

Interactive comment on “Mechanical State of Gravel Soil in Mobilization of Rainfall-Induced Landslide in Wenchuan seismic area, Sichuan province, China” by Liping Liao et al.

Anonymous Referee #2

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With flume and triaxial tests, this paper investigates the mechanical state of gravel soil in Niujuan valley, Sichuan, China. The authors mentioned that they observed the variation is soil moisture content and pore water pressure, and the macro-micro property. They said to have presented a mathematical expression of critical state of soil. And finally discuss the mechanical state of gravel soil. The topic is very interesting.

However, no new mathematical formulation and model appeared in the text, except for some regression fits. There are several inconsistent statements. Lots of data are presented, great job! But, with much less insights and implications. Both the quality of science and presentation is poor. About 1/2 of the MS is very quantitative and

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geotechnical, while another 1/2 is very descriptive. How do you relate these data to field events? What are the implications for the surface flow process and run-out modelling? These are not very strongly connected. Large part of the manuscript would perhaps better fit to some geotechnical and civil engineering journals than E-Surf. E.g. L137-153; L191-312. Probably these data would be interesting more to geotechnicians, and perhaps less to the audience of earth surface process. Otherwise, strongly justify how this is not the case. The journal and the Editors can decide on it.

The font size is too small. It was very difficult for me to read the print even with the power glasses. Time to time there are > 25 citations at a place! What is the use/purpose of this? This is fully distracting! Why don't you properly utilize the space for useful science/research? I thought the Journal/Editor should also have some initial controls on these and other aspects, at least the basic quality and content of the manuscript, before it is sent for reviews.

English, in general is good, but time to time difficult to follow, often strange, and needs to be substantially improved.

Detailed and critical comments:

L23: "state parameter ..." : The audience would not know this here without explaining what they are.

L26: "forecast": It is not clear, also in the main text, how you could forecast, what does it mean? Can you predict cracks formation and propagation, time, location and scale for forecasting and warning? No method is presented for this. If possible, please explain clearly how you could do that with the data and the models you are discussing.

L31,32: Improve English (ENG.). E.g., were locating → were located, etc.

L36-41: There are > 25 citations here! What is the use/purpose of this? I would suggest to reduce it to about 3.

L42: "Fully understanding": Never possible. Improve writing.

L42-46: Looks like introductory undergraduate text.

L50: "Some of the observed phenomena of landslides": Not clear which?

L53-55: Again, so may citations. Do you need all these at once? Limit to about 3.

L57: Readers would under at this point what F is?

L59: "the intermittent debris flow": what is it?

L60-69: Strange writing. Unnecessary details, some irrelevant, not connected.

L74: "landslide velocity": Which velocity? Initiation, or dynamical until runout? You did not present data and analysis for velocity. Also, the dynamic velocity would, at most, negligibly depend on the initial state you are referring to. Otherwise, present data and analysis to support your arguments.

L75-80: Again, > 25 citations at one place. This is fully distracting! Why don't you properly utilize the space for useful science/research?

L81-80: "the critical state of gravel soil in a seismic area is not exactly identified in the field research": Why does it matter if it is seismic or not?

L96, 102: "large scale", "most of rainfall induced landslides is the shallow landslides": inconsistent presentations. What is large scale?

L103-104: "silt and clay (particle diameter < 0.075mm) is about 2%, which plays the important role in the mobilization of landslide and debris flow": How? Without proof and discussion, statements are useless.

L119: "produced in England": Do you need to say this? Why not to use reference properly?

L127-129: Fig. 1a: Initial shape and wedge angle needs to be discussed, also why chosen this way?

L143: "The mean effective stress p' is equal to one third of the sum of σ_x , σ_y and σ_z ":

Do you really need to say this? There are lots of unnecessary things, making the MS much less professional.

L145: "is the soil bulk density": No!

L156-160: Eng.

L168-175: The yellow lines in Fig. panels cannot be seen. Better, plot in different line styles. Explain why the yellow lines are mostly in between the other lines on the right panels? All panels must be plot for the same x- and y-labels for better comparison. The mechanical and geotechnical reasons for the spacial behaviors seen in these panels are not well explained. Furthermore, how these behaviors influence dilation, landslide initiation, velocity and run-out?

L178: "the landslide can be triggered by rainfall": Show the hydro-mechanical relationship with the above figure. Otherwise, what is the use of the above data?

L184-185: Eng.

L185-186: "For example, when the initial dry density is $1.54\sim 1.63\text{g/cm}^3$, the initiating time of landslide is $30\sim 40$ minutes.": You must relate this with Fig. 6, right panels. No insight about the mechanics and process are mentioned, linked, and discussed. Otherwise, what is the use of Fig. 6?

L191: "expansion of cracks": Show it and the dynamics.

L192: "and rotation": how, where do you see it?

L193-194: "All the above process can lead to the decrease of the void ratio and the increase of the pore water pressure": Not clear how?

L195-196: "When the initial dry density is 1.81g/cm^3 , the slope keeps stable and landslide cannot be triggered by the rainfall even though the fine particles disappear, and the coarse particles are exposed at the slope surface.": This is important. Explain with strength relation.

L196-205: The figure captions don't explain the process in panels, difficult to follow.

L252-254: Difficult to follow.

L262: Is this equation used, and connected to the data?

L266-267: "which can indicate that gravel soil also has the similar principle that the soil with the same grade will shear to reach the same critical void ratio.": But, q and p' differ substantially, explain why.

L269: "The fitting curve": Mainly the fit curves are presented, almost no mechanical and process explanations.

L282-287: Not clear why. Also improve Eng.

L291-292: Fig. 12: What is the difference between filled dots, and open triangles? Also, there is no correlation between them. I don't see the validity of extrapolation. Otherwise, explain these aspects.

L296-298: Does not follow, not clear.

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