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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "A Dynamic Bidirectional Coupled Hydrologic-Hydrodynamic Model for Flood Prediction" *by* Chunbo Jiang et al.

Anonymous Referee #2

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The manuscript presents a novel dynamic coupling approach of hydrologic-hydrodynamic simulation, where representation of flood processes and simulation can be potentially improved, and therefore a substantial research topic. However, unfortunately the performance assessment of the model has not been done properly and extensive enough to justify the strength of the proposed coupling scheme. For instance, the performance is only compared to UCMs, instead of BCM, as that's where the novelty value of DBCM lies upon and should be evaluated. Meanwhile, in the comparison to UCMs (section 4), the hydrological consideration using point source inflow boundary is not an appropriate method to support authors' claim (see below point 3).

I also think that the presentation of the manuscript can be much further improved in terms of language clarity, and figure presentation.

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More specific comments can be found below: 1) In Section 4, Scenarios in table 2 and their related text: It is not sure how the result from the hydraulic model in Case B being transformed into the spatial distribution of water depth, e.g. in figure 20.b. Is the HEC-RAS setup, i.e. in case B, considers both 1D & 2D unsteady flow simulation (i.e. in HEC-RAS v.5) OR just 1D + GIS "bathtub method" OR just 2D? Also please provide at least table or information for these setups in the supplementary so that it benefits others who may want to compare in the future.

2) I would also consider improving the presentation of figures 20 & 22, e.g. to remove the information of the elevation in the backgrounds and they may only confuse readers with many colors. Instead, since the authors validated vaguely with the record of water depth reported in the urban areas, the addition of extent, e.g. hollow polygon of these urban areas would be more useful. This could also point out further the claim of the author regarding case A failing to simulate flood in the urban areas (lines 488 -495), or rather parts of the urban areas (higher elevation).

3) Line 495-498, with regards to mentioned reasoning of case A and B failing to simulate the flood depth at the higher elevation further from the river bed, I would add the obvious reasoning is the fact that case A and B contains NO distributed hydrologic modelling, they only consider point sources inflow boundary conditions obtained from SWAT, and therefore none of the spatial rainfall distribution is considered. Such failure has NOTHING to do with the lack of dynamic nor bi-directional coupling method. Therefore, the author's approach for the evaluation/ comparison is not appropriate to prove the strength of the author's DBCM.

4) Since the BCM coupling model (i.e. MIKE SHE + 11) is described timely and only compared conceptually along with author's proposed DBCM and UCM, why is the DBCM is only compared with UCM in terms of performance (instead of all 3)?

5) The performance of bi-directional against uni-directional coupling for flood modelling has already been compared/accessed and known overtime in literatures for its im-

proved water transfer dynamic representation and result when setup properly. Since the author's novelty for the coupling approach is emphasize on the improved representation of changing extend of boundary or in other words spatial-dynamic on top of the BCM, I would say the strong focus of the finding should be on the performance assessment of author's DBCM over BCM instead of the obvious UCM vs DBCM.

6) Line 115, . . .involves the "processes of precipitation"? What does it mean within the context?

7) Line 430-440 and Figure 18, not very clear, please provide a better legend for the soil type, what they mean instead of meaningless abbreviation only and imply for the model, e.g. relating to SCS number or others. Also, please consider providing appropriate reference & source to data inputs like GDEMV2, LULC, and soil type database.

8) Line 443, The selected coefficient of rainfall and floods. . . in table 2 & 3, I think you meant Table 3 & 4 instead. Also 'coefficient of flood' is not appropriate.

9) Line 483, "The red cycle. . .urban area"? Even if it is "circles/ points", I understand they are discharge comparison site (p1, 2 & 3).

Minor: Figure 17 & 18, the DEM information/ figures are repeated, and besides they are also shown differently/ not consistent.

Figure 19, I suggest "Simulated Discharge (SWAT)" instead of "Calculated Discharge".

Figure 20 & 22, considers revising the legends (incl. the scale) into one single space since they are the same rather than repeated in 2 separate figures, currently It may give the impression that only elevation legend applies to figure a while depth only to figure b.

Table 2, "outflow" instead of "out flow".

Line 340, "slopes" instead of "lopes".

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