

Interactive comment on “Transport-limited fluvial erosion – simple formulation and efficient numerical treatment” by Stefan Hergarten

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The manuscript by Stefan Hergarten details the derivation of an implicit solution for the transport-limited stream power model. An implicit scheme for the detachment-limited model was previously developed by the author (e.g., Hergarten and Neubauer 2001) and Braun and Willett (2013) and is popular in numerical landscape evolution models. An implicit solution for the stream power model with deposition was later developed by Yuan et al. (2019). However, the newly developed scheme is numerically more efficient and versatile.

Overall, the manuscript is very well written. It is easy to read and the mathematical development of the scheme is well explained. Moreover, the topic fits perfectly into

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the scope of ESURF. I have no major concerns and only a few minor remarks. I thus recommend to accept the paper with only minor revisions.

Wolfgang Schwanghart

Minor comments:

164: $S_i(t)$ is actually not used later, at least in the immediate context (Eqs. 20-25). You may, however, replace the second term in the right-hand side of Eq. 20 with $S_i(t)$

What about upstream boundary conditions? I wrote the model in MATLAB as 1-D model and the uppermost node remains fixed (if no uplift is applied). I may have wrongly written the code, though.

In the end, the model is not fully 2D, as the scheme is solved in 1D on a network. This may lead to weird aggradational forms (linear ridges on flat topography) if too long time steps are applied. Can you comment on this? What is an appropriate time step length?

References

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