

Interactive comment on “River predisposition to ice jams: a simplified geospatial model” by Stéphane De Munck et al.

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Reviewer #1

General comment

This paper explores ice jam predispositions along northern rivers using a geospatial modelling approach in which sets of fluvial geomorphological parameters are compared with ice jam occurrences. There is a high success rate of predicting ice jam locations, however some errors do occur due to the presence of sand bars and low water depths, variables not considered in the model. The approach does give a first assessment of the ice jam potential of rivers, hence, the paper is deemed publishable if the following minor revisions are considered.

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Authors' response

We thank the reviewer for his comment. It is true that the simplified model presented here gives only a first assessment of the ice jam potential of rivers. Hence, the paper shows that even with limited data, it is possible to get a good sense of the areas at risk for ice jamming. This work can then be further used to build a version of the model that would better take into account some local and more complex causes of ice jams.

Specific comments

The narrowing index (NI) for bridge peers is rather arbitrarily derived that can lead to over- or under-estimation of their effect on ice jamming. No consideration was given to the number of peers spanning across the bridge. Hence, the NI of a suspended bridge would have the same NI value as a bridge with many closely spaced peers. Could you please give an explanation of why this wasn't considered? Authors' response

This aspect was of course considered in the development of the model. However, the information about the different characteristics of the bridges is not always available or easily accessible. Therefore, to maintain the objective of a simplified model that can be quickly deployed on many rivers, we have decided in this version, to consider all bridges equal. On a local scale, one could easily take a bridge out of the analysis if he considers that the structure is not a factor of ice jamming. An improved version of the model would certainly have to take bridges characteristics into account.

Specific comments

Also on the subject of bridges, I find that bridge peers do not necessarily stop an ice run to create an ice jam but reduce the inertia of the ice run enough for it to slow down and stop at a location further downstream from a bridge peer. Would such a consideration improve the predictability of the model?

Authors' response

In its present version, the model considers a bridge to be an "aggravating factor" (com-

ing either from obstacle or constraint). It uses "narrowing" as a strategy to apply this aggravating factor on a geospatial point of view.

NHESSD

Technical corrections

All technical corrections were made.

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