

Interactive comment on “Effects of Y-type spillway lateral contraction ratios on debris flow patterns and scour features behind a check dam” by Huayong Chen et al.

Anonymous Referee #1

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The paper by Chen et al. address relevant scientific and technical questions and presents new data of new concepts. They are up to international standards. The scientific methods and assumptions are valid and outlined clearly. The results are sufficient to support the interpretations and conclusions. Some questions remain still unanswered and should be at least considered in the discussion. The abstract provides a concise, complete summary of the work done. Results are clearly presented. The mathematical formulae, symbols, abbreviations and units are correctly defined and used. Figures could be slightly improved. The authors give proper credit to previous and related work. Own contributions are well indicated. Structure and length of the paper is adequate. Technical language and the English is of good quality and understandable.

C1

some remarks concerning the text: p.1, line 2 not sure, if "downriver of a check dam" would better describe the exact location of the scour

p.1, line 11 in cases where debris flow is used in a word composition (e.g. debris-flow pattern, debris-flow nappe) I learned, that there is a hyphen between debris and flow Please check the manuscript accordingly

p.2, line 29 more common is "initiation zone", not "formation region"; delete "by debris flow" at the end of the sentence, it's an unnecessary repetition.

p.3, line 56/57 not really clear, what this sentence means. Do you mean that the proposed geometry of such spillways is something that should be used especially for torrents with high sediment disposability?

p.3, line 58 "is" instead of "was"

p.8, line 165 are the values for the density of the debris-flow densities measured values or assumptions? Both values seems to me more valid for hyperconcentrated flows. I would expect values in the order of 1700 - 1900 kg/m³

Figures:

#1: indicate flow direction and exchange the word "behind" with "downriver of"

#2a: Sabo dam is never use in the text. Use check dam or replace check dam with sabo dam in the text

#5: describe it as "debris-flow hydrograph". If your LRF gave you min, max and mean values, you could perhaps explain the outliers. And: this hydrograph does not really show a typical steep front of a debris flow. It looks more like a hyperconcentrated flood. Again: add information on the sampling rate of the device

#6: add an arrow to show flow directions. Very small images. Perhaps increase contrast.

C2

General remarks:

Scaling effects are not discussed. Please add a section to explain how the results of the experiments can be use in real dimensions. What is the Froude number of your experiments?

I miss a sensitivity study on different debris-flow mixtures (e.g. higher densities, water content variations)

I miss information on the LRF. What is the sampling rate (in Hz) of the device? How are splashing effects handled?

What would happen, if there is driftwood involved? Did you test that or what do you expect in such a case?

Can you say something about abrasion rates and the expected life time of such structures?

On the whole a very interesting and promising paper with nice results and an auspicious spillway design!

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