

Review of “Ice motion across incised fjord landscapes” by Barndon et al.

December 2025

This is my second review of this manuscript. I would like to thank the authors for the time taken to revise the manuscript. The clarity and readability of the text have improved substantially. I also welcome the inclusion of further details on the opening angle, as suggested by the other reviewer.

Despite these improvements, I believe that the manuscript still has some shortcomings, which are outlined below. For this reason, I suggest further minor revisions to the text before publication. I have separated my suggestions into a section that covers general concerns followed by line-by-line comments.

General comments

- My main criticism is in relation to the discussion about friction laws in the paragraphs beginning on lines 227 and 245. I find the text interesting, but somewhat long and too detailed given that the study does not compare friction laws. I would try to emphasise what the main message is to the reader and how it builds on your work. In doing so, I would suggest reducing the text to one paragraph. The text could be strengthened by (1) providing a stronger link to your results, and (2) emphasising which details are suggestions for future work. For example, the text “...present an obstacle to...” in the opening sentence is quite vague. I see that your results are referred to, but they are somewhat lost in a long sentence (line 239) that is difficult to parse.
- Some other sentences in the manuscript remain quite long, unclear or overcomplicated. I have outlined several in the line-by-line comments below. Generally, the sentences that are most difficult to parse and require multiple readings are those divided by brackets with further information or em dashes (—).
- The paragraph beginning on line 215 in the Discussion describes results related to the opening angle that have not been mentioned in the Results section. I would suggest moving these details to the appropriate section.
- Some confusion remains regarding terminology, e.g. regarding the use of the terms “real topography” and “smoothed topography” (please see my line-by-line comments). In some places, the word “thickness” is used, and I am left wondering whether you mean “plateau thickness” or some other thickness. I would suggest clarifying this throughout the manuscript.

Minor comments

Line 2: The use of the word “thermodynamic” here gives the impression that the manuscript is about temperature evolution. I would replace “thermodynamic” with “dynamic”.

Line 9: I am still skeptical about the use of the word “real”. I would suggest using “high-resolution” or similar here and throughout.

Line 13: This sentence is a bit unclear. I suggest explicitly stating what you mean by “These results” and “surface velocity variations”. I would also explicitly state whether you are referring to observed or modelled velocities. Also consider changing “under-appreciated” to “under-represented in models”.

Line 18: “it’s” -> “its”

- Line 31:** “but not at its fullest extent”: What is this referring to? I would rephrase the sentence to clarify this.
- Line 34:** What kind of “glaciological instabilities”? The word “a” is repeated.
- Line 44:** “The simulation ensemble...” -> “In this study, the simulation ensemble...”.
- Line 44:** To help tie this paragraph together, I would add one sentence that explains briefly why you perform simulations with different flow directions.
- Line 53:** Same as the comment for line 2.
- Line 57:** There is currently no mention of “smoothed topography” or “real (high-resolution) topography” here. This leads me to wonder which topography dataset you are describing. If it is the “real (high-resolution)” dataset that you are describing here, then the mention of “smooth out artifacts” is quite confusing. In this section I would describe both the “real (high-resolution)” and “smoothed” datasets so that it is very clear what the difference is.
- Line 65:** Was the mesh generation done also with gmsh? If so, please mention this. In addition, this sentence is not so clear and could do with rephrasing or splitting into two sentences.
- Line 68:** What is meant by “First” and “Second”? Do you mean after running the simulations for X number of years? Please clarify in the text.
- Line 80:** “axes” -> “axis”.
- Line 109:** “Change” -> “The change”
- Line 129:** This sentence would fit in well in the first paragraph of Section 2.
- Line 209:** “can result in” is not so clear here. Please rephrase this sentence. I would suggest also explicitly stating that a higher domain angle is required.
- Line 217:** “...3D simulations in Fig. 9 of Meyer and Creyts (2017).”
- Line 218:** The phrase “... fit as neatly...” is somewhat vague. I would suggest rephrasing the sentence.
- Line 220:** “falls within” -> “is smaller than” (incorrect use of “falls within”).
- Line 221:** The end of the sentence is unclear, i.e. “...are $\sim 118^\circ$ predicting Moffatt eddies to form.”. Please clarify.
- Line 228:** Please rephrase this sentence as the brackets currently require the reader to re-read the text. I would suggest splitting it into two sentences.
- Line 235:** “maximum up-slope angle in the mean flow direction” Could you please clarify what is meant by this?
- Fig. 8:** I would suggest increasing the size of z_r and z_d .
- Line 245:** What is meant by “anticipated to drown out”?
- Line 257:** This sentence is unclear. In particular these parts: “...exceeding 30° in the palaeo flow direction...” and “...may go some distance towards...”. Is “in the palaeo flow direction” necessary to include and please clarify that you are referring to the bed slope rather than any other angle.
- Line 291:** I would suggest rephrasing this sentence. An example might be “We show that the orientation of fjords relative to the flow direction has a substantial influence on the ice flow magnitude.”