Earth Surf. Dynam. Discuss.,
https://doi.org/10.5194/esurf-2020-90-AC1, 2020

Earth Surface Dynamics Discussions
Open Access
EGU

Interactive comment on "Laboratory observations on meltwater meandering rivulets on ice" *by* Roberto Fernández and Gary Parker

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Received and published: 13 December 2020

Response to Reviewer No. 1 Prepared by Roberto Fernández on behalf of both authors

Thanks for your positive review and your comments. We really appreciate your time. Please see below a preliminary response to your comments, which we hope to address fully in the coming days.

Page 4: "Double-valued planforms" refers to channels, which in a Cartesian plane have two 'y' coordinates for a single 'x' coordinate (y = y(x) is not single valued).

"Meander bends typically show certain systematic deviations from simple Cartesian sinusoidal forms. Bends tend to be round and full, or 'fat', often to the point of possessing double-valued plan-forms, as Langbein & Leopold (1966) have noted." (Parker et al.

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Discussion paper

1982).

We will make sure to add the definitions for fatness and skewness. These terms come from the transformation of Langbein and Leopold (1966) intrinsic coordinate meander equation, to Cartesian coordinates. This transformation involves the generation of higher-order modes. The fatness and skewness coefficients are third order modes. See Parker et al. (1982) for details. In this manuscript, we use the forms derived from the wavelet analysis of Vermeulen et al. (2016).

Figure 7: Thanks for pointing this out. We forgot to remove the 'Flow direction unknown' bit in the legend after the photographer provided information regarding the flow direction.

Page 6: Are you able to expand on this comment? Are you questioning the statement or providing a recommendation?

Figure 10: This comes as no surprise. More than 80% of the fatness coefficients for the NCHRP alluvial rivers vary between -0.1 and 0.1 and have a median value that is very close to zero. Vermeulen et al. (2016) show results for four different rivers. Their distributions also have a median, which is close to zero, and the vast majority of the data lie between -0.1 and 0.1 (see Fig. 4 therein).

Page 7: There is indeed high variability but the largest measured sinuosity for the cm-scale channels is very close to the smallest measured sinuosity for the mm-scale channels. We will edit this paragraph to highlight this issue, avoid using the term 'very different', and acknowledge the high variability.

Figure 11: Well-spotted! Run 04 is almost a continuation of Run 03 but not exactly. After Run 03 finished, we put the ice block back in the freezer and attempted to add just enough water to cover the melt pond that formed upstream. In the process, some water made it into the channel and modified the shape and slope enough that we decided not to consider it the same run. We will include this clarification in the manuscript.

Page 7: Each of the centerlines shown in Figure 11 was analyzed following the approach described in section 2.3 (p.7 Lines 19-24).

Page 9 (lines 12 and 24): Yes! We will change gradient to difference.

Page 9 (line 20): Migration rates were made dimensionless with the average flow velocity. We will add this information to the methods section.

Page 11: The Bond and Weber numbers are defined when they appear in the text. They first appear in the last paragraph of page 10 and the definitions are included right after this paragraph at the beginning of page 11. We only report velocity measurements (and Reynolds numbers) for the cm-scale channels. The 'lack of flow velocity measurements' refers to the mm-scale channels.

Surface tension: Thanks for your comment. We will make sure to edit this section to make it clearer.

Page 11: Thanks for these references. We will take them into account for this section and add clarification on the different slopes observed in other experiments.

Page 11: Yes! This is essential and I am working to achieve that. Stay tuned.

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