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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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Specific comments:

1. The upslope area and slope are two well studied channel initiation thresholds. Since the gully head resembles channel heads in drainage network, I believe studying upslope area of gully heads would be valuable.

– Thanks indeed for your positive comment. The geomorphic threshold (area- slope) are two major parameters. In the line 62 -68 of the revised manuscript, we tried to add the relationship between Are-Slope and shear stress. This subject has been fully considered for this region in the previous study (see reference below). In this research,

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the objective is to use the experimental flume to investigate the effects of land use on threshold condition for gully initiation.

Nazari Samani A, Ahmadi H, Jafari M, Guy B, Ghoddousi J, and Malekian A (2009) Geomorphic threshold conditions for gully erosion in southwestern Iran (Boushehr-Samal watershed). Journal of Asian Earth Sciences 35: 180–189.

2. Did the gully head create a connected network (similar to channel heads that form a channel network)? If yes, I think studying the characteristics (the density, branching behavior and spatial distribution) of the resulted network would be even more interesting than just focusing on the gully heads.

– Thanks indeed for the valuable comment. We fully this point. The initial stage of gullying process is head cut generation with a small size. The nature of our research was based on a experimental flume (15 m), which is located in the area close to gullies network. But none of treated field was the active connected gully network, because we tried to investigate the head cut initiation at the flume scale, where the initial forms and small head cuts were emphasized. The density, branching behavior and spatial distribution can be very important for watershed scale study of gully erosion modelling, which is our next step.

3. The discussion mainly attributes the land cover to the erosional susceptibility of soil, however, I believe, the inïňĄltration is also important here. Land cover affects the inïňĄltration (as simply quantiïňĄed in SCS-CN) and therefore impacts the erosional force (volume and velocity of overland ïňĆow) through the mass balance.

– We are very gteaful to the ctitical comment. The infiltration and soil hydrology are exactly two main components for erosion modelling. In the revised manuscript, the discussion was developed to consider this point using the Q*Fr criteria (Line 256-264). In addition, to create the similar condition between experiments, all of the tests were stablished under the saturated condition with very-very low infiltration. In the new revised manuscript (line 127-135), the method was described in detail. To create a steady flow,

we had to make the infiltration conditions reach to saturation. By this the differences between inflow and out flow was negligible. In the new Fig. 2, such condition was described.

Technical corrections

1.Line 89- “which indicates no signiïňĄcant difference in the soil attributes,. Line 111- To determine longitudinal slope with high precision, Table 2- I suggest represent the results visually in some ïňĄgures. Line169-was more the one for dry farming ... Figure3- The decreasing trend of depth is hard to observe in this ïňĄgure. It is better to plot the depth rather than elevation

– The manuscript has been thoroughly revised. For example the section 3.1 and figure 3 were removed and a new section was added. The table 2 was replaced by three other figures for better visualization. Also in the revised manuscript the mentioned sentences were checked and rewritten.

2.Line 182- There is a typo Line 185- It is better to report P in each ïňĄgure.

– It has been done.

3. Line 187- I think 83 is not correct: b=-Tcr*Kc Tcr = b/Kc=0.3136/0.00038=825

– Many thanks indeed for your correction. We carefully checked it and found it is a typo mistake. In fact for rangeland the Tcr = b/Kc value based on the figure 4 is 0.3135/0.0038 = 82.5. The slope of fitted line is 0.0038 not 0.00038

4. Line 197- How the head imitation shear stress is calculated here?

– Thanks for your question to better calrify the manuscript. In table 3, the critical shear stress for each head cut was calculated by the shear stress equation γRS, where the S and R variables were obtained from measured data according to Figure 2 (in the mid-section of the flume).

5. Section 3.3- It is better to represent Mean shear stress versus Number of heads in

a ïňĄgure and then discuss the relationship.

– In the discussion section of revised MS, the response of land uses to increase of shear stress have been taken into account (Line 429-443). Because of the different land uses' data sets, the plot is not uniform. In addition, plotting the data is not enough as in each land use we have two or three data sets. If we plot whole data within onw graph, it can not show a uniform scatter pattern (see below graph). However, if the respected reviewer believes that this graph is more informative than the table, we can replace it in the final version.

6. Line 278: Kr or Kc? Line 288- delete "the English".

– Thanks indeed for your correction. It is Kc, and it has been revised.

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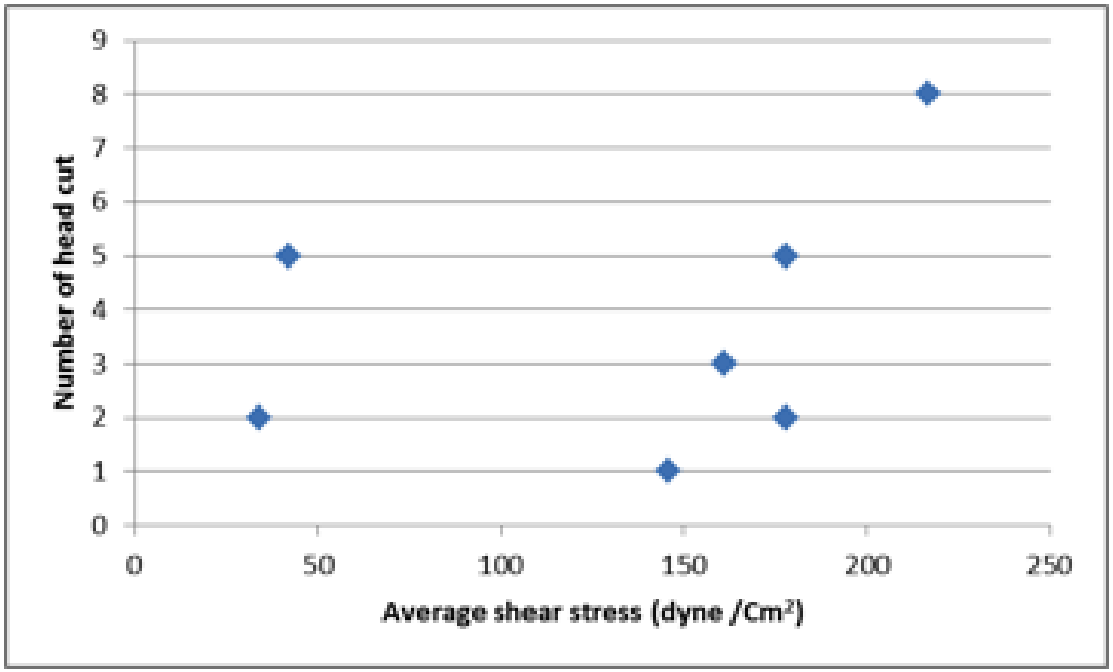

Fig. 1. Relationship between number of head cut and average shear stress

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