



EGUsphere, author comment AC4
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Reply on RC4

Stefan Hergarten and Alexa Pietrek

Author comment on "Self-organization of channels and hillslopes in models of fluvial landform evolution and its potential for solving scaling issues" by Stefan Hergarten and Alexa Pietrek, EGU sphere, <https://doi.org/10.5194/egusphere-2022-605-AC4>, 2022

Dear Reviewer,

thank you very much for your review! Please allow us some short responses before addressing all aspects in more detail in a revised manuscript.

Scaling problems:

It seems that a considerable part of the landform evolution modeling community is not aware of the dependence of the results on the spatial resolution that occurs when applying fluvial erosion and diffusion to all sites. Owing to the numerical limitations of the widely used explicit time-step scheme, spatial resolutions are typically low, so that diffusion with realistic diffusivities (order of magnitude of $10 \text{ m}^2/\text{kyr}$) practically only affects sites at drainage divides. In this case, the dependence on grid spacing is not recognized (and not a big problem). From this point of view, it might even look as if we were solving a non-existing problem. We will try to explain a bit more in detail why this is not the case.

Title:

About the title, however, we disagree. The paper is, of course, not about self-organization of channels OR hillslopes, but about the self organization of channels AND hillslopes. The landform evolution model, which is the key point for you, is just a specific application of this concept. Perhaps we can add this application to the title in the way "... and its application to delineating channels", but the scientific result is our focus.

Nondimensional properties:

There are no dimensional properties anywhere in the manuscript. We guess that you were confused by the colorbar in Fig. 5. This colorbar is optimized for recognizing the transition from hillslopes to channels ($0 \leq A \leq 400$), while the size of the entire catchment is much larger ($A = 5000$). So the largest channels are in a range where the color scale is already saturated (dark blue).

Best regards,

Stefan Hergarten and Alexa Pietrek