the mentioned above parts of this paper are not explained in detail and compared with at least some similar recent work then the

results may be questionable.

Answer: In the new version of paper, research ideas, original data collection, and empirical model construction were explained in detail. As compared with at least some similar recent work, we would like to point out one fact: there are usually three categories modelling methods for flood prediction of Karst wetlands (details in Introduction). Physics-based distributed hydrodynamic models, data-driven models and semi-distributed models. Due to the lack of data, physics-based distributed hydrodynamic and semi-distributed models cannot be applied here. Most data-driven models for Karst wetlands mainly focused on machine learning methods. The decision tree (one of methods of machine learning) is chosen in this paper because it is the most accurate method to predict this data set among the common machine learning methods such as random forest, neural network etc. after comparing them. We mentioned the above information in detail in the part Introduction and Research Idea.

3. R square value of linear regression is 0.58 and that of decision tree 0.69, in both cases the accuracy/goodness is not high. The authors have tried to explain the reasons resulting from these findings however they are not detailed and there is not a single comparison with previous works.

Answer: In the new Discussion part of the paper, we explained the fundamental reason for the relatively low goodness of fit is the difficulty of data acquisition. Data access poses a challenge concerning the other factors that may affect flood and equidistant OWA time series data in this paper. Actually, data acquisition is one of the challenges for Karst flood predictions based on what's mentioned in some references. The main difference between our work and previous works is we tried to afford modelling methods for non- equidistant time series data due to data access difficulty. We think the R square is good enough in this paper based on the current data quality.

4. The language and the text of the paper have to be improved/reorganized if there would be a decision for this article to be published.

Answer: Thank you for your suggestion. We have polished our language for the new version of paper.

In experimental design part:

1. Research ideas

a. What is their research idea closed to

b. Some of the articles that have used the same/similar idea

c. Some of the articles that have used the different/ideas

d. Reasoning why the authors have believed their idea could result in better findings

Answer: Due to the challenge of data access, we have a total of 47 OWA data of the Napahai wetland during the period we considered, which has the characteristic of non-equidistant time series. The routine modelling methods for the usual equidistant time series data cannot be applied directly here, but we borrowed the idea of difference to deal with time series data and generated dependent variable AD and independent variables TI and AP for model construction. Based on what we know, all the references to use data-driven models for Karst flood prediction are related with equidistant time series data. We are the first one trying to construct data-driven model for non-equidistant data. The details can be found in the new version Introduction and Research Idea part of the paper.

2. Original data collection

a. Access to original data

b. The decision to group the original data in reliable and not reliable ones

c. Methodology of processing the data before making them part of the empirical models

Answer: The original data includes daily precipitation acquired from local meteorological station and 47 scenes of Landsat images in rainy season from 1987 to 2018. The daily precipitation data is reliable.

Most open water surface (OWS) data are highly reliable because of data source consistency, high data quality (cloud cover less than 5%, etc.), unifying preprocessing, and ground validation. The 3 scenes of OWS extracted from the Landsat7 ETM+ slc-off data brought some uncertainty to the original data caused by the scan line corrector failure of the satellite. But the images were repaired by the NSPI method, which was a widely accepted method for Landsat7 ETM+ slc-off image repairing. The figure.1 below shows an example of the image before and after the repairing of the images in

Napahai wetland. Compared with other OWS data, the reliability of these 3 scenes of OWS were relatively low.

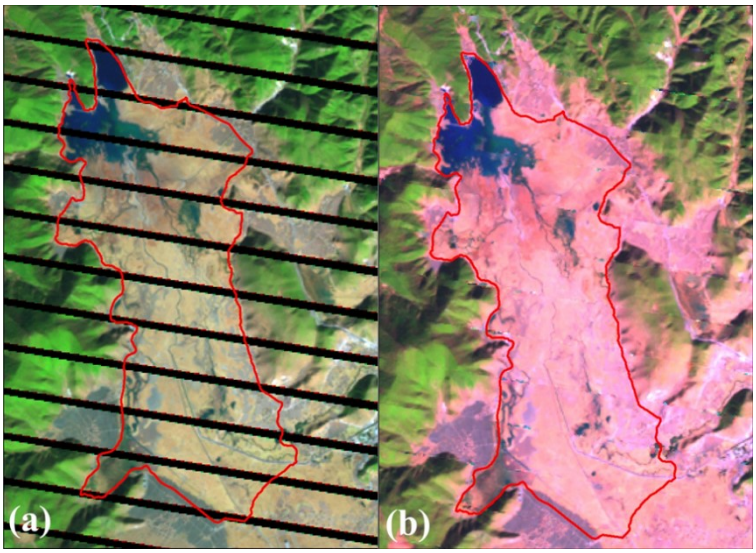

Figure1. one example of image before and after the repairing

We used MNDWI method to extract the OWS. When using MNDWI to extract OWS, it is necessary to detect the boundary of the wetland open water through field survey (as shown in figure 3 of the new version of the manuscript), for determining the threshold value of OWS extraction. The OWA is the area of the OWS, and can be read directly from the OWS. More details can be found in the Original Data.

