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Discussions

Interactive comment on "A model for interpreting the deformation mechanism of reservoir landslides in the Three Gorges Reservoir area, China" *by* Zongxing Zou et al.

Anonymous Referee #1

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General comments:

As a whole, the manuscript is valuable and presents robust data for publication. However, some parts of the manuscipt are completely useless and uncorrect from a theorical point of view, while some other parts require modifications. Therefore, this reviewer suggests a strong re-structuring of the manuscript as well as an improvement of the parts that need corrections. English is generally fine and no significant typing errors have been detected. Here follows some of the main revisions required:

- In the introduction section, the authors should better describe, from a theorical point of view, the problem of rapid drawdown and rainfall infiltration in the landslide equilibrium,

and in particular the role of permeability of the landslide soils and the rate of drawdown. Is this problem related to the type of the soils involved or not?

- In the driving-locking model (Section 2), the authors do not completely account for the general equilibrium of the landslide mass, since they reduce all the equilibrium condition to the single unit vertical slice without considering the inter-slice forces, which do have a role in the equilibrium of the single slice. This is uncorrect, since it affects the location of the locking section. All this section, and the equations here proposed, seems to be a neglection of the slice methods historically proposed in the limit equilibrium approach and in general of the equilibrium theory (the problem being undetermined from a statical point of view and the need of integrative equations to balance unknowns-equations. . .). Moreover, in the limit equilibrium analysis proposed by the authors in the following sections, they use the Morgenstern-Price method, which is a well-known rigorous method and of course takes into account the inter-slice forces. Therefore, the first part of the manuscript is not in agreement with the approach followed in the second part. This reviewer suggests to completely remove Section 2 from the manuscript and eventually to extend the second part (seepage and LE analysis) by including new field or analytical data and relative discussion.

- The distinction between driving section and locking section (I would suggest "resisting section" rather than "locking", if necessary) is not rigorous and can have only a qualitative meaning. Even in the driving section, there is some mobilised strength component along the corresponding portion of the sliding surface, as well as even in the locking section the driving forces, in some circumstances, can prevail over the resisting ones.

Specific comments:

- In the figures proposed the term "deformations" is used to indicate displacements, which have mm as measurement unit. Please, use the term "displacements". - The comment presented at lines 456-461 is questionable, since a displacement of 5 m is not so large to justify a a change in the landslide body geometry, especially for a land-

slide size as that here examined. Apart from the change in the curve trends, a limit equilibrium analysis with the post-movement landslide geometry should be performed to verify the actual change in the factor of safety. - The cohesion value adopted for the sliding surface should be justified more in detail. The landslide is moving and has experienced quite a large displacement; therefore, probably the cohesion value proposed is not operative anymore and, in general, post-failure strength conditions would apply in this situation. A comment from the authors on this choice is necessary. - A more detailed description of the engineering treatment performed in the slope is necessary. It is mentioned, but not described. - Since a transient seepage analysis is carried out, the authors should describe also some more data on the hydraulic properties of the soils used in the seepage calculations, as required by the software code used (retention curves, permeability coefficient variation with suctions). - Line 338: what does it exactly mean "rainfall threshold" as expressed in terms of rainfall intensity? Being clay materials, rainfall data in terms of long-term cumulative rainfalls should be more important than rainfall intensity. - Dam impoundment has also an external loading (i.e.stabilizing) function on the landslide equilibrium. The external impoundment load affects the overall equilibrium of the landslide body. This is never mentioned by the authors. - Since the authors explain the change in the equilibrium conditions of the landslide in terms of seepage forces (inward or outward, with respect to the slope), they should plot the output of the seepage analysis in terms of flow vectors (during a drawdown stage and an impoundment stage, for example) in order to corroborate their comments. - How is chosen the location of the section dividing the driving and locking portions based on the results of the analyses proposed?

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