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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Determination of the runoff threshold for triggering debris flows in the area affected by the Wenchuan Earthquake" *by* P. Cui et al.

Anonymous Referee #1

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The object of this paper is the determination of a critical discharge threshold for debris flow triggering by using experimental data. The authors follow a methodology already used by previous authors. The writer identified the following main deficiencies:

1. The title does not match the work: there is no link between the experimental data used for determining the critical runoff threshold and the hydrologic conditions leading to debris flow triggering in Wenchuan area. 2. Experimental description is very poor. Description of the measurements of debris flow bulk density, flow depth and mean velocity are missing. Also data of these measurements are missing. 3. Critical dimensionless surface discharge threshold proposed by the authors is larger than

experimental data of a previous author. 4. Authors compare dimensionless surface discharge thresholds based on different definitions of dimensionless discharge. 5. English form is not acceptable: some sentences seem without meaning.

Present work is not acceptable in present form. The detailed explanations regarding these points and other spotted errors are as follows:

1) The title should be consistent with the work only if authors compare their laboratory-based threshold equation with discharge values, measured or computed by consistent hydrological modeling, in the debris flows initiation areas in Wenchuan Earthquake zone. They introduce a classical peak discharge design formula without any calculation (eq. 9). 2) The author introduces a dimensionless surface discharge different from that used by Gregoretti, (2000) and Tognacca et al. (2000) because they do not consider the relative density [(ïĄšS-ïĄš)/ïĄš] in their expression. Threshold obtained by the experimental results is compared with the threshold of Gregoretti, (2000) and Tognacca et al. (2000): this is misleading because they mix relationship obtained through different quantities (see above). Moreover, in Figure 7 the threshold proposed by the authors is larger than experimental values of surface discharge that triggered debris flows in flume laboratory provided by Takahashi (1978), although authors underline (page 4668, lines 5-10) the use of material similar to that used by Takahashi (1978). 3) A description of the experiments is missing. For this reason is not acceptable the explanation of the three lines that compose the proposed threshold (see page 4666, lines 3-12). Moreover, is the measured discharge the surface discharge or the total discharge (seepage+surface)? If the measured discharge is the surface discharge, how did the authors measure the seepage discharge? 5) At page 4667 (lines 15-25) author state that Takahashi's criterion is an upper limit after reasoning on erosion of sediment by stream flow and their dispersion all over flow depth. Really Takahashi,s criterion for debris flow occurrence is based on the "geotechnical" equilibrium of a debris layer without any consideration on the hydrodynamic forces exerted by stream flow over the bottom. 6) At page 4669 author refer to runoff calculated at a rainfall frequency of P

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= 99% by eq.(7); equation (7) is the threshold given by Tognacca et al. (2000) so the writer does not understand the meaning of this sentence. 7) Which is the sense of equations (4) and (9) ? They are not used.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 4659, 2014.