Hydrology and Earth System Sciences Discussions

Interactive comment on "Process-based distributed modeling approach for analysis of sediment dynamics in a river basin" *by* M. A. Kabir et al.

Anonymous Referee #3

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This paper presents a distributed model for the analysis of erosion and sediment transport at basin scale. The model is adequately described and the applications show its capability in dealing with the complex issues related to sediment dynamics under different morphoclimatic conditions. Adequate credit is given to previous studies on the same topic. In my opinion, this paper could be accepted for publication in HESS after minor revision. I report below a few comments that I hope could help the authors to refine their paper.

General comments

The authors should stress that suspended sediment, which is the object of model simulations, is only a part of total sediment load of rivers: bedload may have a major role in sediment dynamics, especially in mountain rivers.

Page 5698, lines 1-3: more could be said about the relations between the soil detachability factor (k) and soil texture. More in general, a table with a list of the main input parameters, showing the assessment methods (estimation from soil/vegetation maps, calibration, etc.) could be reported.

Specific comments

Page 5688, lines 25-26, page 5696, line 2 and page 5697, line 13: The paper by Jenson and Domingue (1988) could be cited instead of the ESRI manual. Jenson, S.K., and Domingue, J.O., 1988. Extracting topographic structure from digital elevation model data for geographic information system analysis. Photogrammetric Engineering and Remote Sensing, 54 (11), 1593-1600.

A bracket (the third from the left) is missing in equation 3: KE=KE(DT)*(1−CC) *HTotal+KE(LD) *CC * HNet

Page 5697, line 13: which method was used for extracting the river network from the DEM? Constant threshold area? The value chosen as threshold for channel initiation could also be reported.

Table 8 presents only two values, which could be reported in the text.

Figure 4 needs some editing: The scheme of flow directions reported in the upper-right corner should be removed, as it is not necessary for understanding the flow paths. The equations overimposed on the cells negatively influence readability of the figure. The captions should be extended. The different colours associated to river network cells should be described.

Figure 19: negative values on the vertical axis should be removed.

Figures 18, 19 and 20: As far as I know, a prefix like "Mega-" can be applied only to basic units of measure. The unit of measure "Megaliter" should thus be replaced by "103 m3", which derives from the basic unit of volume Cubic metre, and is a more common unit of measure for volume in water bodies. This would permit also avoiding the awkward unit of measure "1000 Megaliters" on the legend of the vertical axes in figure 20.