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Reply on RC1

Guosheng Duan and Haifei Liu

Author comment on "Regularity of transportation for cohesive bank-collapsed materials"
by Guosheng Duan and Haifei Liu, Earth Surf. Dynam. Discuss.,
<https://doi.org/10.5194/esurf-2021-97-AC1>, 2022

Dear Editor,

We would like to thank editor and reviewers for carefully reviewing the manuscript entitled
**"Regularity of transportation for cohesive bank-collapsed materials"
(esurf-2021-97)**.

We very much appreciate editor and reviewers for their positive and constructive
comments and suggestions. Below is our response to all individual comment/suggestions.
We hope that the quality of the manuscript is greatly improved. If you have any questions
about this paper, please do not hesitate to let us know.

Thank you and best regards.

Yours sincerely

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Detailed responses to reviewer 1's comments

We appreciate the reviewer for the constructive comments to our manuscript entitled
**"Regularity of transportation for cohesive bank-collapsed materials"
(esurf-2021-97)**. We have made the revisions as suggested. Please see our point-to-
point responses below (our responses are in **blue color**).

- Line 37, "Langendoen & Simon,2008", suggest adding blank before 2008.

RE: We have added "blank" before 2008.

- Line 65, "Rijin and Leo", suggest changing and to &.

RE: We have changed "and" to "&".

- Line 100, "(45°, 60°, 75°, 90°)", ensure consistent formatting of commas.

RE: We have changed "(45°, 60°, 75°, 90°)" to "(45°, 60°, 75°, 90°)".

- Line 110, suggest changing "propeller" into "propeller-type current-meter", "shows" to "showed".

RE: We have changed the writing.

- Line 131, in Table 1, for each group of the experiments (No.1, 2, 3, 4), there were two "Flux" and "Water discharge time", why?

RE: For each group of the experiments, the experiment lasted 1 hour. In the first 30 minutes, one flux was selected, in the following 30 minutes, another flux was selected. And the two fluxes represented dry and flood seasons respectively.

- Line 131, please explain how you design the bank morphology and water discharge time.

RE: Experiments were performed in a 25 m long rectangular flume with a width and depth of 0.8 m (Figure 1). First, bank slopes were designed based on the in-site investigation along the Ningxia-Inner Mongolia reach of Yellow River where the most common bank slopes were "45°, 60°, 75°, 90°"; second, bank toe width of each side was 0.2m which was the half of river bed width, so that bank collapse process could be detailed monitored; third, bank top width was design based on bank toe width and bank slopes.

Water discharge time was designed based on two conditions. First, bank collapse could occur among the water discharge time, so the water discharge time should not to be too short. Second, there is rarely bank collapse at the end of water discharge time, and then it is convenient to calculate the quantity of bank collapse. In addition, several preliminary experiments were performed before the actual experiments to observe bank collapse, then water discharge time was decided.

- Line 137, 153, suggest changing "toe of the bank" to "bank toe".

RE: We have made the change.

- Line 152, in Table 3, for each group of the experiments, there is only one "Collapse amount", does the amount represent the whole collapse amount?

RE: Yes, the collapsed amount represented the whole collapsed amount for each experiment.

- Lines 160, 161, ..., suggest changing the units "Nm⁻³", "ms⁻²" to "N•m⁻³", "m•s⁻²", ...

RE: According to your suggestion, we have made the changes.

- Lines 171-175, please add literatures to support the sentences.

RE: We have added the literatures and the sentences have been changed into "In sediment-laden flow, coarse particles are usually transported as bed loads, while fine particles are transported as suspended loads. Although there were mutual transformations between these two in the transport processes, the quantities of bed and suspended loads transported by the water flow remained roughly the same under certain flow conditions (Qian et al., 1983; Shu et al., 2019)."

- Lines 192-193, Lines 209-213, the units such as "ms⁻¹", "ms⁻²" should be changed to

"m•s⁻¹", "m•s⁻²".

RE: Thank you for your suggestion, we have made the changes.

- Lines 194-198, it's better to add literature to explain why you selected the sediment carrying capacity factor ($U^3 g^{-1} R^{-1} \omega^{-1}$). Please add literatures.

RE: Thank you for your suggestion, the literatures have been added.

Li, J., Zhao Z., and Wu, Y. (Eds): Hydraulics, Hohai University Press, Nanjing, ISBN: 9787563015580, 2001.

Qian, N., Wan, Z., and Yang, J. (Eds): Sediment motion mechanics, Science Press, Beijing, ISBN: 9787030112606, 1983.

- Line 216, Line 242, in Figure 7 and Figure 8, whether the curves were the show of the equations (2) and (7)? If not, it is better to provide trend lines.

RE: Thank you for your careful review. Yes, the curves were the show of the equations (2) and (7) based on the experiment data.

- Line 237, " $\kappa=0.4$, $p=0.3551$, $N=0.72$ ", line 240, " $k_s=2D$ ", suggest adding blanks before and after the equal sign.

RE: According to your suggestion, we have added blanks before and after the equal sign. And the sentence has been changed into " $\kappa = 0.4$, $p = 0.3551$, $N = 0.72$ ".

- Line 238, change "m/s" to "m•s⁻¹".

RE: we have changed "m/s" to "m•s⁻¹".

- Lines 250-251, "sediment suspension energy decreased because of the drag reduction of suspended sediments provided by Zhang (1963)", what does it mean? Please explain the drag reduction of suspended sediments.

RE: Based on the literature (Zhang, 1963), it is pointed out that in sediment laden flow, the increase of suspended sediment content can reduce the energy dissipated by water flow. Then the theory was considered as the drag reduction of suspended sediments in several literatures (Miu et al., 1986; Shu, 2010). The literatures were listed as following:

Miu, H. Criteria for drag reduction of suspended sediment, J. Sediment Res., 2, 73-78, <https://doi.org/CNKI:SUN:NSYJ.0.1986-02-009>, 1986.

Shu, A. Study on efficiency coefficient of suspended load motion in sediment-laden flows, J. Basic Sci. Eng. J., 18, 209-216, <https://doi.org/10.3969/j.issn.1005-0930.2010.02.0003>, 2010.

- Lines 266-275, "There are still limitations that need to be addressed within future research ...". More specific research work should be addressed within future research based on this study, please rearrange this part.

RE: Thank you for your suggestion, we have rearranged this part as following:

There are still limitations that need to be addressed within future research. First, the quantity of the collapsed materials, bed and suspended loads in this study were obtained under specific flow conditions. For the complicity of natural rivers, more bank shapes,

angles and series of flow processes including both dry and flood seasons should be added. Second, although the law of energy dissipation is a promising approach to describe the transportation of collapsed materials, studies of sediment transportation in terms of energy dissipation are usually qualitative. More accurate measurement tools need to be explored and applied to obtain the energy consumed by the bed and suspended loads. Finally, the relationship between quantities and energy dissipation should be studied further to analyze the transportation of collapsed materials and benefit channel evolution prediction.

Please also note the supplement to this comment:

<https://esurf.copernicus.org/preprints/esurf-2021-97/esurf-2021-97-AC1-supplement.pdf>