General comments for the Editors

The authors would like to thank the editors of the journal Earth Surface Dynamics for considering publishing our manuscript and for the Referees for their constructive criticism on the manuscript and their valuable suggestions on how to improve the manuscripts overall quality. The responses for each referees comments are presented in separate documents and all comments and suggestions was incorporated into the manuscript where possible. Looking at both the Referees comments the authors felt that we should add a joint response that would alleviate some common concerns from the referees.

The main objective of this manuscript was to introduce the new coupled soilscape-landform evolution model. However we strongly felt that there should be some applications of the model albeit simple, to show how the model performed well in reality and to highlight some of the geomorphic signatures emerging from the modelling results itself. We recognise that it is not a reasonable application that necessarily be directly applicable in the field setting. However we are inspired by the early work on hillslope geomorphology by authors such as *Kirkby* [1971] and *Carson and Kirkby* [1972] which was very useful in understanding hillslope evolution processes. So as first step we used a 1Dimentional hillslope to run our simulations because, understanding dynamics of 1D hillslope evolution is easier and we can better illustrate possible implications for different processes.

In this manuscript emphasis was given to the presenting the model formulation and only limited comparison was done with field data mainly because we were unable to find any experimental work done by any other researcher which has used a similar setup as our simulations. However a subsequent paper will deal with implications of model results in terms of one-dimensional and three-dimensional alluvial fans. In this future manuscript, we compare and contrast the model results with experimental work done by authors such as *Seal et al.* [1997] ,*Toro-Escobar et al.* [2000] and general observations done regarding naturally occurring alluvial fans and their formation dynamics.

We admit that the model is limited in its scientific scope. The model is based on physical fragmentation of parent soil particles and it does not model chemical transformations. The modelling approach used here is complimentary to the chemical weathering modelling work done by Michael J Kirkby [Kirkby, 1977; 1985; 2018]. However we will be incorporating a physically based chemical weathering model described by Willgoose [2018] into SSSAPAM in the future.

At the current time we decided not to consider SOC and its influence in the soil formation and evolution processes. All available evidence suggests that in order to effectively model SOC, it will require an extremely complicated coupled model with soil grading, soil moisture, SOC as well as vegetation. Although formulating such a model is very desirable (and would be an important endeavour by itself) for the entire scientific community, it is well beyond the scope of this current research work.

The deposition model of SSSPAM is designed in such a way that the difference between the transport capacity and the sediment load of the flow is always deposited regardless of the settling velocities. This is done to prevent the flow from being over the transport capacity. Depending on the material grading distribution and the concentration in the profile of the flow, the theoretical amount of the material that can be deposited can be different. In this model formulation we assume that the sediment grading is uniform and the sediment concentration is also uniform within the flow. The reality may not be as simple as that. There is literature that argues that the sediment concentration profile has an exponential distribution (i.e.most of the sediment are concentrated near the bottom of the flow) such as *Agrawal et al.* [2012] and that the grading distribution profile in the flow is also a function of the settling velocity of different particles (i.e. Larger particles are concentrated near the bottom of the flow). So in practice the amount of material deposited at each pixel according to the critical immersion depth might be higher. Although the approach used in SSSPAM may not perfectly mimic the natural behaviour of sediment deposition we believe that this is the most effective way to numerically represent this process in the model at this time.

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