Nat. Hazards Earth Syst. Sci. Discuss., 3, C1377–C1379, 2015
www.nat-hazards-earth-syst-sci-discuss.net/3/C1377/2015/

Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Behavior analysis by model slope experiment of artificial rainfall" *by* M. C. Park

Anonymous Referee #3

Received and published: 28 July 2015

Synopsis: The paper presents the results of a model slope experiment aimed at the analysis of the process of slope failure and seepage under rainfall. The experiment has also been reproduced via numerical modelling, in order to compare the experimental and numerical results.

General comments: In my opinion, physical laboratory modelling can be an extremely useful tool to better understand the mechanisms and conditions that lead to landslide triggering, and so I really appreciate the content of the paper, which is also well-structured and mostly well written. However, although I agree with the use of numerical simulations to verify the experimental results, I am not sure what the purpose of the work is. In other words, modelling is a good thing, but the authors should focus on specific questions regarding slope failure, because the text is fairly vague in this respect.

I also believe that further experiments are needed to make the paper acceptable, as suggested by Referee 1. Currently, the lack of further experiments does not allow to interpret some results: in this sense, the section "Results and discussion" need to be improved, as emphasized by Referee 2. If additional experiments are performed, then the authors will be able to analyse in more detail the investigated process, as well as to test the reproducibility of the experiment, in such a way as to exclude potential errors. Finally, I suggest to perform experiments with different initial and boundary conditions, in order to evaluate their importance (as stated several times in the manuscript). Specific questions for the authors to address and suggestions for improvement are reported in the following paragraphs.

p. 4160, line 17. This sentence is a bit generic and needs some references.

Table 1. Modify the table, distinguishing three columns for 1) test type 2) obtained parameter 3) measured value. Use m s-1 for the hydraulic conductivity and kN m-2 for the cohesion. Furthermore, you have to add the call for the table in the text.

Figure 1 and Figure 2. You have to add the call in the text also for these two figures, I would say at the beginning of the section "Material and methods".

p. 4165, line 1. "The artificial rainfall would introduce surface erosion and the formation of gullies". Your statement is correct, but such phenomenon may change the rainfall infiltration process. Is this effect accounted for by the numerical model? If not, I suggest to use a spray nozzle as rainfall simulator, in order to avoid the mechanical erosion by water.

Table 2. Modify the table as suggested for Table 1, distinguishing between soil and crushed stone.

p. 4165, lines 9-17. This part is a bit out of sequence. I suggest to insert it when you describe the slope stability analysis (P. 4166, line 4).

p. 4165, line 15. Replace with "Air entry pressure Ub is"

p. 4167, line 21. Sensor F?

p. 4167,lines 23-24. Figure 4b and f? Did you mean Figure 4 sensor B?

p. 4168, line 9. “However, in the model slope experiment, slope failure occurred later in sensor D” Please rewrite this sentence more clearly.

p. 4168, lines 17-19. I suppose that the time at the start of decrease is similar both for matric suction and water content in the case of sensor A, but it is not clear. Please rewrite this sentence more clearly.

p. 4168 lines 21-27. This part is a bit confusing: which sensors converge to 0 kPa at 165 min (from the beginning of the rainfall)? Are you sure that slope failure occurred 210 min from the beginning of the event? It doesn’t seem so according to Figure 8.

Figure 9. Why phi (the internal friction angle, I suppose) is equal to 33.6? In table 1 and table 2 is 36.9.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 4159, 2015.