Response to editor comments

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Editor (Professor Andreas Lang)

Editor decision: Publish subject to technical corrections

Dear Tzu-Yin Kasha Chen and author team,

I am happy to convey that your manuscript has now been accepted for publication in ESurf subject to the technical corrections indicated by Tom Coulthard.

Thank you for working with the associate editor and his reviewers. The comments have helped to improve the earlier versions of your text.

Best wishes,
Andreas Lang

Associate editor (Professor Tom Coulthard)

Associate editor decision: Publish subject to technical corrections:

I would like to thank the authors for their hard and considerate work revising the paper. There are a couple of fairly minor changes that I think can be taken care of under technical corrections.

Additional private note:

Thanks for the changes made. I have one fairly small suggestion - that I would like to see carried out under technical corrections. Reviewer 2 (Stefan Hergarten) discussed the computational efficiency of your algorithms - and you have a very clear response to this in the 'response to reviewers suggestions' pdf - lines 270-300. I know that when the paper is fully published this response will be public as part of the review package - but I think Stefans points are important and it would be helpful to the readers if a sentence or two or three covering your response could be added to the manuscript.

Many thanks,
Tom Coulthard

Our reply:

We wish to thank Professor Andreas Lang and Professor Tom Coulthard for appreciating the manuscript and the constructive comments. We agree adding the response to the computational efficiency discussion is important and will strengthen our paper. We added the response (highlighted in blue) in the last paragraph in Section 7:

In Table 1, we also report the computational time in seconds needed to run these simulations on an i5-9500 Intel processor. We emphasize that the use of the dynamic time step in our solution contributes significantly to its efficiency. Preliminary versions of the code used a constant time step selected by $\Delta t = 0.25\Delta\ell^2/\nu^*$. This approach produces the same predictions as those reported here but requires over an order of magnitude more CPU time.

And in the last paragraph of the conclusion:

Despite these current limitations, we have shown that a critical slope model accounting for yield stress and friction angle can simulate deposit morphology with excellent efficiency using dynamic time steps. Aside from computation time, another key consideration is the work involved in calibrating model parameters. In this regard, an important advantage of our proposed simple model is that its parameters can be calibrated directly from topography profile data. As done in the paper for the experimental cases, all model parameters can be acquired from a single long profile through observed deposits. It is therefore not necessary to run the three-dimensional model multiple times to adjust model parameters by trial and error. More complex models, by contrast, typically require multiple iterations, or must rely on other sampling and material analysis to acquire parameter values. The model can easily calibrated parameters for a broader range of conditions than considered previously. To simulate such deposits in complex geometries, moreover, the control volume finite element method (CVFEM) was found to provide a promising numerical approach, and could possibly be extended in the future to more general processes or other geomorphic systems.