

Interactive comment on “Representation of spatial and temporal variability in large-domain hydrological models: Case study for a mesoscale prealpine basin” by Lieke Melsen et al.

Anonymous Referee #2

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This article compares parameters estimated for the conceptually-based VIC model at varying spatial and temporal resolution over a regional catchment. I find this manuscript to be well written and clearly organized. I think the topic is of interest to the readership of HESS, I recommend publication pending some minor comments. I have listed a couple detailed comments below.

Comments

This study uses a conceptually based approach where calibration is generally mandatory given the indirect nature of the model parameters. Are there lessons learned from the more physically based modeling community which is also studying the effects of resolution (see references below)? It would be valuable to summarize these and dis-

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cuss in context with current study.

I am curious about the spatial resolution of routing. It appears that the routing network is a constant across all simulations, which might substantially influence the conclusions. Prior studies have relaxed that assumption (again see references below). The authors should comment on this more and while it may be infeasible to conduct additional simulations, additional discussion would be valuable. I wonder if this might help explain why the authors found good spatial parameter transferability? I also wonder if findings that Dunnian runoff averages to effective parameters (e.g. Meyerhoff in references below) while Hortonian does not might be relevant here as well?

References:

Meyerhoff Quantifying the effects of subsurface heterogeneity on hillslope runoff using a stochastic approach. Hydrogeology 2011

Sciuto et al. Influence of soil heterogeneity and spatial discretization on catchment water balance modeling, VZJ 2010

Shrestha et al. Impacts of grid resolution on surface energy fluxes simulated with an integrated surface-groundwater flow model HESS 2015

Sulis et al. Impact of grid resolution on the integrated and distributed response of a coupled surface-subsurface hydrological model for the des Anglais catchment, Quebec HyP 2011

Vivoni et al. On the effects of triangulated terrain resolution on distributed hydrologic model response HyP 2005

von Gunten et al Efficient calibration of a distributed pde-based hydrological model using grid coarsening JoH 2014

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