Earth Surf. Dynam. Discuss.,
doi:10.5194/esurf-2016-41-RC4, 2016

Earth Surface Dynamics Discussions
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EGU

Interactive comment on "Steady state, continuity, and the erosion of layered rocks" *by* Matija Perne et al.

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Received and published: 21 September 2016

Yes, you understand my argument correctly.

In my view, what you are concerned about in point 3 is valid - the solution I provided is an approximation. From running numerical simulations I could perceive that channel profiles with the "controlling layer" near the contact maintained equilibrium or near equilibrium slopes. This observation provided the insight for an analytical solution. Where this solution could fail is if the influence of lower non-controlling layers in the sequence causes the controlling layer to deviate from an equilibrium slope and kinematic wave speed. Indeed I do see this happening in the n<1 case, but not in the n>1 case in my simulations. This is why I say the n<1 case applies best to the basal strong-over-weak contact. In layers above I find the channel profiles in the strong layers have somewhat

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Discussion paper

reduced slopes and thus faster wave speeds, which results in lower slopes on the over-steepened weak layers as well – a progressive decline with each strong/weak pair. A damping of the signal related to the strong over weak contact if you will.

I did not pursue this aspect further. One might imagine a similar complication for n>1 but I didnt detect one in my simulations.

Either way, the approximate analytical solution, I believe, provides useful guidelines and a closer approximation to system evolution in the presence of dipping contacts than provided by your original derivation. Naturally either solution only pertains to the stream power river incision model and does not account for some of the processes likely to influence the evolution of river profiles in the vicinity of a strong-over-weak contact.

Interactive comment on Earth Surf. Dynam. Discuss., doi:10.5194/esurf-2016-41, 2016.

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