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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Opinion paper: Linking Darcy's equation to the linear reservoir" *by* Hubert H. G. Savenije

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Thank you very much for the comments and suggestions. They shall be incorporated in the revised paper.

What is the evolutionary dynamics of the drainage network?

It is likely that the drainage network makes use of cracks and fissure present in the base rock, but subsequently expands and develops by minerals going into solution. As a result, these networks never stop to develop, continuously refining and expanding the fractal structure. In relatively young catchments such structures may not yet have been developed to the full extent. By sampling the chemical contents of springs and base flow at the outfall of catchments, we may be able to determine the rate of growth of the

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Discussion paper

drainage network, and – if the mineral content of the substrate is known – the origin of the erosion material. I think it is an interesting venue of research to study the expansion of such networks as a function of the mineral composition of the groundwater feeding the stream network, possibly supported by targeted use of unique tracers.

Whether it is at all possible to test the hypothesis of constant resistance by direct observations seems doubtful. The process manifests itself at system scale and this is difficult to test by observations in the field by – for example – observations in, or samples from, piezometers. Unique tracers may provide supporting evidence, but also here, the heterogeneity is so large at small scale, that such observations, already difficult to set-up, would probably not convey much. I think that observation of the mineral composition of the drainage water, whether from springs or at the outfall, would possibly be more valuable.

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