RE: *NHESS 2017 376 Schwindt et al.: Experimental study of sediments traps permeable for frequent floods*

Authors response

Overview

The authors introduce a new concept for the design of open check dam (the introduction of a guiding channel) and study through experiments its interaction with different sediments retaining techniques.

The work presented by the authors is very interesting but needs some corrections and additions before its publications.

Dear Reviewer,

Thank you for the time you took for reviewing our Manuscript. We appreciate your comments and we applied them to our manuscript according to the detailed responses. The updated manuscript still requires the Editor's invitation that we hope to receive soon.

Kind regards,

the Authors

The following are the detailed comments and specifications.

Introduction

Last sentence too long and confuse: please rewrite it.

We improved the introduction, also accounting for the comments from Francesco Comiti (RC 1) and Reviewer 3.

Design approach for permeable sediments trap

The orientation of figure 1 shows a channel with an adverse slope. Could be it possible a figure with the channel inclined along the flow direction?

Our main study objectives address the deposition area and the barrier (check dam) which are only visible from an upstream point of view. We created Figure 1 based on a CAD drawing where the channel has a geometric slope in the flow direction. If we had changed the view angle, it was not possible to show the target elements of our study. Thus, the CAD model that constitutes Figure 1 is correct regarding the landscape and structure geometry. We hope that you agree that we kept Figure 1 as it is, because changes in the view angle would reduce the comprehension of the elements in our study.

Moreover, authors should introduce an insert or a new figure that explains the possible cases of open barriers: simple openings, bar screen or a combination of them. In present figure only the bar screen is visible.

A number of standard literature discusses and describes the barrier types and their openings. Any reproduction of these figures or only similar representations in a journal article require copyright authorizations. Even though we agree that an overview on existing barriers can be interesting for the reader but it is not crucial for understanding our study. We added a paragraph that cites sources of *check dam design charts; this literature includes the phd thesis of the main author, which is publicly available (we added the public access url in the list of references: Schwindt, 2017).*

Experimental set up

The Microsoft Kinect V2 seems and adapter rather than a motion-sensing camera

The manual mentions the device as "consumer-grade RGB-D sensor", i.e., neither camera nor adapter. We changed the term "camera" to "device" to avoid confusion.

Parameters and dimensional considerations

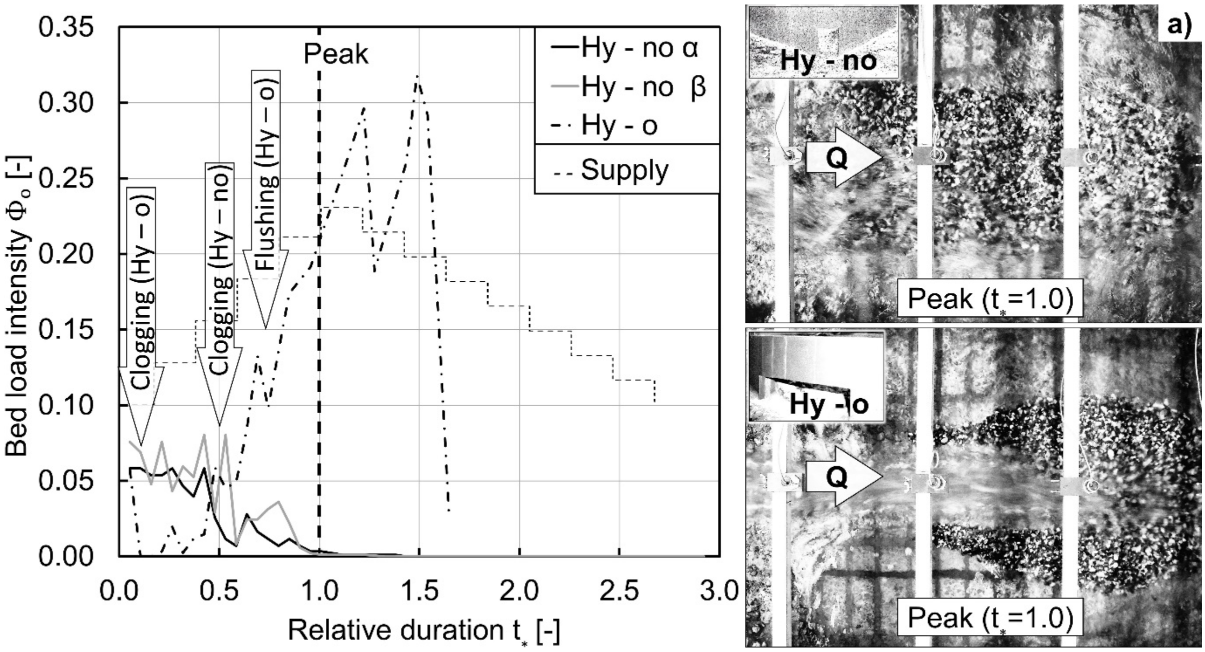
About dimensional analysis the writer has some concern about the resulting dimensionless quantities. The dimensionless quantities should have at least one of the chosen fundamental variables. Authors should justify the presence of dimensionless quantities without them.

We choose this set of fundamental variables that suits our analysis of sediment transport-related phenomena, as we consider bed load transport as the principal process in our study. We use ratios of other base variables, e.g., for hydrodynamic parameters, where our set of fundamental variables is not accurate (Yalin, 1977). These parameters are, e.g., the discharge where we use the bankfull discharge of the guiding channel for normalization, or the duration of the hydrograph. Prior to our analysis, we also considered a normalization of discharge or time based on the fundamental variables but such representations are not meaningful for the interpretation of the results. If we were applying the fundamental variables to the time, then $t^* = t/sqrt(g \cdot D_{84})$*, i.e., a variable that has no meaning for the analysis. Nevertheless, all geometry-related dimensionless parameters result from the fundamental variable of the* D_{84}*, where the set of fundamental parameters corresponds to the one used by Einstein (1950) to derive* Φ_i*. Further discussions on the set of fundamental variables and dimensional analysis are included in the main authors phd thesis (Schwindt, 2017) and in the former articles that originate from previous adjustments of the same experimental setup (Schwindt et al. 2017a, 2017b, 2017c). However, we cannot find an accurate place for these explanations in the dimensional analysis-section without dispersing the reader from the main objective of our in the journal of Natural Hazards and Earth System Sciences.*

Evolution bed load transfer through the barrier

About Figure 8, could be it possible to add the inflowing sediment rate Φ_i?

We considered adding the sediment supply rate but the graphs became very messy and hard to read – here an example of Fig. 8a, where the graph density is still much lower than in Fig. 8c:



In particular, the range, where the bed load outflow and inflow rates are present, is very hard to interpret. This is why we opted to present the sediment supply rate apart from Fig. 8, with the hydrograph in Fig. 7.

Applications and limits

The sentence at lines 17-21 of page 16 should rewritten clearly. For istance, "(steps 8 and 9 in Piton and Recking, 2016a)" should be inserted after "is similar to……." .

We adapted the text as proposed (with the new numbering, the paragraph is in Section 5.4).

Bed load intensity in Figure 7 is time variant while in Figure 14 is constant.

Figure 7 shows the hydrograph test while Figure 14 shows the flushing test. We added information on the constant sediment supply at the beginning of the flushing experiments in Section 3.4 (Experimental procedures).

Finally, I would suggest the authors to give just some more detail on sediment flushing and its consequence on the downstream area.

We added a comment on the consequences of sediment flushing for downstream reaches at the end of the discussion section 5.2 (Sediment flushing).