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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Minimum dissipation of potential energy by groundwater outflow results in a simple linear catchment reservoir" *by* Axel Kleidon and Hubert H J. Savenije

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This study clarifies a catchment's overall behavior by deriving a characteristic time-scale for steady-state conditions. It seems to me that any catchment (i.e. also a non-linear one) in a single state (e.g. steady-state) can be characterized by a single characteristic time-scale (tau = S/Q). However, a catchment can only be considered to behave as a linear reservoir when this characteristic timescale tau also applies in other states (e.g. lower or higher storage and runoff). For the presented example, showing that the derived timescale tau also applies to other conditions seems to require relaxing the steady-state assumption. However, in that case, the characteristic timescale cannot be

derived anymore with the presented analysis. Thus, do we now have a Catch-22? Or do I misunderstand something?

(P.s. a short conversation with the second author could not clarify this issue and he encouraged me to post this query on HESSD)

Kind regards,

Wouter Berghuijs

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