Nat. Hazards Earth Syst. Sci. Discuss., 3, C2746–C2750, 2015
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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Effectiveness and efficiency of slot-check dam system on debris flow control" *by* Y. H. Zou and X. Q. Chen

Anonymous Referee #2

Received and published: 21 December 2015

General comments: This paper presents an interesting approach in order to evaluate the efficiency of check dams against debris flow events. Nevertheless, the paper suffers major problems suggesting rejecting the paper. The paper could be accepted, but the authors have to fix all the problems in order to publish it. First of all, the English suffers many problems: sentences are sometimes too long and written with a bad syntax (or maybe these sentences are just incomplete?); the vocabulary is not well suited (see specific comments below) or has to be specified (For example, what is the difference between effectiveness and efficiency?). The paper should be carefully reviewed by a native English-speaker. There are several problems concerning the form: (1) Most of the references cited by authors are not presented in chronological order. Authors should systematically list references within the text starting from the oldest one to the

newest; (2) The introduction is not-well structured. It is difficult to understand clearly scientific questions and main objectives of the paper. You should clearly list, what are the main objectives of your work and what are you planning to do in order to fulfill these objectives; (3) Authors mix in a pretty bad way methodology, results and discussion. They should adopt a clear plan and expose all their "material and method" stuff before the results and discussion. That's not always the case and is unacceptable for a scientific paper; (4) Authors do not systematically add the variables definition (symbol and name) at the end of each equation. This is not helping reader to understand clearly both the equations and the meaning of variables. Due to these problems, Part 3 is just a nightmare to read... Another problem is the lack of crucial information in order to help readers to figure out what are main characteristics of both study area (see specific comments below) and debris-flow events which took place within this watershed. For example, there is no information about geological settings (lithology and tectonic) of the watershed and geomorphological characteristics (presence of soil or superficial formations, active slope erosion areas, etc.). Authors should also precise what is the type of debris flow they are dealing with: granular or muddy debris flows? If they could provide also some physical characteristics of the debris flow deposits/samples, it would clearly help the readers (textural graph or grain-size curves). Specific comments: Line 5-7 (page 5779): another important function of check dams it to contribute to the stability of the neighboring slopes. Line 10 (page 5779): "...intercept all but the fine particles...". I do not understand this sentence, or maybe you have to replace "but" with "except"... Please clarify it. Line 16-18 (page 5779): "... its storage capacity is left available for the very large debris flows." I do not understand this sentence. Line 1 (page 5780): "...proposed (Zhou et al., 2014). In the study, a new way..." When you are talking about "the study..." are you talking about the work published by Zou et al. in 2014, or the work presented within this paper? Line 20 (page 5780): "It covers an area of about 32 km^2..." Well, I try to confront the morphometric values presented both in the text and in table 1 with the map (Fig. 1). You should precise some values. For example, you should draw on your map the location of the apex and give us additional information

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(within table 1): (1) length of the torrent from the source area to the apex, (2) length of the torrent from the apex to the confluence with the main stream (Xiajiang R.), (3) surface of the torrential fan, (4) channel gradient from the source area to the apex and (5) channel gradient from the apex to the confluence with the main stream (Xiajiang R.)... All these additional values will help the reader to figure out the activity of this torrential watershed (usually, active debris-flow prone torrents have a strong difference between the two channel gradients (4 and 5), and the size of the alluvial fan (3) represent usually for active debris-flow prone torrents 20 to 30% of the total surface of the watershed. Line 24-27 (page 5780): You should precise some basic information about the climatic data: - How many weather stations did you use? Please add their location on Figure 1. - When did this (these) weather station(s) has (have) been installed? So, in other terms, what is the duration of the weather parameters chronicles? - What do you mean by "rain shower"? To my point of view, you should provide these information through a synthetic table (mean, min and max annual rainfall), intensity-duration curves for a given return period (2, 5, 10, 20, 50 and 100 if possible), or a graph presenting the variations of annual rainfall since the start of the measurements. Line 2 (page 5781): "The annual rate of rainstorm is 08.-1.5 times per year..." Well, that sounds very rare. So in this study area, you will have more or less 1 rainstorm per year? And, what do you mean by rainstorm? Is this term associated to specific rainfall intensity (> 20 mm.h-1 or whatever...)? Line 6 (page 5781): "The peak discharge of flood with return year of 50 years is 169.2 m3.s-1". How did you get this value? Through the analyses of Q chronicles gathered by an apparatus (discharge measurements, flow height measurements, radar measurements, etc.) in your study area? By using some empirical formulas (if yes, just precise which formula and the parameters you used)? Please clarify it. You should also add within the text some information about the number of debris-flow event observed in this watershed (and so estimate a frequency per year). Line 12-13 (page 5782): "...to the possible surface erosion volume of the region V0". Can you explain what do you mean by surface erosion volume? You want to estimate erosion volume with the help of surface of erosion? (Using thickness of deposits?). Please clarify it.

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Line 1-4 (page 5783): How did you calculate the critical rainstorm intensity? What is the average annual rainfall intensity per 24h? Line 6-9 (page 5784): "...is distance from the dam to the most upstream point of the region". What do you mean by "region"? The entire region? The sub-basin watershed? Please clarify it... Concerning "the coefficient of transport capacity of the slot-check dam", you should provide a graph showing the variation of this coefficient regarding the grain size distribution of debris flows. This would clearly help readers to understand the relationship between these two variables. Line 13 (page 5784): Can you tell us more about the experimental tests? Line 9 (page 5785): "For a stony debris flow..." How did author define stony debris flow? Line 5-16 (page 5786): Maybe I did not understand clearly the author's message here. But, it appears to me that authors do not discuss a critical point: how much slot-check dam should I build in order to minimize the volume of debris flow event? Line 6 (page 5787): Authors start the "Results and discussion" part with a new paragraph concerning the methodology... Furthermore, this "methodological paragraph" is also unclear. What type of field survey? GPS, LiDAR or any topographic measurements? Photographic survey? Others? Authors should define precisely what type of field survey they have conducted, but in a specific chapter concerning "material and methods". Line 15 (page 5787): "The construction of check dams...causes flow perturbation". Indeed, but usually the main torrential flow is derived during the construction in order to minimize such perturbations. Who build these check dams? How did they proceed? Line 21-24 (page 5787): "...the sediments stored within each couple of check dams mainly come from the bank and the lateral slope on both sides of the gully, rather than the bed". And how did authors manage to make such an assumption? Did they make some measurements or photographs before and after the event? Did they try to estimate the volume of each sediment reservoir? One again, authors should clearly explain their methods. Line 10-11 (page 5788): 60% of what? 60% of the total volume of sediment crossing this dam during a debris-flow event? 60% of the maximal check dam volume? Please once again, clarify it. Table and Figures: Table 1: what are Qp=0.5%; Qp=1%, etc... How have they been estimated/calculated? Table 2: A small remark: all the design

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discharges are the same (96.55 m3.s-1) and very low regarding the discharges you have presented in table 1. Does that mean that the individual check dams are not well designed? Figure 1: Authors should add information about the lithology and draw the contour line of the torrential fan (and locate the apex). Figure 2: Please add some scales on the photographs. Figure 5: Authors should also provide the complete length profile of the torrent. This could be useful to better understand the specificities of the stretches armed with check dams. Figure 7: Why the central boxes are drawn within a dot-line box? No information about the optimal number of check dams? I am not convinced this figure is really useful in his actual configuration.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 5777, 2015.

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