

## ***Interactive comment on “Process-based distributed modeling approach for analysis of sediment dynamics in a river basin” by M. A. Kabir et al.***

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(C = comment; R = response) C 1: Page-5686: Abstract I suggest re-writing the abstract starting with a sentence that describes the main issue of this paper [for example the issue for this paper could be: ‘This paper presents a process-based .....] followed by method, major findings and the main conclusion [i.e. implication of those results]. Delete Line 2-7 and line 25-26.

R 1: We appreciate this suggestion. But, before going to the specific wordings about the development of this study at “Abstract” section, the lines (Line 2-7, page 5686)

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that describe the importance, background and the main concern of this research are relevant to mention here. Similarly, lines 25 and 26 are seemed to be relevant to summarize about the content of this paper very specifically in the “Abstract” section.

C 2: Page-5689, Line 24 The word ‘suitable’ should be replaced with ‘appropriate’ R 2: Page 5689, Line 24: the word ‘suitable’ is replaced by ‘appropriate’ word.

C 2: Page-5692, Line 14-15 ‘In this modelling approach’ is repeated. It is not needed in line 14. R 2: Page 5692, Line 13-14: The sentence “Thus, the river and hillslope sediment dynamics have been modelled separately in this modelling approach.” is revised by “Thus, the river and hillslope sediment dynamics have been modelled separately in this study.”

C 2: Page-5692 Equation (3) need to be mentioned in the text. R 2: Page 5692, Line 21: The following sentence is added “The total Kinetic energy then can be described by Eq. (3).”

C 3: Page-5692, Some symbols are not defined but some are defined more than once. Need to check all through the paper R 3: Page 5692, A thorough check has been made over the symbols of this paper. Meaning of different symbols of this paper is also appended at the end. Please find the details in “reply to referee #1 comment”.

C 3: Page-5693, Line-4 Delete ‘0.9 to’ R 4: Page 5693: Line-4, deleted ‘0.9 to’ from this line as suggested.

C 3: Page-5693, Line-15 ‘Derived by Parsons’- Need reference for this. R 3: Page 5693: Line 14-17: The sentence “The use of rainfall intensity and raindrop diameter relationship (Eq. 6) derived by Parsons as described in Jain et al. (2005) makes the latter mentioned water ponding correction factor easier to estimate” is replaced by “The use of rainfall intensity and raindrop diameter relationship (Eq. 6) derived by Laws and Parsons (1943) as described in Jain et al. (2005) makes the latter mentioned water ponding correction factor easier to estimate.”

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Then, the following reference is added in page 5706 (after the line 32 and before the line 33).

Laws, J. O. and Parsons, D. A.: The relation of raindrop size to intensity, Transactions, American Geophysical Union, 24, 542-460, 1943.

C 3: Page-5694, Line-23 Delete 'also' R 3:Page 5694, Line 23: 'also' is deleted as advised.

C 3: Page-5695, Line- 15 The word 'surface grid' is not appropriate. R 3: Page 5686, Line 14; Page 5689, Line 27; Page 5695, Line 15, 18, 24; Page 5696, Line 3, 5, 7 The word 'surface grids' is replaced by 'land grids' Page 5710: "(a) Surface grids" is replaced by "(a) Land grids" Page 5691, Line 6: The word 'surface grid' is replaced by 'land grid'

C 3: Page-5695, Line- 26, 27 Rewrite these two lines. For example 'We used ArcGIS 9.3 to generate .....' R 3: Page 5695, Line 26, 27 and Page 5695, Line 1: The sentence "GIS software, ArcGIS (version 9.3) developed by Environmental Systems Research Institute (ESRI) has been used to generate river network and flow accumulation maps from a digital elevation model." is revised by

"ArcGIS 9.3 developed by Environmental Systems Research Institute (ESRI) has been used to generate river network and flow accumulation maps from a digital elevation model."

C 3: Page-5697, Line- 9 Rewrite the sentence as 'Measured hourly water height and sediment concentration data are available.....' R 3: Page 5697, Line 9: The sentence "Hourly measured daily water discharge data is available only in flood peak hours." is rewritten by "Measured hourly water and sediment flow data is available in flood peak hours."

C 3: Page-5697, Line- 9 1-h time step for 500 m grids seems large. Please check Courant condition carefully. R 3: Page-5697, Line 9-10: Courant condition is checked

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in every steps using 1-h time step. If it is not satisfied in any steps then the time step is rearranged and everything is recalculated unless it is satisfied. That is why; the following sentence is written there: "The model stability checking and temporal resolution refining have also been carried out based on the satisfaction of Courant condition."

C 3: Page-5697, Line- 24 Add a reference that justifies using constant runoff coefficient. R 3: Page-5697, Line- 24, 25: The sentence "It revealed that a runoff coefficient of 0.72 has allocated water distributions properly for hydrological simulations at Abukuma River Basin." is revised by "The concept of runoff coefficient is still widely used for many practical purposes (Merz et al., 2006). It is revealed that a runoff coefficient of 0.72 has allocated water distributions properly for hydrological simulations at Abukuma River basin."

Then, the following reference is added in page 5706 (before the line 33).

Merz, R., Blöschl, G. and Parajka, J.: Spatio-temporal variability of event runoff coefficients, Journal of Hydrology, 331(3-4), 591-604, 2006.

Comments on Tables

C 4: Table 2: It is actually not needed. Instead you can refer the paper that describes model development. Table 3: Same to previous comment. R 4: This modelling approach consists of widely used and derived continuity, momentum and other physically based well established transport equations. But, these equations are customized in this research approach using process-based distributed hydrological model (DHM by Dutta et al. 2000 as mentioned in the paper) which is innovative in this context. The modelling approach is presented in table 2 and 3. Hence, these 2 tables are required for this paper.

C 5: Table 5: Use sentence case for the title of the Table R 5: The title of 'Table 5' is rewritten by using sentence case as follows: "Table 5. Performance evaluation of

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hydrological and sediment modelling.”

C 6: Table 6: 4th column: replace Manning with Manning's n and replace (n) with (-) R 6: In Table 6: 'Manning (n)' is replaced by 'Manning's n'

C 7: Table 7: This information can be described in the text. R 7: The information provided in 'Table 7' is also described on Page 5702, Line 26-28

C 8: Table 8: This information can be described in the text. R 8: Page 5703, Line 10-11: The sentence “Therefore, simulated suspended sediments are found to be similar by comparing with a single observed data as described in Table 8.” is rewritten by “Therefore, simulated suspended sediments at different river gauging stations are found to be reasonable (less than 15% deviation) by comparing with a single observed data as described in Table 8.”

Comments on Figures

C 9: Figure 3: You can refer the relevant paper instead of adding the Figure. Figure 4: Same to previous comment. R 9: Figures 3 and 4 are modified figures and innovative products of this paper.

C 10: Figure 7, 18, 19: Rainfall bar chart at the top is not needed. R 10: Figures 7, 18, 19: Rainfall bar chart is relevant since mostly hydrology which is considered as the dominant factor for sediment dynamics in this research.

C 11: Figure 8: You have used n for Mannig's n. Here you can use N R 11: Since in Fig. 8, 10, 12, 20: 'n' (No. Of observation) is conflicted with 'Manning's n', No. Of observations are represented by 'N'. Please, find the attached ZIP file.

Please also note the supplement to this comment:

<http://www.hydrol-earth-syst-sci-discuss.net/7/C3098/2010/hessd-7-C3098-2010-supplement.zip>

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 5685, 2010.

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