

Interactive comment on “A fluid-mechanics-based classification scheme for surface transient storage in riverine environments: quantitatively separating surface from hyporheic transient storage” by T. R. Jackson et al.

Anonymous Referee #3

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General Comments: I greatly appreciate the proposed approach to handling the classification and influence of STS RTDs based on field based measurements. The MS is well written and the information clearly presented. My overarching suggestion is in regard to the application of this research. A clear path regarding the implementation of this fluid mechanics approach within the context of the transient storage models is not provided. There is mention of deconvolving the theoretical STS RTD from the transient storage RTD, but this is mentioned in passing without a reference to recent work along these lines (e.g., Gooseff et al. 2011) or discussing how this could be accomplished.

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Along these lines, a more complete discussion regarding the practical implementation of these ideas within the context of two storage zone modeling seems necessary. While it appears the fluid dynamics literature review is quite thorough, a discussion within the context of existing transient storage literature would result in a more significant impact and make the paper more complete. For example, how could these RTDs be used within the current transient storage modeling approaches? This could include classic two zone TSM modeling approaches (e.g., Briggs et al. 2009), different two zone model parameterizations (e.g., Neilson et al. 2010), or approaches where different RTDs can be incorporated (e.g., Worman et al. 2002). Is there a way to use the actual measurements necessary for the fluid dynamic STS relationships past establishing RTDs? For example, could the measurements be used to estimate additional parameters for transient storage modeling? In other words, with all the measurements describing the STS zones, depending on the representative RTD, could these data be used in reach scale model parameterization (e.g., provide an average measure of A_s)? Would this be necessary? Last, I think it is important to discuss the application of these relationships to real systems that are significantly more complex than the idealized situations presented within the MS. It is important to acknowledge that in reality, many of these types of STS zones do not occur in isolation (meaning that an STS zone may consist of one or many types) or these zones may not fit within the types described within the MS. Are there ways to deal with this sort of complication?

Specific Comments: Within the MS, it would be useful to ensure that the fluid dynamic terminology is clearly defined the first time each term is mentioned (e.g., Kelvin-Helmholtz instabilities, backward and forward facing steps, etc.). This would be useful for the intended audience that may not have easy access to appropriate definitions.

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