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Hydrology and Earth System Sciences Discussions

Interactive comment on "A model of hydrological and mechanical feedbacks of preferential fissure flow in a slow-moving landslide" *by* D. M. Krzeminska et al.

Anonymous Referee #2

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Dealing with heterogeneities involved in hillslope hydrology is indeed the most important bottleneck in modelling both the runoff process and landslide initiation. This paper is very interesting from the viewpoint of evaluating effects of these interaction.

1) I think it's understandable that the fissure connectivity (Cfis), an important factor for 'hydrological feedback', can be controlled by the soil wetness in Eq (1). For the mechanical feedback, however, I wonder why the fissure volume is correlated to the safety factor and why it can be calculated in Eq. (2). I guess this concept has not been generally accepted in hydrology. I roughly suppose there is a mechanical relationship

between the slope stability and fissure volume may be created through the long-term evolution and seasonal fluctuation processes of soil, but I have a question whether a functional relationship in Eq. (2) is only an assumption that you have firstly given here or based upon any evidence that some other studies have shown. I myself think that additional evidences or explanations are needed for your estimation 'when the stability of the soil column approaches equilibrium limit (fs = 1), more fissure appear and the volume of fissures increase with decreasing fs' (P.11168, L20-23).

2) As for the calibration step 'the first stage as hydrological feedback was made in order to get estimates of fs,min and fs, max (P.11172, L10-11)', I can't follow through what calculation process you obtain these values of fs in this step before the mechanical feedback step in Eq. (2). Please explain a method how to get these values.

3) In Fig.6, differences between (a) and (b) may be derived from the mechanical feedback, and I wish to know a basic reason why the differences are generated. You certainly made an analysis on comparing the groundwater levels among the three scenarios in Fig. 10, but I think this may result from multiple processes involved. Before these discussions, in order to understand a core basic meaning and effect of 'mechanical feedback', I hope you could mention mechanical reasons why some cells with fs<1 in (a) is changed into fs>1 in (b) for example.

4) Also in Fig.6, I think that the modelled distribution of the safety factor is not so much agreeable with that of Fig.3. For example, the low safety factor is located in the middle right portion in Fig. 6, but this belongs to a stable unit in Fig.3. Of course a very good agreement is not always necessary for the model calibration, but some comments should be added for discrepancies.

Minor comments 5) P11165 L21: (Γusat,FM,) may be (Γusat,FM) 6) P11166 L17-20: '(-)' may be a mistake 7) P11169 L20: 'increasing the Ksat' may be 'decreasing the Ksat' 8) P11171 L19 'continues' may be 'continue' 9) P11172 L11 'fs,min and fs,min' may be 'fs,max and fs,min' 10) P1173 L18 'set are' may be 'set is' 11) P11186 Table

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3: ‘Ãů’ may be a mistake 12) P1189 Fig.3 (a) : The symbol ‘HG’ is not referred in the text. Please accord the symbols with those (U1 etc.) in Fig. 2 (a) 13) P11189 Fig.3: The abscissa axis seems to be shared in both panels (c) and (d). If so, the scale marks should be inserted into the panel (d) below the numbers indicating the scale marks of the panel (c). 14) P1191 Fig.5: (Chapter 5) in the box (STAWWARS) may be a mistake 15) P1195 Fig.9: ‘see Fig. 2a’ may be ‘see Fig. 3a’

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