

Hydrol. Earth Syst. Sci. Discuss., referee comment RC4
<https://doi.org/10.5194/hess-2021-399-RC4>, 2021
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Reply on RC3

Anonymous Referee #3

Referee comment on "Rill Erosion on Slope of Spoil tips: experimental study of runoff scouring erosion in multiple times" by Yongcai Lou et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-399-RC4>, 2021

Review of 'Rill erosion on slope of spoil tips: experimental study of runoff scouring in multiple times' by Lou et al.

A really very good piece of experimental work at a scale sufficiently large to provide insights into field scale processes. Well done!

However, the paper is quite difficult to follow in many places and the English needs a thorough rework, right from the title and onwards. This will need to be done before the paper can be published.

- The introduction sets the scene well. However, the paper neglects the fantastic work done by RS Parker and the work of Schumm, Mosely and Weaver (Experimental Fluvial Geomorphology). It is imperative that this work be examined and referenced in this paper as there are many similarities.
- Also, there is I believe considerable debate regarding rill and rill measurement and characteristics. Given that you used state of the art survey methods, why didn't you extract cross-sections and compare your data with field measured cross-section from material in your local area or from other published data (i.e. from the references above and other data)?
- It was not clear about the rationale and timing of the 3 experiments for each slope. How can you ensure that antecedent soil moisture is the same for all? This is not a show-stopper in terms of experimental method but it really needs to be explained better.
- Line 106-108. What is the relevance of this soil? It seems like it was something that was available, not something that was of interest to the regions? Is this an important regional soil or just something available? Please explain.
- Section 2. Great experimental setup! Its impressive! I really liked how you compacted the soils. This is a world class setup.
- Section 2.4.1. While I can understand why you are doing these calculations, they are

not really fully utilised or useful without seeing and understanding rill cross-sections. This is needed to be included. It seems that they are included without being of great use.

- Line 218. What's the timing between runs? Was any new material added or did you just start from the previous surface? Was there a crust, armour?
- Section 3.1 is quite difficult to follow as the first paragraph discusses runoff rates and their variability and then jumps to rill growth then jumps to equations of runoff rate (RR). I don't follow why you have fitted equations for RR as I struggle to see where and how it's used later? Also, I don't understand what N (scouring time) is? Is this start of the rill incision? Rill growth? Data on rate of rill growth would be interesting and useful
- Line 248. 'number of scouring'?
- Equation 9. Is this the best fit for all slopes? While interesting, this should be scaled for area and compared with other studies.
- Figure 5. The 2mm runoff has quite a bit of scatter and in some cases more than the 2.4mm. Can you suggest why?
- Figure 14. Interesting that rills developed at the top of the slope for the 32degree slope and not the others. Why? Would be very helpful to show some cross-sections.
- Figure 8 and accompanying text. I really struggled to see what this is demonstrating and ultimately where it is going.
- Equations 10,11 and 12. Some great work here but how does this compare to what others have found and for other soils?
- I struggled to put Sections 3.4.1 onwards into context.

Overall some fantastic experimental work here that deserves to be published. With a better structure and the work placed in context the paper would be of high interest.