Response to Editor and Reviewers

Re: egusphere-2025-5839-R2

Title: Regulatory role of permanent gullies in dissolved nitrogen and phosphorus transport under different rainfall types

Dear Dr Tarasova and reviewers,

We sincerely thank you for your careful handling of our manuscript and for your constructive guidance. Your comments, together with those of the reviewers, have greatly helped us improve the manuscript. We have carefully reviewed all comments and revised the manuscript accordingly.

Sincerely,

Zhuoxin Chen, Mingming Guo

Comments:

Q1. Public justification (visible to the public if the article is accepted and published):

Both reviewers agree that the revisions improved the manuscript greatly. I very much agree with the reviewers and commend the authors on their efforts to improve the manuscript. However, I request a few technical corrections before the acceptance of the manuscript:

1. Please make sure that every element of the equation 1-3 is explained in the text.

2. Please add the uncertainty bounds/confidence intervals for the fit in Figure 8 and Figures 9 (my concern is a potentially high uncertainty in the right side of the plot due to very few points with high concentration and high rainfall depth - this has to be transparently communicated to the readers). Consider also using log scale to make the left hand side of the plot where most of the points are more visible.

3. Please also follow up on the note form reviewer 2 regarding passive and active voice consistency.

I am looking forward for your corrected manuscript.

Best regards, Larisa Tarasova

Response: Thank you very much for your positive evaluation and for these additional helpful comments. We are grateful for your recognition of the improvements made in the revised manuscript. Following your suggestions, we have carefully checked the manuscript again and made the corresponding technical revisions.

(1) Based on your suggestion, we have ensured that every symbol in Eqs. (1)–(3) is clearly explained in the text.

rainfall types on dissolved NH_4^+, NO_3^-, and P transport fluxes, five parameters were selected for cluster analysis: rainfall depth, duration, average intensity, maximum 30-min intensity, and rainfall erosivity. The calculation of rainfall erosivity (*RE*, MJ mm ha^{-1} h^{-1}) is shown in Equations (1)–(3):

$$RE = K_e \cdot I_{30} \quad \cdots\cdots (1)$$

$$K_e = \sum(P_r \cdot E_r) \quad \cdots\cdots (2)$$

$$E_r = 0.29[1 - 0.72e^{-0.082 i_r t}] \quad \cdots\cdots (3)$$

In Eq. (1), K_e represents the total kinetic energy of a rainfall event (MJ ha^{-1}), and ~~.~~ I_{30} denotes the maximum rainfall intensity in 30 min (mm h^{-1}); In Eq. (2), P_r represents the ~~total~~ rainfall amount of segment ~~during the event~~ r (mm); and in Eq. (3), *Er* denotes the unit kinetic energy during rainfall segments *r* (MJ ha^{-1} mm^{-1}). Here, *r* = 1, 2, ..., n refers to the consecutive rainfall segments within a single rainfall event, which were defined according to the temporal variation in recorded rainfall intensity; and i_r is the rainfall intensity during ~~the consecutive~~ rainfall segment *r* (mm h^{-1}).

(2) We have also added 95% confidence intervals to the fitted relationships in Figs. 8 and 9 to more transparently show the uncertainty of the regressions, especially at the higher end of rainfall depth where the number of observations is limited. To better display the differences among the data and improve visual clarity, we applied a log10 transformation to the y-axis in Fig. 8 and to the x-axis in Fig. 9. We found that applying a y-axis transformation in Fig. 9 would compress the differences among rainfall types and weaken the visual contrast that this figure is intended to show. We therefore retained the original y-axis scale in Fig. 9, applied a log10 transformation only to the x-axis, and added the 95% confidence intervals.

