**Hydrology and
Earth System
Sciences
Discussions**

Interactive
Comment

Interactive comment on "Development of a river ice jam by a combined heat loss and hydraulic model" *by* J. Eliasson and G. Orri Gröndal

Anonymous Referee #2

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General comments: This paper provides a real insight into how the icejam equation works and provides a practical example of how it can be used in the case of a change in slope. This is very useful information as jams often occur there.

The formal linkage between ice production and ice jamming is a real contribution. So many articles deal with breakup jams so it is important to see an article deal with a freeze up jam.

Questions: * How do dimensionless values (e.g., "a" or "L") differ from dimensionless values used by Beltaos or Ashton? If different, are they similar? How do proposed equations compare with Beltaos or Ashton? * How do results compare with numerical models (e.g., HEC-RAS)?

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Required clarifications:

* Page 1024: what are the units of C and how is C related to the calculated volume?

* What are the units of Volume? Does it include porosity?

* How is S obtained? Is it from the air/water transfer only (and therefore dependent on C) or is a global value? Does it depend on surface area? What are its units? Based on Figure 2, what is the computed air/water transfer coefficient? 17Watts/m2? How does shore fast ice effect the formula?

* Figure 2ă: There is no real mention of Q – How was V obtained?

* Figure 3 : Not sure what solid horizontal blue bars mean

* Missing figure : Please add a definition sketch please for y, h, etc. … or at least refer to a specific definition sketch found in Beltaos or Ashton.

* Figure 4: What do series 3 and 4 refer to?

* Table 2: Hard to follow – What are the columns "x" and "2 jams" referring to?

* Equation 3 : Is the first term correct ? * Since the hydraulic radius is half the depth, in equation 7, under root, it should read +2ay and not +4ay.

* Similarly in equation 8, to get y, the term should be multiplied by 2(2/5). (The two previous errors are partially off-setting.)

* On page 1028, line 19, "So" does appear in y and therefore "hm" is not DIRECTLY linear with "So".

* Page 1030, according to line 15, h = hL at x = 0 whereas according to line 17, h = hL at x = L. The text is a little hard to follow with respect to the value of x in relation to the waterfall from equation 11 and equation 12.

* On page 1031, first paragraph, dam should read jam at both locations.

* On page 1032, why is M used for a symbol for volume (why not V)? M implies mass – is it mass or volume?

* Page 1032, line 4 should read "of course" rather than "of cause".

* I don't understand the last paragraph of p. 1032. Please rephrase and/or include a sketch.

* I think on page 1033, line 2 should read "1960/1961" not "1961/1962".

* Line 21 page 1033, the sentence could read something like "If the discharge is assumed to be half of the proposed value, the effect is even less".

* Please give values of all coefficients used in equations (porosity, specific heat, coefficient of internal friction etc.). E.g., as simulated for Tables 1 and 2.

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