Geoscientific

Model Development

Discussions

Open Access

GMDD

Interactive
comment

Interactive comment on "lumpR: An R package facilitating landscape discretisation for hillslope-based hydrological models" *by* Tobias Pilz et al.

Anonymous Referee #1

Received and published: 12 February 2017

General comments: This manuscript introduced a computer software lumpR that serves as pre-processing tool for the hydrological model WASA-SED. This manuscript is more like a technical document, it needs to emphasize the key features and major functions of this software. It also declared that "the first objective of this paper is to provide an overview of existing landscape discretisation algorithms and software", however this review need a major revision.

Major comments:

There are many literature reviews in each sections. Please move these literature reviews into Section 1 or/and Section 2.

Section 1: Introduction

1) Classification of the hydrological modelling approaches into three types (fully distributed approach, lumped approach and semi-distributed approach) is often questioned. For example, many large scale hydrological model uses grid cells for the discretisation of the landscape, but the size of the grid cell is very large, so they also employ sub-grid parameterization schemes. What type do these hydrological models belong to?

2) The logic between the literature reviews in Section 1 and Section 2 is not clear.

3) The logic between the first objective and the second objective is not clear. Before the the overview of existing landscape discretisation algorithms, authors already determined to use hillslope-based approach.

Section 2: Review of landscape discretisation in hydrological modelling

1) This section should focus on the landscape representation, not only the landscape discretization.

2) Section 2.1 presents common knowledge about the DEM. What is relationship with section 2.2?

2) To model the catchment hydrology, water flow pathway is a key issue in landscape discretization/representation. This section lacks of representation of catchment water flow pathway. (Reference: Yang D, Gao B, Jiao Y, et al. A distributed scheme developed for eco-hydrological modeling in the upper Heihe River. Science China Earth Sciences, 2015, 58(1): 36-45.)

3) What are the basic units of hydrological simulation in different landscape discretization approaches (different semi-distributed hydrological models)?

4) In Section 2.3, it's hard to see what kinds of software is suitable for landscape discretization?

Section 3:

1) A flowchart is needed in description of lumpR. Figure 1 should be modified to contain both discretization procedure and major functions.

2) This section should be rearranged, for example, general workflow, major functions, additional tools.

3) How to define the topological relationships between the hillslopes and sub-catchment?

4) As shown in Figure2, how to simulate the flow discharge in the river networks? It's also important to consider the spatial variability of precipitation inputs.

5) This is the main part of this MS, more detailed information is required.

Section 4:

1) Sensitivity analysis in this section is repeated in Section 5. I suggest move the sensitivity analysis to Section 5.

2) This section is very confusion. It's very hard to see how to implement the lumpR for application of WASA-SED model. Please rearrange this section.

3) What are the inputs (climate forcing data) and outputs of WASA-SED model?

4) What are the major functions of WASA-SED model? Please show these functions by using the simulated results.

Other comments:

1) Yang et al. (2002) developed a hillslope-based hydrological model. This work should be cited. Yang, D, S Herath & K Musiake (2002), A Hillslope-based hydrological model using catchment area and width functions. Hydrological Sciences Journal, 47(1), 49-65.

2) Some references should be added in Section 1, e.g. Yang et al., (2000), Comparison

of different distributed hydrological models for characterization of catchment spatial variability. Hydrological Processes, 14, 403-416.

3) P4, L32-33: Here should emphasize that the models use HRUs face the difficulty of representing water flow pathways (for example the runoff from hillslopes and runoff along the river networks) appropriately.

4) P5, L15-20: The difficulty of determining the size of REW should be mentioned.

5) P6, L15: A table is needed to summarize the existing software for model pre-processing.

6) P12: A table is required to summarize the model parameters.

7) P19: The discharge hydrograph is required in addition to the reservoir water volume shown in Figure 4.

8) P 20: Use a table instead of Figure 5.

9) P 21: Show the results of sensitivity analysis using the hydrograph too.

Interactive comment on Geosci. Model Dev. Discuss., doi:10.5194/gmd-2017-17, 2017.