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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Stability evaluation and potential failure process of rock slopes characterized by non-persistent fractures" *by* Wen Zhang et al.

Anonymous Referee #1

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The manuscript presents a comprehensive approach that combines several well-established methods to carry out both stability and runout analyses of a fractured rock slope in Laohuding Quarry (Jixian County, China). Specifically, the discrete fracture network modelling technique is performed to generate non-persistent discontinuities according to the fractures collected in the field. Subsequently, synthetic rock mass approach is applied to simulate the slope model using 2D particle flow code software, and a stability analysis is carried out based on the improved gravity increase method. Finally, by analysing 100 slope models generated with different DFN models, the critical slip surface, factor of safety, and accumulation distance are discussed through a statistical analysis.

GENERAL COMMENT As a general comment, the paper is clear, well structured, and accurately describes tools and techniques that are of great interest to those involved in landslide practice. The results of the proposed methodology seem quite promising, but, in my opinion, the weakest point is related to the selected case study, whose slopes seem to be too stable and, therefore, real collapses are not presented nor discussed. These could have been fundamental for reliable validation of the performed analyses, regarding both the triggering and runout phase of the rockslide. My recommendation is therefore: accepted with minor revisions, taking into consideration the following specific comments SPECIFIC COMMENTS L 69-70: Authors state: "These slopes may become hidden dangers (e.g., geological disasters) and pose potential threats to people and nearby equipment". This sentence is in strong contrast with the results from the stability analyses, since the safety factors range from 25 to 75. I'm wondering if the investigated slope is really too stable or the safety factors could have been somehow overestimated. Nevertheless, no event seems to have occurred in recent times from the investigated slope; this is a pity, since real events could have been extremely useful for validating the performed analyses. Why did Authors choose to test the proposed procedure to this slope? L 92-93 and figure 3: the division of the detected discontinuities into sets is rather questionable, since data dispersion is indeed too high. Yet, this should not affect model reconstruction too much, as dispersion is also considered in the generation of artificial discontinuities within the DFN model. L184: I suggest not to take for granted what a "fish function" is; please explain for those unfamiliar with numerical modelling L255-259: The modelling results are nice and look quite reasonable, but without validation they seem to be an end into themselves. Did any real event occur from the investigated slope in recent times? Are there any detached blocks to compare their volume and shapes with the simulated ones? What about their runout? In my opinion the reliability of the proposed procedure needs to be demonstrated. L260: Please change section 6 title, since "stability analysis" has already been used for section 4. Maybe, "Statistical analysis"? L281: please change are 43.5 to is 43.5 L327 and 334: To trigger instability, Authors used the gravity increase method proposed by Meng

et al. (2015). It is not clear to me if Authors made some amendments to this method, or if they used it as is. If so, in my opinion, the method cannot be defined as “innovative”. Figure 1: Fig 1b: image is not clear; I suggest deleting the text superimposed over the image. Fig 1c: if the image contains the window reported in Figure 2, please add the box limits. Figure 7 In my opinion, the picture in picture representation is misleading. If possible, add all the drawings in a single image, otherwise, split in two different figures. Figure 8: to improve image resolution, I suggest cropping the images to the fractured sectors. Figure 9: sometimes the timestep count is represented in decimal notation and sometimes in scientific notation, please uniform.

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