Responses to the comments of Reviewer 2:

► Overall Comment

The paper aims to use the KLR technique to demarcate river cross-sections from point cloud data obtained from UAV photography. The authors apply the KLR technique to two case studies in Korea and compare it with other regression approaches, such as polynomial regression and LOWESS. They propose KLR as an alternative method for demarcating river cross-sections with point cloud data.

Response ◄

The authors appreciate this reviewer insightful comments. The authors tried their best to improve the quality of the current manuscript following the provided comments from this reviewer. Hope the modifications satisfactory to this reviewer.

► Major Comment1

The paper structure could be improved, and the length could be reduced. The paper should focus more on the main contribution of the study, which is the KLR technique, and describe other regression methods briefly and only for comparison purposes.

Response ◄

The authors appreciate this comment. The number of figures were shortened by merging the figures. Now, the number of figure are now 16. In addition, the section 2.3 about LOWESS was shortened much as commented. The section 2.1 about the polyfit is already short enough.

► Major Comment 2

Is the heuristic approach based on Eq. (10) better than cross-validation or other methods for selecting K value?

Response ◄

The authors appreciate this insightful comment. The Eq.(10) is the heuristic approach. One can apply cross-validation and other estimation methods. However, the number of datapoints are too

much to handle the CV-based methods. Also, this heuristic approach method has been often employed for KNN applications. Therefore, this heuristic approach was chosen and an appropriate multiplier was selected from the experiment in the current study. The manuscript was improved as the following to explain this discussion.

For selecting the number of neighbors *k*, cross-validation (CV) based methods such as Generalized Cross-Validation [*Lall and Sharma*, 1996] are available. However, the number of data points is extremely large to apply CV-based approaches consuming long computational time. Therefore, a heuristic approach for estimating *k* for the KNNR model given by $k = \sqrt{n}$ [*Lall and Sharma*, 1996; *Lee et al.*, 2010; *Lee and Ouarda*, 2011] was applied in the current study. The heuristic approach for KLR was tested in the current study with the multiplier as:

$$k = a\sqrt{n} \quad (10)$$

where *a* is a multiplier and is a positive integer (i.e., 1, 2, 3, 4). In the result section, the appropriate multiplier was suggested for real applications.

► Major Comment 3

The authors should justify the need for using the KLR technique to demarcate river cross-sections from point cloud data. From line 80-82, it is stated that "the dense cloud point dataset obtained from UAV aerial surveying and the SfM technique mostly contains errors and does not provide direct cross-sectional information". However, from the results, it seems that the point cloud data already describes the cross-section very well. What is the advantage of using KLR overusing the mean or median of the point cloud data?

Response ◄

The authors appreciate this insightful comment. The introduction section was improved accordingly to explain the usability of the KLR for UAV aerial surveying data s

In UAV aerial surveying applications for river management and flood analysis, the demarcation of cross-section of a river is critical. Accurate demarcation of the cross-section is mostly required to calculate peak discharge and flow amount. From this calculation, riverbank is designed to prevent overflow from the designed floods of the cross-section. Inaccurate demarcation of cross-section might lead overestimation or underestimation of the current flow amount. However, the dense cloud point dataset obtained from UAV aerial surveying and the SfM technique mostly contains errors and does not provide direct cross-sectional information. An appropriate technique to demarcate the cross-section from the point cloud dataset is necessary to develop. Furthermore, the demarcation process with the point cloud dataset can be used to develop an automated

procedure to extract cross-section densely along a riverbank. This procedure enables flood-risk managers to analyze the entire riverbank of a basin to find the most vulnerable point (Lee et al., 2022).