

Ice jam formation at river confluences: comprehensive field investigation and comparison to laboratory-derived predictive equations

Notification to the Authors – Code and Data Availability:

The "Code and data availability" section of the manuscript: If the data are not publicly accessible (including cases where access is provided "upon request" or is missing), a clear and detailed justification must be provided.

Response: We thank the editor for this note. The "Code and data availability" section of the manuscript has been divided into three parts to provide a clear and detailed justification for each type of research output, in line with the Copernicus data policy:

Code availability: The code used to analyze and display the data was developed by the River Ice research group of Université Laval as part of the team's internal data-processing infrastructure. As this code is not the sole property of the authors of this manuscript, it is not publicly released at this time, but it can be made available upon reasonable request.

Data availability: All datasets used in this study are publicly available at Borealis, the Canadian Dataverse Repository, under a CC-BY 4.0 license (Charbonneau et al., 2026), at <https://doi.org/10.5683/SP4/QTWLIR>. The dataset has also been added to the reference list, cited as Charbonneau et al. (2026).

Video supplement: Field photos and videos are not publicly released at this time due to their large file size, but they could be made available upon request.

We hope this revised structure and the accompanying justifications satisfy the journal's requirements regarding data and code accessibility.

35 **Ice jam formation at river confluences: comprehensive field investigation and
comparison to laboratory-derived predictive equations**

General Comments

40 Comment: The structure and clarity of the manuscript have improved on revision. I appreciate the effort of the authors in addressing my prior comments. Some minor points for clarification are below.

Response: We thank the reviewer 2 for this positive feedback and for the additional careful reading of the revised manuscript. Below, we address each of the minor points raised in turn.

Comment 1 – Lines 38-40

45 Comment: This phrase, in the first paragraph of the introduction, could be unclear to a broad audience, as the definitions of 'consolidating' and 'toe' may not be widely known. Please could you rephrase: 'ice always began consolidating at the upstream end of the jam and stopped at the toe'.

50 Response: Thank you for this suggestion. The phrase has been rephrased to avoid undefined jargon. It now reads: 'the ice always began consolidating (i.e., compacting into a stable, rigid mass) at the upstream end of the jam and stopped at the toe (the jam's downstream end)'.

Comment 2 – Line 69

Comment: typo; apostrophe on authors'

55 Response: Thank you for catching this. The missing apostrophe has been added; the text now correctly reads 'authors'" where the possessive form is intended.

Comment 3 – Lines 130-136

60 Comment: This text describes the link between areas of sediment deposition and ice grounding at a discordant confluence. Is it possible to switch the position of the concordant and discordant confluences so that the description of the discordant confluence comes first? When reading I was not immediately sure why the sediment dynamics were at issue, so it would be helpful if the link were made explicit earlier in the paragraph.

65 Response: Thank you for this observation. We have kept the order of the confluence descriptions unchanged, as it follows the upstream-to-downstream presentation order of the confluences along the Chaudière River (CH-DL at km 103.4, CH-FA at km 97.5, CH-BSV at km 75.3), consistent with the presentation order used throughout the manuscript. Instead, to make the link between bed morphology, sediment deposition, and ice grounding explicit earlier, the following framing sentence has been added at the beginning of the paragraph, before the description of the CH-DL confluence: 'At each confluence, the bed morphology, either concordant or discordant, governs local sediment-depositional patterns, which in turn
70 determine where ice grounding is most likely to occur during low-discharge periods.' This sentence orients the reader to the relevance of sediment dynamics for ice grounding before the site-specific descriptions are introduced.

Comment 4 – Figure 1

75 Comment: the 'x's denoting the confluences are not easy to find when printed in black and white. Please could these be made more clear, perhaps by using a slightly thicker line?

Response: Thank you for this observation. We clarify that the 'x' markers in Figure 1 denote significant slope breaks along the river profiles, not the confluences. Nonetheless, these markers have been enlarged and their line weight increased to improve their visibility when the figure is printed in black and white.

Comment 5 – Line 264

Comment: typo; I think 'process' is meant instead of 'processes.'

Response: Thank you for pointing this out. We clarify that 'processes' (plural) is correct in this sentence, as it refers to two distinct ice jam formation mechanisms: the one observed at CH-DL (concordant bed configuration) and the one observed at CH-FA (discordant bed configuration), which are different from each other. To avoid any ambiguity between these two sentences, a related sentence at Line 605, which describes the single mechanism observed at CH-FA (resembling both process 6 and process 7), has been revised to use the singular 'process': 'Although the process observed resembles both process 6 and process 7, equations are only provided for process 6. Therefore, Eq. 6 and Eq. 7 (process 6) were tested at this confluence.'

Comment 6 – Section 5

Comment: The purpose of the use of hydraulic modelling is now very clear, thank you for the changes made to this section.

95 Response: We thank the reviewer for this positive feedback. No further changes were made to this section.

Comment 7 – Line 640

Comment: The role of empirical modelling is now more clear and I agree that simplified empirical models targeting decision-makers would be a useful addition to the existing physically based models. Given the risk of flooding due to ice jam formation and breakup I am a bit concerned that a purely data-driven/AI approach could incorrectly predict ice dynamics and result in incorrect decisions on the ground and loss of property etc. Perhaps it would be possible to use the data-driven alongside the existing physically based models to evaluate the physical basis of the prediction, this could be an additional source of verification for the new models?

Response: Thank you for this valuable suggestion and for sharing this concern, which we share. The following sentence has been added to the concluding paragraph of Section 8, before the sentence describing the opportunity provided by the collected data: 'Data-driven models should be used alongside the physically based models to evaluate the physical basis of their predictions and provide an additional source of verification.' This addition clarifies that data-driven approaches are intended to complement, rather than replace, the physically based framework, reducing the risk of physically implausible predictions being used in operational decision-making.

The authors hope that these revisions adequately address all comments. We remain available to provide any further clarification if needed.