

Interactive comment on “Data Assimilation with An Improved Particle Filter and Its Application in TRIGRS Landslide Model” by Changhu Xue et al.

Anonymous Referee #1

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General comments

The paper presents the results of a study aimed at improving a data assimilation (DA) algorithm based on the residual resampling particle filtering. Two applications are provided in order to respectively test the feasibility of the improved algorithm and show an example concerning slope instabilities. In this latter regard, a ‘synthetic’ case is presented starting from the expression of the factor of safety implemented in the TRIGRS physically-based model. From this point of view, in the abstract the positive effects of the proposed DA algorithm in the use of TRIGRS should be enhanced and, more in general, the main goal to be pursued with reference to slope stability processes should be more clearly stated. Indeed, the submitted version of the paper does not allow understanding the benefits deriving from the adoption of the improved algorithm in ad-

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dressing practical issues about landslides. In my opinion, for the readers of NHESD International Journal, the paper could be of interest only if the theoretical approach is applied to a real (not to a synthetic) case study. Finally, the paper is poorly written and, in some parts, difficult to understand; in this regard, the manuscript needs some English language editing.

Specific comments

Introduction – page 1, line 17. Why the (only) landslide event occurred in China on June 24, 2017 is mentioned? Section 1, Introduction – page 1, lines from 19 to 23. Considering the scope of the paper, why the authors mentioned some numerical methods for landslide modelling? And what type of landslides the authors are taking into account? The description of the TRIGRS model is very poor and should be improved. Section 1, Introduction – page 2, lines from 20 to 22. As mentioned in the general comments, the manuscript includes some sentences that appear meaningless. For example, the authors claim that they choose a ‘slope movement model’ (?) with a 10*10 size grid (no information about the dimensions are provided), applying the assimilation algorithm and TRIGRS program to ‘predict and improve the prediction’ (?) of safety factors (more than one?) and deformations (TRIGRS does not allow studying deformations) of the landslide (which?). Section 4, Application to landslide simulation based on TRIGRS model – page 6, lines from 1 to 5. Bearing in mind that TRIGRS allows simulating only the triggering stage of landslides, why the authors considered the post-failure stage? And, once again, what type of rainfall-induced landslide are they referring to? Or, more in general, what kind of physical process are they simulating and how the variation with time of the groundwater pressure head is estimated? Section 4, Application to landslide simulation based on TRIGRS model – page 6, lines from 11 to 12. Could the authors clarify the meaning of Figure 5? Numbers in Figure are representative of what? And colour shadings?

Technical corrections

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Section 1, Introduction – page 1, lines 21 and 22. Iverson did not carry out the TRIGRS program; as a matter of fact, the TRIGRS model performs transient seepage analyses using the linearised solution of Richards’ equation proposed by Iverson (2000). Please correct accordingly. Section 1, Introduction – page 1, line 23. Please modify “Baum 2008” with “Baum et al. 2008”. Section 1, Introduction – page 1, line 23. “Jiang” is not included in the references. Section 1, Introduction – page 2, line 17. The acronym “PDF” is introduced without explanation. Section 3, Application to Lorenz-63 model – page 5, line 5. Greek symbols are introduced without explanation. Section 3, Application to Lorenz-63 model – page 5, line 7. Please modify “are generated form the” with “are generated from the”. Section 3, Application to Lorenz-63 model – page 5, lines 10, 13 and 14. “closed to” or “close to”? Section 3, Application to Lorenz-63 model – page 5, line 19. Please modify “RMSE” with “RMSD”. Section 4, Application to landslide simulation based on TRIGRS model – page 6, line 1. Please modify “depends on” with “depending on”. Section 4, Application to landslide simulation based on TRIGRS model – page 6, line 2. Please modify “is the soil unit weight” with “is the soil unit weight at saturation”. Section 5, Conclusion and discussion – page 7, line 3. Please modify “Grids are independent of” with “Grid cells are independent of”.

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