

Interactive comment on “Assessment of land use impact on hydraulic threshold conditions for gully head cut initiation” by Aliakbar Nazari Samani et al.

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Received and published: 22 May 2016

Specific comments 1. Lines 114-116 says that "the experiment was started with low discharge (0.75 liter per second) then increased to high discharge so that the head cut could be observed". First, information about how the discharge increased from low to high discharge gradually is better to be given here. Further, in my view, the three experiments are better to have same runs and same discharge in each run so that the experiments can be more comparable and scientific. However, this study designed different runs and discharges for the three experiment land (Table 2). Please explain why design in this way.

– The main objective of this study was to determine of threshold condition for head cut
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initiation. This threshold is different under different land use, therefore we had to follow the land condition. In fact a given discharge in one land use could not be applied to another due to slope and land cover variation. Moreover, the situation of land in three treatments was not the same and consequently we have to pursue different runs. We increased the discharge gradually, and after each run the surface of flume was monitored. In lines 124-133, we explain this issue in details.

2. Line 144-146 states that "A total of four, seven and five runs were conducted on the rangeland, dry farming and abandoned land respectively to reach the mentioned threshold of head cut initiation". But there are 6 runs shown in Table 3 for the dry farming land. Please check.

– The Authors would like to appreciate such realistic and accurate view-point from the reviewers about the data reporting. In fact, the table 3 is related to the head cut initiation. As stated in the text, seven runs were conducted on the dry farming. The sixth and seventh runs were very similar; therefore we decided to neglect the sixth run for the head cut initiation. In addition, after the 5th run, the flow exceeded the threshold condition. We have added these information in the revised manuscript. Also, we consider this point and completed the data in the table 2.

3. Lines 154-156 stated "the land covers in dry farming and abandoned lands increased the surface roughness and indirectly caused the decrease of Re by decreasing the flow velocity." So my question is that the flow velocity used to calculate Re in this study is the measured values or calculated by equation (1)?

– The velocity was calculated. To check the results, surface velocity was also measured by liquid dye tracers. In the revised MS, we focused on the Fr number and the stream power analysis instead of flow type and Reynolds number. Please refer to Section 3.1 page 12 of the revised manuscript.

4. Few references cited in manuscript are from last five years. Please read more literatures in recent years and modify the introduction.

– We tried to find some new relevant references (Zhang et al., 2014; Tekwa et al., 2015). We added some recent literature and correspondingly we carried out some new analysis for stream power and threshold shear stress calculation. There are a lot of literatures about gully erosion, and most of them concentrate on the factors affecting gully processes. However, few studies are available that test the hydraulics condition and gully initiation under field and undisturbed soil condition. We believe that real field data and experiments are needed for understanding the gully erosion process, which is the major sediment sources.

Technical corrections 1. The mathematical symbols in the formulae and in the paper should keep consistent. The "U" in formula (1) is in italics while is in non-italics in other places (say line 125). The "b" in equation (7) and on line 137 is inconsistent.

– The symbols and formula were carefully checked and revised.

2. The Froude number is expressed using "F" on line 126 while using "Fr" on line 150. Please check the whole paper and unify their form.

– Many thank indeed to the reviewers for your precise review. It has been fixed and the Fr is correct.

3. Experiments of the three kinds lands are better to be separated with a horizontal line in Table 2 and Table 3 so that readers can distinguish which discharges or runs corresponding to which land use type more easily.

– Thanks indeed for your great suggestion. The Table was carefully revised fixed (page 21)

4. Please check the sentence on lines 168-170 "However, the discharge needed to create enough energy for incision in rangeland was more than was required for dry farming and abandoned lands."

– Thanks indeed for your suggestion. In the revised MS, the entire paragraph and this specific sentence have been rewritten (page 9, lines 195-203).

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5. The Kc in equation (7), c is subscript or not? Please check.

– Thanks indeed for your suggestion. c is subscript. I had been revised.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2015-462, 2016.

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