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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Open check dams and large wood: head losses and release conditions" *by* Guillaume Piton et al.

Anonymous Referee #2

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General comments: I carefully read the manuscript titled "Open check dams and large wood: head losses and release conditions" submitted by Piton and co-authors to the Journal Natural Hazards and Earth System Sciences and currently undergoing a thorough open discussion process. The authors tackle a subject of utmost interest describing the behavior of large wood (LW) at variously designed open check dams, assessing quantitatively the increase of energy dissipation and thus the flow level at the structure due to accumulating of LW in various fashions and attempting to decipher the LW release mechanisms which may trigger subsequent hazard processes potentially resulting into severe damages at farther downstream located risk hotspots. In investigating these topics, the authors applied an experimental approach and conducted an extensive research program. This enabled them on the one hand to gain

important insights into the physical processes of LW entrapment and overtopping and to provide for estimates of the relative overtopping flow depths which may prove useful in engineering design endeavors. In light of these preliminary considerations the covered contents fit into the range of scopes of the Journal further contributing to improve our understanding of both the interplay of LW with instream structures and the potent hazard triggers which may result from this interaction. As clearly emerges from the previous paragraphs I value the proposed research and the experimental approach which underpins it, I also contend that the employed experimental setup (i.e. inclined channel featuring constant width with an "insertion" of instream structures of different geometries and designs) might not reflect the entire variety of topographic settings real retention basins and check dam structures are inserted in. If the width of the channel was variable and if, in particular, the available retention volume for all constituents of wood laden flows increased behind the interfering instream structure, LW could be accommodated differently in space due to a more variable spectrum of flow patterns. Different longitudinal profiles (i.e. milder slopes in proximity to the check dam if compared with possibly steeper feeding channels) could also influence the LW accumulation upstream of the considered instream structure. Hence, I motivate the authors to comment of these issues, since the interested reader needs to clearly understand the limits of knowledge transfer related to your findings. I also argue that the way how LW is approaching the interfering instream structure may co-determine the blockage behavior. It could have been insightful to explicitly consider the peculiarities of LW influenced flow regimes rather than trying to supply LW to make the jam "supply unlimited" as is stated by the authors. To reiterate on this point, I think that the LW pieces arrival scenario may play a relevant role. The LW congestion (sensu Braudrick et al., 1997) or more recently described hyperconcentrated LW flow regimes (Ruiz-Villanueva et al., 2019) might play a crucial role in determining the blockage mechanisms, rightly due, as the authors point out, to both drag forces and buoyancy, to particular entanglement mechanisms between LW pieces and to friction forces between LW and exposed structure surface. I think that in their discussion the authors should deal with these issues and

based on their findings provide hints for specific future research. More generally I'm also convinced that the experimentally simulated discharge vs time relation (i.e. flow hydrograph) could indirectly exert an influence on the LW blockage and overtopping behavior. Falling limb scenarios seem not to be considered in the applied experimental protocol. To conclude this general comments section, I also share most of the concerns raised by the other anonymous reviewer. So without any further redundancy, I suggest a major revision focusing on the aforementioned both content and form related issues. Additional specific comments: Abstract: L11: It would be better to rephrase "Large wood (LW) tends to accumulate against such structures" to "Large wood (LW) tends to accumulate at such structures".

L14: It would be advisable to rephrase "to estimate how high is the overflowing depth atop the structure" to "to estimate the overflowing depth at the structure".

L19: "is about 3-5 the mean log diameter". I'd write "is about 3-5 times (or Đě) the mean log diameter".

L23-25: Please check this last sentence and enhance its readability.

L26 Keywords: I'd put Large Wood instead of Woody Debris.

1 Introduction:

L70: Please reformulate the entire sentence to improve its readability.

2 Computing open check dam discharge capacity

L102: Check the font of z2 in the figure caption. It seems not to be consistent with other mathematical symbols.

L104: The caption of Figure 1 should end with a full stop.

L111: $\sqrt{2}$ðİŚŤ is a common factor and it may be brought outside the bracket. The same suggestion applies to the second term in equation 4.

3 Materials and Methods

L134: Instead of referring the reader to the research report of Piton et al. (2019b) please provide a sketch of the flume. Instead, please try make the difference of this work with respect to the cited research report explicit.

3.3. LW mixtures

It would be an added value to provide more background on reasons for the selection of these specific mixtures.

L158: There seems to be an inconsistent link to the figures in the supplementary material: (Figure 3 and Erreur ! Source du renvoi introuvable.-3 in supplementary material). Please fix it.

3.4. Experimental protocol

L174-175: Is there a deeper logic for the choice of the number of runs. Are these numbers sufficient to capture the randomness of the LW jam formation?

L190: h0 seems to be in the wrong format. Homogenize with the other employed mathematical symbols.

Caption of Figure 4: The caption of this figure should be expanded to explain how to interpret the wealth of information displayed in the figure.

L204: I'd change "accumulation against. . ." into "accumulation at. . .". Maybe even more rigorously "accumulation upstream of.."

L247: 4.2 LW-related head losses and stage –discharge relationships. Insert a space after –

L268: Change "both coefficient" into "both coefficients"

4.3. Release conditions

L307-308: Furlan (2019) also studied the effect of log density that was ignored in this

study. I think this should be explained. Is density unimportant? If yes, why?

Figure 10: Personally I find the figure a bit cryptic. On the horizontal axis “the fraction of large wood released is considered. In the legend the % released with circles of different sizes in displayed. Is there a redundancy here? Please explain.

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