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Discussions

Interactive comment on "A Modular, Non-Newtonian, Model, Library Framework (DebrisLib) for Post-Wildfire Flood Risk Management" *by* Ian E. Floyd et al.

Anonymous Referee #2

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This paper attempts to build a modular computation library by calling different modules to simulate the process of movement of post-fire debris flow. However, there is no convincing proof in this paper whether the models can describe every link of post-fire debris flow. Because the soil condition after a fire is different from the soil before a fire, which will result in lower infiltration rates, more rainfall splash erosion, and more severe gully erosion during movement of post-fire debris flow. Whether the model can truly reflect these scenarios requires more experimental data and field evidence. Comments can be found in below:

The post-fire debris flow is not only the debris flow with high concentration, but also different from the traditional debris flow due to the change of the physical and mechanical properties of the soil after fire. The consequence of this may affect the erosion of debris flow after fire and the amplification effect along the path, which is not well reflected in the model in this paper. And these changes need to be explained experimentally.

Reviewer agree with the author's consideration of the non-Newtonian property of debris flow in the shallow water equations. While the non-Newtonian property is closely related to the rheological property of post fire debris flow. Therefore, experiments and verification need to be added to make the model convincing.

The research object in this paper is post-fire debris flow. However, in order to verify the correctness of the model, the data of the three experiments of debris flow used in this paper are not from the experiment of post-fire debris flow. Even if the simulation results match the model, it cannot be proved that this model is suitable for the simulation of post-fire debris flow.

Post-fire debris flow often has more severe erosion ability than traditional debris flow. Equations (11-15) in this paper ignore the erosion ability to soil. This erosion ability is related to the physical and mechanical properties of soil after fire: Chen HX, Zhang LM. EDDA 1.0: integrated simulation of debris flow erosion, deposition and property changes. Geoentific Model Development, 2015, 8(3):829-844. Chang D S, Zhang LM, Xu Y, et al. Field testing of erodibility of two landslide dams triggered by the 12 May Wenchuan earthquake. Landslides, 2011, 8(3):321-332.

The discussion in this paper is not deep enough. The similarities and differences of erosion force and dynamic characteristics between post-fire debris flow and traditional debris flow should be discussed. Otherwise, the model will not be able to distinguish post-fire debris flow and traditional debris flow.

Table 2 does not address specific techniques, algorithms, efficiency advantages and disadvantages. It is suggested that the authors describe the advantages and disadvantages of the above content from a more objective perspective, which is the most concerned by professionals.

Please further revise the reference format according to the requirements of the journal and add some latest literatures such as: Addison P, Oommen T. (2020). Post-fire debris flow modeling analyses: case study of the post-Thomas Fire event in California. Natural Hazards. 100(1). Cui, Y, Cheng DQ, Chan D. (2019). Investigation of Post-Fire Debris Flows in Montecito. ISPRS International Journal of Geo-Information. 8(1), 5. Staley DM, Negri JA, Kean JW, Laber JL, Tillery AC, Youberg AM (2017). Prediction of spatially explicit rainfall intensity–duration thresholds for post-fire debris-flow generation in the western United States. Geomorphology 278:149–162

Based on above comments, major revision is suggested.

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