Geosci. Model Dev. Discuss., 7, C514–C516, 2014
www.geosci-model-dev-discuss.net/7/C514/2014/

Geoscientific Model Development
Discussions
Open Access

Interactive comment on "SEHR-ECHO v1.0: a Spatially-Explicit Hydrologic Response model for ecohydrologic applications" *by* B. Schaefli et al.

H. McMillan (Referee)

h.mcmillan@niwa.co.nz

Received and published: 12 May 2014

This paper presents a hydrological model designed by the authors for simulation of catchment scale hydrological processes. It is a fairly standard semi-distributed model, with water balance routines for each subcatchment simulating snow and soil processes, surface and fast/slow subsurface run-off; run-off is then routed to the catchment outlet. Novel features of this model are the attempts to define relationships between parameters in different subcatchments based on physical and scaling relationships; and the use of dispersion and travel time formulae in the routing algorithm.

I believe the paper is suitable for GMD as it provides a thorough description of this

model which is in use by the research group. I have several minor comments for the authors:

Title: the case for eco-hydrologic applications is not made clear in the paper.

P1867,L18: the Clark et al model has a separate parameterisation of subcatchment travel time before water reaches the defined channels; it is not considered negligible.

P1868, L3: It is not clear how this term "spatially explicit hydrological response model" is different from the standard term "distributed model".

P1869,L 14: Are wind, radiation etc also used in the energy balance?

Figure 1: It could also be useful to add the flux/state symbols.

P1870, L 6: Does "important vegetation cover" mean trees?

P1870: What happens to the non-evaporated water Ic? It may be better to reformulate this store as dIc/dt as with the other stores

P 1874, L19: Should be "slow" in the subscript

P1875: How do you account for the fact that water flows more quickly at higher stage (i.e. the kinematic assumption)?

P1876, L 17: Is explicit time stepping good enough for the fast component?

P 1879, L 24: What are the units or values of rD?

P1881, L 22: Please state how many individual parameters were you estimating, given that many were jointly estimated using scalings between subcatchments.

P1882, L1: The splitting between different speed processes was partly imposed by setting minimum residence times.

P 1884, L 27: The "unique transferability across timescales" was not shown – I expect other models can also achieve this.

P1885, L5: "the presented model can easily be extended to transport processes" – this is rather a bold statement, especially since the area-based scaling may no longer be valid when considering the transport of water/contaminant particles (e.g. Hrachowitz, M., C. Soulsby, D. Tetzlaff, J. J. C. Dawson, and I. A. Malcolm (2009b), Regionalization of transit time estimates in montane catchments by integrating landscape controls, Water Resour. Res., 45, W05421, doi:10.1029/2008WR007496)

Interactive comment on Geosci. Model Dev. Discuss., 7, 1865, 2014.