

Interactive comment on “A Synthesis of Space-time Variability in Multi-Component Flood Response” by Yiwen Mei et al.

Yiwen Mei et al.

manos@engr.uconn.edu

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The authors would like to thank the Anonymous Referee #1 for his/her critical points. They are all very important aspects that helped improve the soundness and quality of the presentation of our results. Below is description of revisions addressing the Referee's comments. In the attachment we include marked-up document of the revised manuscript.

Specifically, there are four points in the Referee's comments. In point #1, the Referee asked for more emphasis and discussion on comparison of the analytical framework results with the observation. We therefore included additional scatter plots of hydrograph properties derived from the analytical framework with respect to the observation in the original Figure 10. Corresponding statistics have also been added in the original Table

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4. This resulted in major revision of Section 5 and paragraph 5 of Section 6. Please refer to these sections, as well as Figure 10 and Table 4 of the revised manuscript.

In point #2, the Referee suggested that we analyze and discuss more deeply the reasons of lumping hillslope and channel flow velocity in our new framework. Here are our responses. First, it should be noted that the hillslope and channel routing processes are considered individually by CREST model and thus the runoff routing time Θ attained by the analytical framework should represent the sum of routing times of both processes. Besides, given that CREST uses the same parameterization to model these two routing times (they only differ in terms of parameter values), we see no additional benefit for the analytical framework, and rather an increase of framework complexity, to decompose runoff routing into hillslope and channel routing. To make our argument clearer, we added discussion in lines 27 to 30 on page 5 and lines 22 to 27 on page 6.

In point #3, the Referee suggested to show the values of terms for the two pilot events because they are characterized by different space and time patterns. Therefore, we added descriptions for the value of terms of the events and their implications in lines 6-7 of page 5, lines 22-24 of page 8, lines 9-10 of page 10, lines 19-20 of page 11, lines 18-20 of page 12 and lines 22-23 of page 13. The reason we did not add this information in the tables is because this will make the tables very long (three times the size of the original table). Also, since the values of these terms for the pilot events have already been shown in the figures, we feel that adding such information in text should be sufficient.

The main concern in point #4 is the hydrologic representativeness of the CREST simulation results, which in turn refers to the representativeness of the analytical framework. To articulate this point, we added content to describe the value of error metrics of the two pilot events in lines 5-7 of page 5. Also, we refer to the content provided in lines 32-34 of page 4 and lines 2-4 of page 5 for the performance of the simulations.

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Please also note the supplement to this comment:
<http://www.hydrol-earth-syst-sci-discuss.net/hess-2016-255/hess-2016-255-AC1-supplement.pdf>

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