

Dear Reviewer#1,

We appreciate your thoughtful and constructive feedback, which has greatly improved the quality and clarity of our manuscript. Below, we provide detailed point-by-point responses to all comments. Your comments are presented in **bold**, and our responses are given in regular text.

Sincerely,

Zhuoxin Chen (on behalf of all authors)

General comments

1. Overall summary: This study by Chen et al. aims to understand how gullies influence nutrient transport under different rainfall conditions. This research is ethically sound, scientifically valid, and technically accurate. Additionally, the methods are clear, making this reproducible. Overall, the paper is well-written and not too long, and the authors do a good job of describing why this research is important. I recommend professional English-language editing to improve clarity and consistency, especially in the abstract. For example, the term gully is repeatedly used as a plural noun; this should be corrected to gullies throughout the manuscript. Consequently, I have restricted my language-related comments and focus on the scientific content. Minor comments are listed below.

Response: We sincerely thank you for your positive and constructive evaluation of our study. We appreciate your suggestion regarding professional English-language editing and will carefully revise the manuscript to improve clarity and consistency. Regarding the use of “gully” versus “gullies,” our

original intention was to use the singular form when referring to the influence of an individual monitored gully on dissolved nitrogen and phosphorus transport, and the plural form when discussing broader, regional-scale implications. However, we acknowledge that this distinction may not have been sufficiently clear and could potentially cause confusion. We will therefore carefully review and standardize the terminology throughout the manuscript to ensure grammatical accuracy and consistency. We appreciate your helpful suggestion and will further refine the manuscript to enhance its clarity and rigor.

Specific comments

1. Minor Comments: L17: Define ammonium and nitrate before acronym use.

Response: We thank you for this helpful comment. We will define ammonium and nitrate at their first occurrence before introducing the corresponding acronyms in the revised manuscript.

2. L42: Perhaps a photo (could be supplemental) of a gully could be useful here.

Response: Thank you for this constructive suggestion. We agree that field photographs can provide a more intuitive understanding of gully morphology and activity. Following your advice, we will include an unmanned aerial vehicle (UAV) image of the gully in the Supplementary Materials. We have accumulated extensive visual materials from previous field surveys. For example, one of our earlier studies on gully morphological characteristics and their controlling factors, published in *Earth Surface Processes and Landforms*, was selected as a cover article, and the cover image clearly illustrates the destructive nature of gullies and their hydrological significance

(<https://onlinelibrary.wiley.com/doi/10.1002/esp.70002>). In addition, based on comments from the community, we recognize the need to further clarify the activity status of the gully in Lines 101–110. Field photographs provide direct and convincing evidence of ongoing headcut retreat and exposed gully slopes. Therefore, we will also add two UAV photographs to Fig. 1 in the revised manuscript to better demonstrate the gully’s active condition and geomorphic features. We sincerely thank you again for this valuable suggestion. For readers who are not directly engaged in gully erosion research, the inclusion of field photographs will serve as an important and helpful supplement, facilitating a clearer and more intuitive understanding of gully function.

3. L79-80: Define ammonium and nitrate before acronym use.

Response: We completely agree with you. We will define ammonium and nitrate at their first occurrence before introducing the corresponding acronyms in Lines 79–80. Based on this, we will check the abbreviation usage throughout the text.

4. L118: How did you determine how much erosion occurred? Is this using the equation below, or did you ever measure suspended sediments? And what was the threshold for “significant” here?

Response: We thank you for pointing out this issue. We intended to indicate that only rainfall events under natural conditions that generated clearly observable surface runoff at both the gully head and outlet were included in the monitoring dataset. We agree that the previous wording was not sufficiently precise and will replace “significant” with a more appropriate term (such as measurable or clearly observable) to improve clarity.

5. L157-163: I recommend putting the sentences that describe the types of rain (A/B/C) first, followed by the type A was dominant, followed by B and C sentence.

