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Hydrology and Earth System Sciences
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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.

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Dear Editors and Reviewers,

We highly appreciate the detailed valuable comments of the referees on our manuscript of 'Distributed model of hydrological and sediment transport processes in large river basins in Southeast Asia'. The suggestions are quite helpful for us and we incorporate them in the revised paper.

In response to the raised comments, we have revised and attempted enhancement. And we hope the Reviewers and the Editors will be satisfied with our responses to the

'comments' and the revisions to the original manuscript. We would be very appreciated if you could consider our manuscript for publication in your journal. We Look forward to hearing your final decision for Hydrological Earth System Science.

Our response to the referee's comments are as follows;

Q1. The work presented in this manuscript did not add much novel knowledge and understanding of sediment transport at the scale of large river basins. The main reason for this is that the that the Nash-Sutcliffe efficiency coefficients for the simulated sediment concentrations are in generally negative. This would imply that the model provide poorer predictions than the mean observed suspended sediment concentration. A1. The authors agree with the referee mention that the NSE coefficient for sediment concentration are general negative. But, the major objective in our model is to simulate sediment load. We consider, our model successful simulate sediment load based on the value of NSE is within the range of acceptable value of model performance. As far as we know, is difficult to model sediment concentration and also due to lack of observation data in large river basin resulting the authors to give priority to sediment load. The authors agree that our model still have a lack and we believed our model performance may be further improved by incorporating the uncertainties in terms of model inputs, parameters and structure which may have influenced the model performance.

Q2. 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. A2. The authors agree that the strong seasonal variation in discharge can contribute to the Nash- Sutcliffe efficiency coefficients in prediction of sediment loads. The authors consider to add this information in discussion part.

Q3. 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 grid cells of the sediment transport module.

A3. In hydrological hillslope model, the runoff was generate in hillslope units. The hillslope unit is viewed as a rectangular inclined plane with a defined length and unit width. The inclination angle givens by the corresponding surface slope. Figure 1 show the concept of hillslope based on distributed hydrological model used in this study.

Q4. 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. A4. The authors agree to include the mention of lacks of the model is did not include sediment process such as bank erosion and floodplain due to limitation of the available data.

Q5. 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. A5. Some of the parameters was calibrated, whereas other parameters have been calculated based on empirical relation reported in the literature. A justification of these choices is because due to limited information about the calibrated parameters especially for large river basins. Some of the calibrated parameters was related with soil type and information related with the soil type is easily to find and referred from other studies. Moreover, in this study, the authors did the sensitivity analysis to check which parameter are most sensitive. A justification was added in the manuscript.

Q6. 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. A6. The parameters were calibrated in a spatially distribute manner based on the soil type. The authors already explain in the manuscript. The soil types were aggregated from global soil map, which each type of soil was aggregated into big group. More information was include in the manuscript.

Q7. 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? A7. The authors agree to add more explanation about the sensitivity of raindrop detachability index due to soil type in the manuscript.

Q8. p. 6756, l. 22: “recent”: I would not call a study from 2003 a recent study. A8. Removed "recent" in the manuscript.

Q9. p.6758, l. 7: ground flow = groundwater flow ? (but this is also a form of subsurface flow). A9. Yes.

Q10. 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? A10. Information about hydrological model in the manuscript will be added.

Q11. p. 6762: N shields = Nshields A11. Revised in the manuscript.

Q12. p. 6763, l. 17: reference needed for equations 12 and 13. A12. Reference will be added in the manuscript.

Q13. p. 6763, l. 18-19: is the d50 the same as the single sediment particle size. A13. Yes, d50 is the same as the single sediment particle size. Q14. p. 6764, l. 11: how was the cross-section area A derived? A14. Cross section area A is derived from the water depth of river and width of river channel.

Q15. p. 6764, section 2.3 Dam = Reservoir. A15. Considered to be revise in the manuscript.

Q16. p. 6766, l. 3-4: rephrase. A17. Agree to rephrase in the manuscript.

Q18. p. 6766, l. 67: more: more than what? A18. The authors cannot find the word ’more’ in the mentioned page.

Q19. p. 6767, l. 8-11: provide more details about the number of rain gauges and their distribution across the river basins. A19. Agree to provide the details about the number of rain gauges and showed the distribution across the river basins in Figure 2 (Chao Phraya River Basin) and Figure 6 (Mekong River Basin) in the manuscript.

Q20. p. 6772, l. 22: why have the authors used the GTOPO30 DEM for the Mekong River basin instead of the SRTM DEM? A20. The GTOPO30 DEM was used for Mekong instead of the SRTM DEM due to better quality in resolution especially in the downstream part of Mekong River Basin (Cambodia part), known as flat area.

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

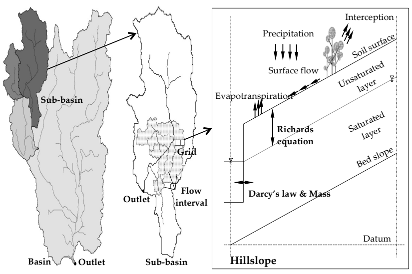

Figure 1. The concept of hillslope based DHM where hydrological processes and river routine take place

Fig. 1. The hillslope concept in distributed hydrological model