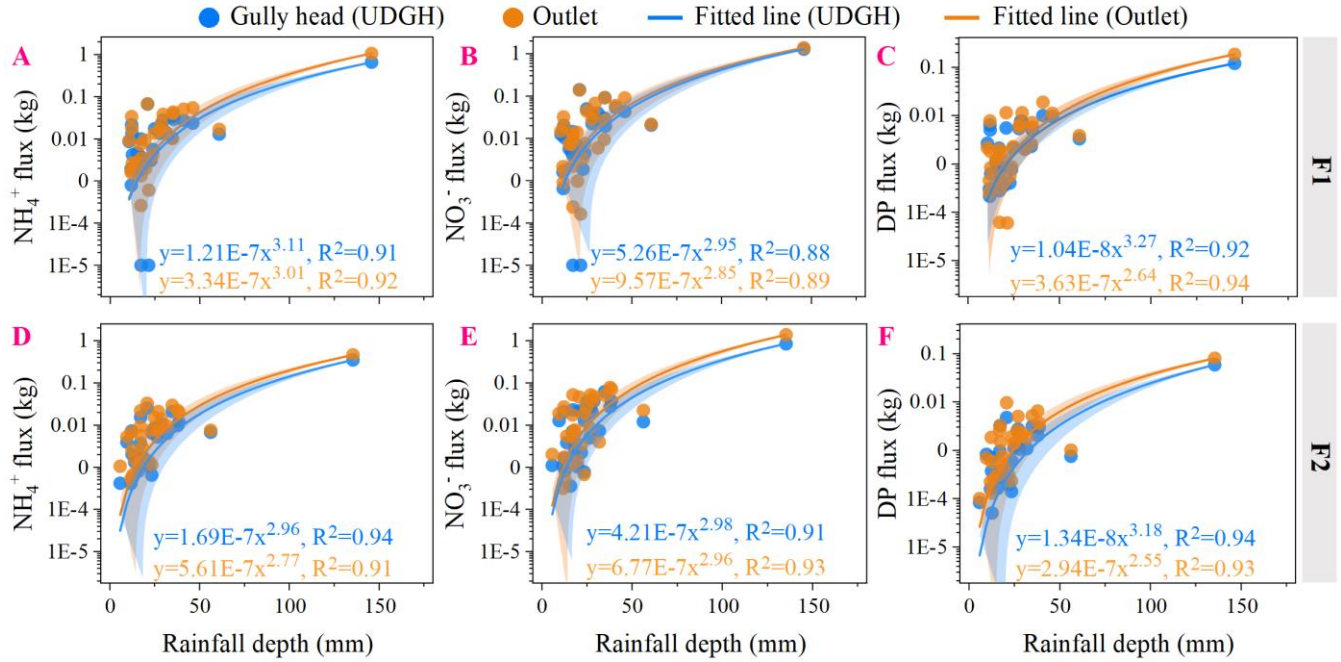

Fig. 8 Differences in the response of dissolved NH_4^+, NO_3^-, and P transport fluxes to rainfall depth between the gully head and the outlet. Solid lines indicate the fitted regression lines. The orange and blue shaded bands indicate the 95% confidence intervals of the fitted lines for the outlet and gully head, respectively. (A–C) F1 catchment; (D–F) F2 catchment. Abbreviation: UDGH represents the upslope drainage area of the gully head.