Response: We fully agree with your suggested revision. After comparing it with our original structure, we found that your proposed logic presents the ideas more clearly and improves the overall flow of the text. We sincerely appreciate this helpful suggestion.

6. Results (general): I am finding it difficult to remember the differences in the types of rainfall (A, B, C). Perhaps you can call them something different or redefine them in the captions of the figures?

Response: We sincerely thank you for this valuable suggestion. We agree that using simple alphabetical labels (e.g., A, B, C) may reduce clarity and make it difficult for readers to distinguish among rainfall types. Following your comment, we considered adopting more descriptive abbreviations, such as LER (Low-Erosivity Rainfall), SHI (Short-duration High-Intensity Rainfall), and LDR (Long-duration High-depth Rainfall). However, we recognize that even these abbreviations may not be sufficiently intuitive. To further enhance clarity and readability, we plan to revise the relevant figures by introducing distinct graphical symbols for each rainfall type. Specifically, the size and number of raindrops within the symbols will visually represent differences in rainfall intensity and erosivity. We believe this visual approach will make the classification more intuitive and improve overall readability.

7. Figures (general): In any figure with multiple panels, please define each letter in the caption.

This is also a lot of figures, and a lot of information. Some of the figures only have a couple of sentences describing their results. I would recommend moving a couple of these to the supplemental, in order to make this an easier read and reduce redundancy.

Response: We sincerely thank you for this constructive comment. We fully agree that some subfigures lack sufficient description. In the revised manuscript, we will add clearer explanations in the figure captions to improve clarity. In addition, we agree that some figures (e.g., Figs. 8 and 9) could be moved to the Supplementary Material, as they provide supporting analyses rather than the core findings of the study. We will revise the figure organization accordingly.

8. Figure 11: Type C relationships seem to be driven by a single point. Did you check if this is an outlier? Also, these all have regression lines on them. Are they all significant relationships?

Response: We thank you for this careful observation. In this study, Type C rainfall corresponds to high-erosivity events. During the two-year monitoring period, one relatively extreme rainfall event (100–200 mm) was recorded, which appears as the high-value point in Fig. 11. Based on long-term local rainfall characteristics, such events occur roughly once every three years. Therefore, rather than representing a spurious outlier, this data point reflects a naturally occurring high-magnitude rainfall event and enhances the representativeness of our dataset by capturing both regular (Type A and B) and relatively extreme (Type C) conditions. In Fig. 11, the regression patterns differ substantially among rainfall types. As commonly observed, the relationship between nutrient flux and rainfall amount follows linear or power-law forms. The notably steeper slope under Type C rainfall indicates a disproportionately stronger response of nutrient loss to incremental rainfall, highlighting its enhanced erosive and transport capacity compared to the more frequent rainfall types. We will clarify this

interpretation in the revised manuscript and explicitly report the statistical significance of all regression relationships in the figure caption.

9. Discussion (general): I think the discussion could be a bit longer. There are so many results, and I think you could pull more from the literature to place this into context and provide suggestions for future research.

Response: We fully agree with your suggestion that the Discussion section can be further strengthened. In the revised manuscript, we will expand the discussion by incorporating additional literature to better contextualize our findings. For example, we will include comparisons with artificial drainage ditches to clarify the distinct hydrological and geomorphic characteristics of naturally formed gullies. In addition, we will broaden the literature review to include studies from other regions worldwide addressing gully-mediated nutrient transport, not limited to dissolved forms, in order to enhance the breadth of the discussion. Furthermore, we will add a dedicated paragraph in Section 4.3 outlining potential directions for future research based on the findings of this study. We appreciate this valuable suggestion and will revise the Discussion accordingly.

10. Conclusion: Most of the conclusion is just repeated from results. I think you could cut it down to just the last couple of sentences.

Response: We fully agree with your suggestion. In the revised manuscript, we will streamline the Conclusion section by reducing repetitive descriptions of the results and focusing on synthesizing the key findings. We appreciate this helpful comment.