Geosci. Model Dev. Discuss., 1, S168–S170, 2009
www.geosci-model-dev-discuss.net/1/S168/2009/

Geoscientific
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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.

E. N. Mueller et al.

Received and published: 23 March 2009

We would like to thank the anonymous reviewer for his/her valuable suggestions. In reply to his/her general comments, we agree that the presented WASA-SED model builds on previously published process descriptions and equations. However, the strength and focus of the WASA-SED model lies in its integrated multi-scale approach. This refers to the linking of the hillslope to the catchment scale and the integration of the three components hillslope, river and reservoir into a single model. Using its innovative scaling approach it enables an adequate upscaling of those processes that dominate water and sediment export of dryland catchments: runoff and sediment generation on the hillslope; water routing and temporary sediment storage in the river network; water and sediment retention in reservoir networks; aggradation and remobilisation patterns

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in large reservoirs. The employed upscaling approach preserves a high degree of process-relevant details (e.g. intra-hillslope profile and soil distribution) while maintaining a slim demand in computational power and storage. Thus, it provides a future option for tackling issues of water and sediment yield at the meso-scale by excelling over raster-based models, which require considerable higher computational resources or have to sacrifice spatial resolution. We acknowledge that we did not lay enough stress on this issue in our manuscript and can accordingly modify a revised version. Apart from that we still think that the manuscript matches the requirements of a "Model description paper", as laid out in GMD Journal White Paper. From the comments in GMDD we learned that there has been some confusion about the principal aims of the GMD journal. As clarified by its Executive Editor Dan Lunt, GMD will allow "peer-reviewed publication of model descriptions" and the respective paper will not necessarily "address or solve outstanding scientific issues, or reach profound conclusions" (Lunt, 2009). In that context we regard our manuscript as such a "Model description paper" as defined by GMD. We consider this paper to set the "benchmark for other papers in other journals which will typically apply the model to scientific questions" (Lunt, 2009). Nevertheless, we gratefully acknowledge the reviewer's suggestions on how to extend and improve the paper, which we may implement in an revised version as follows: Focus 1: Scientific reasoning for process parameterisation We will enhance the scientific reasoning of the chosen model descriptions. The reviewer's definition of the "niche" of the model seems particularly elucidating and will be included. Focus 2: Scientific challenges of model development We chose not to delve into the topic of the numerical code of the model since this does not provide any additional scientific value in our opinion. We will, however, make the source code available in an appropriate manner as suggested by the reviewer. Focus 3: Model applications and insights As described in the original manuscript, the model has been applied to a variety of cases. Since all the respective results have been published or are awaiting publication elsewhere, exhaustive details of these applications cannot be repeated in this paper. Instead, we will provide a more detailed comparison of the case studies, their foci,

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strengths and shortcomings in the respective chapter. Apart from that we encourage any further comment from reviewers or third party that may help us improve the quality of the manuscript.

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Lunt, D. (2009). Focus of GMD. Interactive comment on Geosci. Model Dev. Discuss., 2, 1, 2009. URL: http://www.cosis.net/copernicus/EGU/gmdd/2/S4/gmdd-2-S4.pdf, accessed 2009/03/16

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