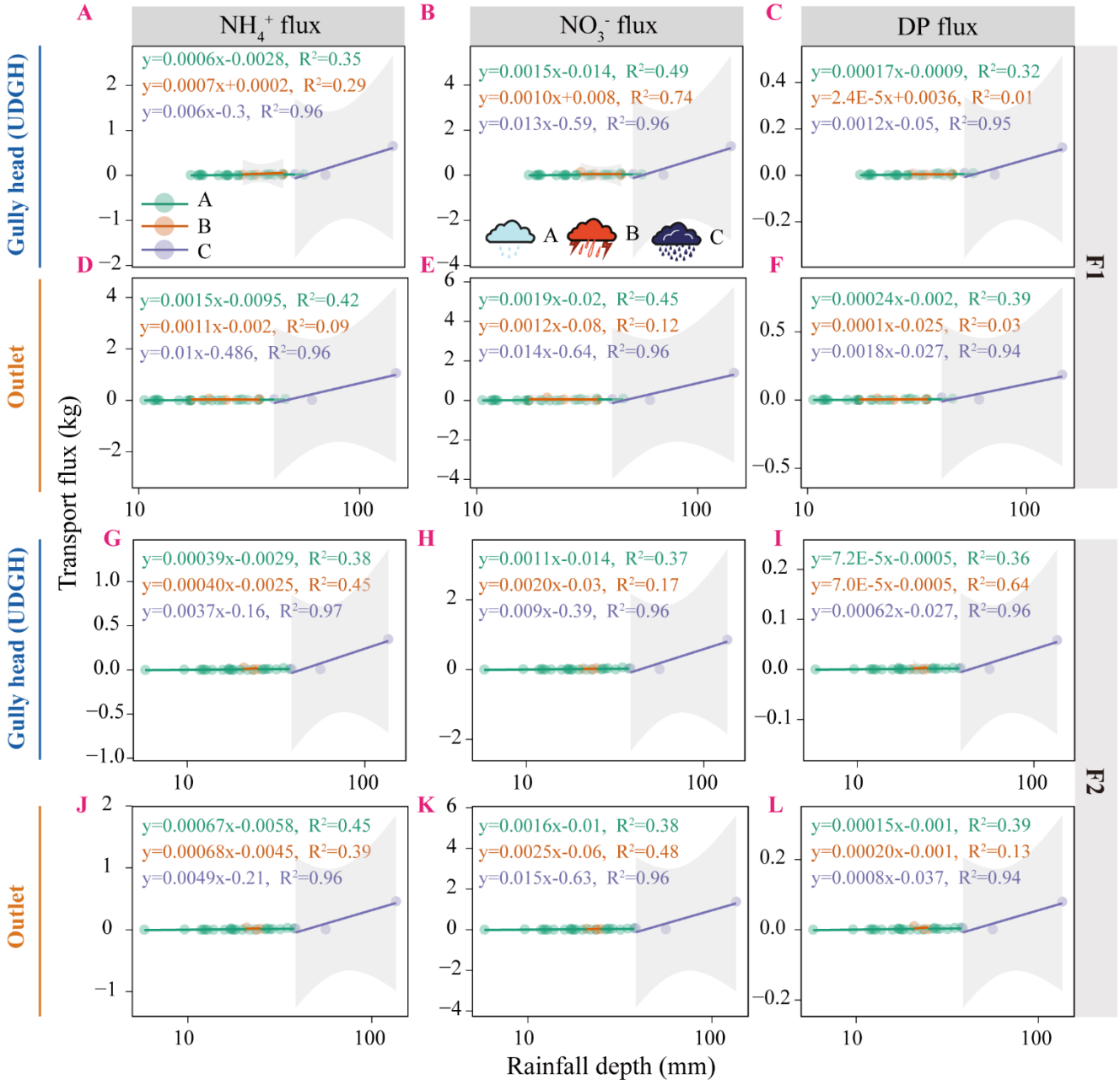

Fig. 9 Differences in the response of dissolved NH_4^+, NO_3^-, and P transport fluxes to rainfall depth under different rainfall types. Solid lines indicate the fitted regression lines. The gray shaded bands indicate the 95% confidence intervals of the fitted lines.

(3) Thank you very much for this helpful comment and for your positive assessment of the revised manuscript. We have carefully rechecked the manuscript and revised the wording throughout to improve consistency, readability, and overall flow. In doing so, we aimed to maintain a more consistent writing style across sections. In general, we used a more direct style in the Introduction, Results, and Discussion,

where clarity of interpretation is especially important, while keeping the Methods section stylistically consistent in its description of procedures and measurements. We also revised sentences where unnecessary switching between active and passive constructions affected readability. In addition, we carefully corrected other minor language and technical issues throughout the manuscript. As these revisions are distributed throughout the manuscript, we do not repeat them here in detail. We kindly refer you to the revised manuscript for the corresponding changes.