3. Empirical model construction

a. Selection of the empirical model (what are the fundamentals and literature review done by the authors in order to choose the 2 proposed models

b. Limitation of these models regarding the specific topic

c. What have the authors done in order to minimize the errors in the findings

Answer: In the literature review part, we introduced there were three categories modelling methods for Karst wetland. Physics-based distributed hydrodynamic models, data-driven models and semi-distributed models. Due to the lack of data, physics-based distributed hydrodynamic and semi-distributed models cannot be applied here. Considering the characteristic of non-equidistant time series of the original data, we

made the difference of the data at first and got the variable AD, TI and AP. After that, we chose two models: piecewise linear regression model and decision tree. Our logic for model selection is as followed: classic regression model and machine learning are main types of data-driven models. Usually, machine learning methods have better prediction than classic regression methods, but classic regression methods could provide easy and clear interpretation based on the regression results. Our discussion part also verified it. In practice, we care about both prediction accuracy and result interpretation. Therefore, we decided to choose one classic regression method and one machine learning method simultaneously. Based on the descriptive analysis, we could see clearly there is no linear correlation between AD and TI, but a piecewise linear correlation. Therefore, we chose piecewise linear regression model as one model in the end. As for the decision tree, we explained in the Research Idea part that it's the most accurate method to predict this data set among the common machine learning methods. In the Decision Analysis part, we proposed one decision strategy combining the two models in application.

In validity of the findings part:

1. ***It is essential to reorganize the research idea together with the empirical models and at the final stage of the research to propose a wetland flood prediction model that better fits the analyzed area rather than a comparison of the two models their selves.***

Answer: We reorganized Research Idea, Empirical Models and added one section called Decision Analysis. Besides prediction accuracy, we also care about result interpretation in practice. This is one reason why we keep the two models. Another reason is we combined the two model to propose one decision strategy for local water manager for making decisions.

In Additional comments part:

1. ***The language and the organization of the text have to be improved/reorganized if there would be a decision for this article to be published.***

Answer: We did some effort on the language and organization in the new version.

Reviewer #2

<u>In basic reporting part:</u>

1. …However, it is very difficult to understand the words in this manuscript, so I suggest this manuscript need be polished by a fluent English speaker.

Answer: Thank you for your suggestion. The manuscript has been polished by a native English speaker.

2. I think authors need rewrite the introduction. You did not collect what different researcher do, but you need conclude their research and upgrade the mechanism on karst wetland. Moreover, I even did not know what authors want to do and what your hypothesis is.

Answer: Thank you for your suggestion. We did rewrite the introduction especially for the literature review. We proposed our question at the end of introduction.

3. Method section, if authors have sampled in the Napahai Wetland? It looks you did not test and calibrate the simulated results by model.

Answer: In the study, we tried to build two data-driven models for the flood prediction rather than using a well-developed hydrological model. Because the karst wetland was lack of basic monitoring and hydrological data, the only adaptive data for the model building in the study area were the OWA derived from Landsat remote sensing images and the local daily precipitation. So based on these data, a piecewise linear regression model, for its better interpretability, and a decision tree model, for its better prediction, were built to supporting the decision making of the local water managers. Therefore, there is no need to calibrate the results by models.

In Results section, we did a comparation of the predicted values and the extracted values (which could be seen as the real measured value), shown in figure 9 and figure 11 (in revised version of the manuscript). These parts could be seen as the test of the models.

4. It lacks of enough discussion linked with the area and water source change in the Napahai Wetland.

Answer: We revised the section Overview of the Study Area this time and added more discussion related with the area and water source change in the Napahai Wetland.

5. There were very low-quality figures and tables.

Answer: We added two figures and made some change to the tables.

<u>In Experimental design part:</u>

1. ***No data descriptiton and uncertainity.***

Answer: We revised the section Original Data, and explained in detail how we accessed data, which data is reliable and which not, and what kind of methods we used to improve data reliability etc. Data description can be found in Original Data, Descriptive Analysis of Empirical Model Construction.

Reviewer #3

<u>In basic reporting part:</u>

1. I think the knowledge gap needs to be better explained. Also, the authors should explain why wetland karst matters. Instead, authors more focused on wetland in general that makes the manuscript does not have strong background for the research. Limited cited literature (such as in L53) related the topics addressed confirms this flaw.

Answer: Based on the above questions, we rewrote our Introduction, Research Idea. Please check the new revision.

2. Authors also shall focus how to deliver the message clearly as in current form seem lack coherency among paragraphs.

Answer: Thank you for your suggestion. In the new version of the manuscript, we tried to improve coherency among paragraphs and hired an English speaker to polish our language.

3. I don't understand what the meaning this phrase 'precipitation is a stable and reliable data source' (L78). In all hydrological modeling, precipitation is the main input data as clearly stated in L80-81.

Answer: The above sentence was deleted in the new version of manuscript.

4. The last paragraph of the intro is confusing; what kind of message is like to deliver? Also, it didn't clear where is the authors idea and which ones is not (refers to citation). I think in the current form, the manuscript needs substantial revision on writing style and structuring the texts. Further, the manuscript lack of discussion why the research matters to give the readers a sense of worth findings, and how the findings differ with others.

Answer: We rewrote the Introduction, Research Idea and Original Data. Based on what we know, we are the first one to build data-driven models for non-equidistant time series data of Karst wetland flooding prediction. We tried to afford to the readers some strategy for non-equidistant time series modelling due to the data acquisition challenge which in common for Karst flood prediction.

5. L119 ‘… the once- …’ what is it?

L 125 Research ideas?

L157 Data editing or data manipulation?

L204-218 is for Method section

L221 there was not any method related to suffering from wetland flood.

L262 challenging?

Answer:

1. L119 ‘… the once- …’ what is it? Means it happened once in twenty years. We deleted it in the new version.
2. Research Idea.
3. We changed the title to “Data transformation”.
4. We moved the definition of R^2 to the Empirical Model Construction part in Materials & Methods section.
5. We revised the discussion section.
6. We revised the discussion section.