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Discussions

Interactive comment on "Modelling water availability, sediment export and reservoir sedimentation in drylands with the WASA-SED Model" *by* E. N. Mueller et al.

Anonymous Referee #1

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General comments

This is a paper that documents a complex and sofisticated sediment production and transport model. However, it reads much like a technical document rather than a scientific paper. One could argue that the parameterisations of the processes incorporated in the model do not provide much added scientific value. Indeed, the model concepts, i.e. the equations that the model implements, are all available and well described in the literature. In that sense, a model is rather a tool with little intrinsic scientific value. Applying the model to specific case studies would obviously generate interesting scientific insights, for instance about the performance of a specific process parameterisation, or

a certain combination of such parameterisations. To a limited extent, the authors describe model applications and their results in chapter 3. This part is only a (rather shallow) review of existing applications that in my opinion is not very informative. Extending this part, or presenting new results, would improve the scientific content of the paper. Another approach would be to increase the scientific value in the development of the model itself. Without this, in my opinion the current manuscript should then be a technical paper accompanying the downloadable model, rather than a full peer-reviewed scientific publication.

Therefore, I would encourage the authors to rethink the scope of the paper. There are a several (compatible) options to increase the scientific value of the manuscript:

(1) focus on the scientific reasoning behind the choice of process parameterisations. This is quite well explained for the choice of the modelling scale (landscape units) but seems to lack for all the other equations that are presented (see also the specific comment below on the niche of the model).

(2) focus more on the technical and scientific challenges of the model development. Many technical and scientific challenges have to be overcome in translating the conceptual model (the equations) into a procedural model (the actual model code), and this is a relevant topic for this journal. Particularly the way that the model deals with scale issues (landscape units) is quite interesting and merits closer attention.

(3) focus on model applications and the scientific insights gained from them. This ideally includes comparison studies where the performance of different models can be compared. This is much more useful than rather vague performance assessments such as "reasonable", "good", "sufficiently" (p 298) or a case study that shows the model in action. The current section (chapter 3) is short, and although it provides good links to existing studies, is not very informative as such. For instance, I could not really see which applications and which shortcomings were referred to "The above review of model applications showed several shortcomings of WASA-SED". This part can surely

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use a bit more detail.

Particularly if the authors wish to focus on option (2), I would like to make an additional suggestion: the best place to show in detail how the model is implemented and which design choices have been made is in the model code itself. Therefore, I am of the opinion that the scientific value of the current paper can be increased significantly by making the model code available. Since the model is available for free, I suppose the authors do not have commercial ambitions with the model which would inhibit publishing the code. Additionally, many different software licences are available that detail copyrights and avoid misuse (e.g., general public license, BSD license, MIT license).

A few specific comments

p286/24: large catchments with a size of several hundreds or thousands of km: is this the typical size of a WASA-SED implementation? Is this computationally feasible?

p286/1: why would they need to be deterministic?

Due to their extensive and detailed data and parameter requirements, these physically-based models are not applicable to large river basins

287/10-29: I think this section is not very clear. I suppose the model tries to fill a niche between fully distributed and data-intensive soil erosion models on the one hand, and simple lumped models such as (R)USLE on the other. But I am not sure what is exactly meant with "spatial representation of hillslope processes that are described for individual terrain components along the catena". It is also not really clear how this alleviates the problems found in the other mentioned models, especially since the model is also based on the USLE equation.

p289 eq2-5: may be better in a table?

p290/12: "can be applied": does this mean that each approach is implemented in the model at both scales?

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p291/18: no "i+1" in the formula??

p292/3: "it was furthermore assumed": is this about a specific application, or does the model always assume this?

p301/15: firstly -> first

Interactive comment on Geosci. Model Dev. Discuss., 1, 285, 2008.

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