

Interactive comment on “Sediment transport modelling in a distributed physically based hydrological catchment model” by M. Konz et al.

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The authors present the improvement of the distributed hydrological model TOPKAPI for the simulation of stream bedload transport and analyze the results obtained when the model was applied to a major event, in comparison with the results obtained with a more specialised sediment transport model (SETRAC).

In my opinion the subject and approach are relevant although there are some methodological doubts that deserve consideration.

The hydrological part of the model was calibrated using not measured but ‘reconstructed’ discharges of the event. This part of the model is not new in the paper and

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therefore its evaluation is not essential; nevertheless the fact that the hydrological simulation could not be checked means that the possible (and unevaluated) errors in the hydrological simulation may result in large uncertainties associated with the sediment transport simulations.

One of the advantages of the comparison of the results with another model is that both models had very similar discharge forcing, so the role of possible errors in the hydrological part of the model was avoided. Indeed, the sediment loads simulated by both models were similar, so the authors may certainly conclude the success of the new developments of TOPKAPI in comparison with SETRAC.

Nevertheless, the comparison with the volumetric estimates was really not so straightforward; even when the macro roughness was taken into account, the overall volumes resulted in similar values, but the correlation between spatial estimates and simulations in Fig. 6 seems really poor. It is unclear therefore whether the approximate agreement between overall simulated volumes was physically due to the role of hydraulic macro roughness or the changes in the use of equation (15) just absorbed diverse structural and parameter model errors.

Finally, the importance of the ‘artificial redistributions’ of sediment is unclear. From figure 11 this seems that this problem was avoided using a short time step, but this is unclear in the text and particularly in the ‘conclusion and outlook’ section.

On the other hand, although the paper is generally well written, there are some inadequacies that may lead to wrong interpretations. Particularly, the overall methodological approach is not properly described in a ‘methods’ section, but scattered in the paper or in the ‘discussion’ section.

Detailed comments:

Page 7592 Line 1: Bedload sediment transport... Line 4: It seems that TOPKAPI is here a new model. “Improved” should be used instead of “developed” Line 7: ... on

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the ground surface... Line 15: the comparison with LIDAR reconstructions was not so positive Line 25: “containing a high portion of gravel cobbles and boulders” has no real meaning. Line 26: ... high values and the transport limiting factor...

Page 7594 Line 4: Delete “and routing” Line 27: The estimation of the recurrence period for this event would be appreciated

Page 7597 Line 1: ...Temperature melting factor... Line 2: ... Radiation melting factor...

Page 7599 Line 14: on bedload sediment transport...

Page 7603 Line 18: It is unclear what is dm. Mean grain size seems inadequate. Is it median armour grain size?

Page 7605 Line 12: It should here stated that hydrographs are simulated by another model (HEC-HMS?)

Page 7606 Line 7606: The comparison of the two models is not the main goal of the study but the main approach used.

Page 7608 Line 5: The meaning of the first sentence is unclear here

Page 7609 Line 20: Same sentence on the goal of the study commented before

Page 7610 Line 7 and subsequents: Most of these sentences should be moved to a ‘methods’ section.

Page 7614 Line 2: ... artificial redistributions... Line 22: the improvement is respect to which approach? (the SETRAC model?)

Page 7615 Lines 8 and subsequent: Is the problem of the artificial sediment redistribution so important after the use of a short sub-time step?

Figure 1: needs a scale bar

Fig 4: may be reduced

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Fig 10: The caption does not correspond to figure A

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