

Authors point-to-point response on Editor comments

Dear Editor, dear Elisa,

many thanks for providing a separate review, that is very helpful! We give below a point-to-point answer to your points. 'Done' means that we just followed your suggestion in the revised version.

Many thanks,

Angelika and co-authors

Line 11-12: What does "diminish" mean precisely in this context? That they are less frequent perhaps?

"Diminish" means that they decline in depth, width, they disappear, fade out.

Line 16: maybe "tend to occur less frequently"?

We think that "tend to occur less frequently" is not really representing what we aim to describe. However, it is correct that further downstream in ice shelves, they do appear less frequently, but we aim here to explain that they vanish with distance.

Line 25: are linked to incisions at the ice base due to buoyancy

Thanks, incisions is the perfect term here. We rephrased it accordingly for the revised version.

Line 26: This is not clear at all

We rephrase this and added another sentence for the revised version, so that it will read as 'Surface troughs on ice shelves are linked to incisions at the ice base, thus either to melt channels (citations) or to basal crevasses (citation). The surface troughs are formed by viscoelastic deformations in the transition to buoyancy and buoyancy equilibrium itself.'

Line 30: *the* lateral dimension

Done.

Line. 33-36: Tenses are inconsistent in this sentence and the next. Present tense seems more appropriate, but whatever the authors choose, please apply it consistently.

Thank you for this comment! In the revised version, we choose the present tense for the marked sentences.

Line 33: downstream?

Done.

Line 37: It is unclear if the authors are referring to sub ice shelf channels in general or to the specific channel that is subject of the study. If the former, I would rephrase such channels -> sub ice shelf channels.

Yes, you are right. The wording "such channels" was misleading. So we changed it to "sub ice shelf channels", as you suggested.

Line 39: the lateral direction

Done.

Line 42: The mechanism described below is not specific to channels but to ice shelves in particular and was first (to my knowledge) described by A. Jenkins, A one-dimensional model of ice shelf-ocean interaction, JGR 1991, and even earlier by D. MacAyeal in the context of tidally induced melting.

This is correct. We have rephrased it and also cite Doug MacAyeal's work from 1994 in the revised version.

Line 44: Falling pressure due to what? I suppose that the authors are referring to decreasing hydrostatic pressure as one moves downstream along the ice shelf and the shelf draft decreases, but this should not be left to guessing.

This was mentioned also by the reviewers and is discussed below. We rephrased these sentences.

Line 51: Again, this comes out of the blue. It is understandable by a reader knowledgeable in ice sheet modeling, but it would be great if the authors could provide more context and avoid giving for granted concepts that are specific to a relatively small part of the audience.

Yes, we agree, this is like a jump into icy water and we rephrase this in the revised version.

Line 57: assessing in what regard? Can the authors be more specific?

We basically wanted to check with this simple computation if it is in hydrostatic equilibrium. Outside the hinge zone (which can be identified using interferograms), we have no other observational means to understand if the ice is in hydrostatic equilibrium. We rephrased 'assess' into 'understand' in the revised version.

Line 60: gradients in space?

To our knowledge, gradients are defined as derivatives in space. Therefore, it seems a bit odd, to add to each notion of gradients, spatial gradients.

Line 60: I believe "This process .." would work better

That is a very good suggestion, thank you.

Line 61: viscously

Done.

Line 67: engage with

Done.

Line 88: I suggest moving this back as "taking into account snow accumulation ..."

Done.

Line 95: obtained?

Done.

Line 110: again, tenses must be consistent throughout, whether it's present or past.

We apologise for that - in the revised version we will make sure that we correct this!

Line 123-125: I found this description hard to follow. It might be just because I am unfamiliar with the technique, but a schematic would certainly be helpful. If this is covered in the publication cited, then maybe the explanation is not even needed.

We think it is useful to be very specific here and the reason is that pRES and ApRES systems are more widely used in the recent past and one could potentially choose different settings for the windows for correlations. So, it is useful additional information for all who are doing themselves pRES and ApRES data processing.

Fig. 2: why does freezing correspond to zero melt rate?

We did not want to give freezing rates, therefore, we have chosen unfilled circles and placed them at zero melt rate. This is also mentioned in the text. It is interpreted as, freezing takes place, but the exact freezing rate is not known.

Line 216-217: provided no changes in the ice flux have occurred

This can be excluded by comparing to the measurements outside the channel, in which the advected ice thickness H_{PDadv} matches the observed well.

Line 241: shed

Done.

Line 241-242: beyond the scope of the project

Done.

Line 259: In my view the mathematical model should be fully stated, otherwise this description is confusing to the uninitiated

We are very much in favour of doing this and it was also mentioned by the reviewers. Our experience in the past was that, when we submitted a manuscript which included a

mathematical model that was presented elsewhere, we were asked to delete that part of the manuscript. But we are more than happy to include it.

Line 272: no brackets needed (2x)

This is somewhat out of our control and will certainly be solved in the typesetting.

Line 303: years?

Done.

Line 329: notable

Done.

Line 404: they would be expected to

Done.

Line 423: is reduced

Done.