

Interactive comment on “Interactions between channels and tributary alluvial fans: channel adjustments and sediment-signal propagation” by Sara Savi et al.

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Received and published: 9 January 2020

The manuscript presents an experimental investigation into the impact of tributary channels, in particular the presence of alluvial fans, on river channel behavior. The results from six experiments are presented to understand the impact on channel slope, profile, aggradation/incision patterns and sediment dynamics. This is an interesting study and I believe that it adds to established literature in this field and represents a contribution to scientific knowledge in this area that would be of interest to the reader-ship. I support publication of the manuscript following some modification. The following aspects should be addressed:

*We thank the reviewer for the support and the constructive review. Answers to the raised points are reported in-line with the review.*

1. Section 2 could be reduced and integrated into the general context provided in the first section; there is repetition of much of the material between these sections and an overview of basic theory that could be condensed

*As suggested by the reviewer, we strongly reduced Section 2 and moved few of the important information to the introduction (e.g., lines 97-101 in the manuscript version with changes).*

2. In the methods section there needs to be further clarification on how the input conditions were determined for the experiments, i.e. how were the initial  $Q_w$  and  $Q_s$  values decided upon? How was the ratio between tributary and main channel initial size,  $Q_s$  and  $Q_w$  calculated? There are different  $Q_w:Q_s$  ratios between group 1 and group 2 to promote aggradation or incision but how did you determine what was an appropriate ratio? Also why was there only one  $Q_w$  change in the T\_IWMC experiment when there were 2 changes for the tributary conditions in the group 1 experiments

*To decide the initial  $Q_w$  and  $Q_s$  conditions we calculated the  $Q_w/Q_s$  ratios of ca 40 alluvial rivers of northern Argentina. These ratios ranged between  $10^{-2}$  and  $10^{-4}$ . To define the values for our experiments, we finally ran several (around 10) short test-runs and observed which ratios guaranteed a good balance between sediment transport and deposition. We have added a sentence to explain this choice in the method section.*

*The size of the two channels was defined based on the size of the wooden box. We performed a single change in  $Q_w$  in the T\_IWMC experiment to explore what may happen in a glaciated catchment following the modern rise in temperature and the consequent glacier retreat (similarly to what happened to many mountain rivers). This motivated our choice of a single change in Group 2 compared to Group 1 experiments. We have added a sentence to explain this reasoning in the text.*

3. There are a lot of figures in the paper, these are presented to a high quality and are informative but the number is overwhelming at the moment and some consideration could be given to reducing the number of these in the main paper and moving some to the supplementary information (i.e. Figure 6 could be removed, and it is not necessary to have both Figures 9 and 10). Additionally, the figure headings are very long and often repeat what is said in the main text – therefore this information could be removed from one or other of these to make the paper overall more concise.

*According to the reviewer's request, we have moved figure 6 and 10 in the supplementary material. We additionally reduced the headings of some figures (Figs. 3, 4, and the new Fig. 6)*

Minor changes:

1. Title: suggest revising the word “channel” and being more specific that you are referring to the main/trunk channel in a river

*Done.*

2. Line 74: there have been some papers that have explored the influence of tributary fans on main channels in the field (i.e. Giles, 2016 that you refer to later) and there should be some description hereof what these have shown

*We have added a short description to what Giles et al have described in their work. There are a couple of points in the text that refer to their work (lines 224-228, and 247-248 in the manuscript version with changes).*

3. Table 1 could be expanded (or a separate table used) to include a brief summary of each of the experiments (this is covered in section 3.2, but a concise summary for reference would be useful) and also including the duration of each experiment. The spin-up time for each could also be stated

*We have added a column with the duration of each experiment and the corresponding spin-up phase to table 1.*

4. Line 352: why is the Qs-out only recorded over a 10 second period rather than over the whole 10minute recording period?

*Qs\_out has been recorded over a 10sec period because the measure has been done manually, with a small container that we used to collect the material exiting the system. A manually measure over the whole 10min period would have been logistically impossible within the experimental set-up.*

5. Line 670 remove the colon at the end of this sentence, or remove the sub-section heading for 5.3.1 and 5.3.2

*Done.*

6. Be consistent in your use of hyphens with certain words, i.e. grain size and grain-size

*Thanks for pointing this out. We have checked through the paper and correct the wording.*