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Discussions

Interactive comment on "Distributed model of hydrological and sediment transport processes in large river basins in Southeast Asia" *by* S. Zuliziana et al.

Anonymous Referee #2

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The manuscript entitled "Distributed model of hydrological and sediment transport processes in large river basins in Southeast Asia" by Zuliziana et al. describes the development of a large-scale sediment transport model based on existing submodels of hydrology, soil erosion, and sediment transport and deposition. The models were applied to the Chao Phraya and Mekong River basins in southeast Asia.

Although the application of process-based models to simulate sediment transport in large river basins is scientifically challenging, I do not think that the work presented in this manuscript add much novel knowledge and understanding of sediment transport at the scale of large river basins. The main reason for this is that the Nash-Sutcliffe ef-

ficiency coefficients for the simulated sediment concentrations are in general negative. This would imply that the model provide poorer predictions than the mean observed suspended sediment concentration. The predictions of the sediment loads are better in terms of their Nash-Sutcliffe efficiency coefficients, but this can mainly be attributed by the strong seasonal variation in discharge, which is typical for the monsoon dominated river basins. Moreover, the simulated discharge of the Chao Phraya Basin is strongly controlled by the dam operation rules based on observed discharges. The authors have not successfully convinced me that the model has added value over observed discharges and sediment concentrations for scientists or river basin managers.

Furthermore, the model approach seems rather traditional and may contain a number of flaws that remain undiscussed in the manuscript: 1. The hydrological hillslope model is based on the calculation of runoff generation in hillslope units. It remains unclear how large these units are and how the discharge is distributed across the apparently smaller gridcells of the sediment transport module 2. The sediment transport model does not include processes such as bank erosion and floodplain sedimentation. The manuscript lacks a discussion of the potential implications for model calibration and model predictions. 3. A number of model parameters have been calibrated, whereas other parameters have been calculated based on empirical relation reported in the literature. A clear justification of these choices is missing. 4. It remains unclear whether the parameters were calibrated in a spatially distributed manner based on for example soil type or land cover. It would be logical that the parameters as listed in table 1 were assigned based on soil type. The authors should provide more information how the soil types were aggregated for this purpose. 5. The main outcome of this study seems the observation that sediment transport is more sensitive to the raindrop detachability index. However, the authors do not discuss the possible explanations for this. Can this be related to hydrological differences or to differences in soil type or land cover in the river basins?

Based on these major flaws I cannot recommend to accept the manuscript for publica-

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tion in HESS in its present form. I would recommend major revisions. These revisions should at least improve the discussion sections. The conclusions section should be rewritten accordingly.

Other minor comments p. 6756, l. 22: “recent”: I would not call a study from 2003 a recent study p.6758, l. 7: ground flow = groundwater flow ? (but this is also a form of subsurface flow) p. 6759, l. 21-25: more information should be provided on the resolution of the hydrological model; what is the size of the subbasins and flow intervals? p. 6762: N shields = Nshields p. 6763, l. 17: reference needed for equations 12 and 13 p. 6763, l. 18-19: is the d50 the same as the single sediment particle size p. 6764, l. 11: how was the cross-section area A derived? p. 6764, section 2.3 Dam = Reservoir p.6765, l. 19-21: what could be the implications of neglecting reservoir sedimentation in the Mekong River basin for the simulation of suspended sediment concentration and loads? p. 6766, l. 3-4: rephrase p. 6766, l. 67: more: more than what? p. 6767, l. 8-11: provide more details about the number of rain gauges and their distribution across the river basins. p. 6772, l. 22: why have the authors used the GTOPO30 DEM for the Mekong River basin instead of the SRTM DEM?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 6755, 2015.