

Response to comment by M. Pelto (original comments in gray box)

We thank Professor Pelto for his highly useful comments and suggestions which have helped us to improve the paper.

Luckman et al (2011) have provided the most detailed examination of basal crevasses in Antarctic Ice Shelves to date. The importance of basal crevasses in an environment of ice shelf thinning is quite significant, but remains an unknown. This paper will hopefully be a key step in the process of more increased examination of these features. This is a well written and critically important paper. The comments below are generally aimed at providing more details on identification and distinguishing the characteristics of basal crevasses.

2037-15: Why would basal crevasses moderate the exchange of melting or refreezing?

Because (1) they influence the surface area in contact with the ocean and (2) they provide access for warm ocean waters to be in contact with ice at much shallower depths than had they not been there. We have modified the language where appropriate to clarify these points.

2038-8 and 12: Include the ice thicknesses noted in Table 1 for where the two series develop?

Done.

2038-10: What are the velocities? A reference to Haug et al (2010) for velocity maybe useful.

Done.

2039-24: Is there any indication in the two series of the propagation upward of the crevasse tips as they move downstream from the grounding line?

No, but we see where you are coming from..

2040-10 or 2042-26: If we are merely examining the surface the basal crevasse induced surface troughs are wider than those of surface crevasses. Any quantification similar to that in Table 1 for the typical width of surface troughs above typical surface crevasses would be useful. It is noted that the surface crevasse features are probably only a few meters wide. However, it is also indicated that the width-depth aspect should be the same for the surface and basal crevasses and that would equate to surface crevasses 10% of the width of basal crevasses. This implies widths potentially of several tens of meters. Better defining this surface crevasse width issue would be valuable.

We don't understand this comment, as troughs do not form above surface crevasses. However, we have clarified the surface crevasses width issue in the text.

Fig.5: It would be invaluable to annotate Figure 5b in terms of more complete identification of all of the visible crevasse features in terms of which are basal and which are surface.

We have made changes to Figure 5 in response to this and other comments.

Added Figure: The focus of the paper is on the detailed examination of the basal crevasse features near Joerg Peninsula. I would find it quite valuable for a more detailed examination of the larger area of Figure 1. Identification of evident surface features that fit the basal crevasse characteristics would be instructive on the figure itself. In particular I suggest focusing on the same flow band extending to the ice front. For example Haug et al (2010) in Figure 10 and 11 provide excellent imagery of this vicinity of Larsen C. Figure 11 is the closeup. In whatever image used, which of the features fits your analysis of basal crevasses? The differentiation seems apparent. This would help illustrate the broader importance, extent and persistence of these features on Larsen C. More important it would further our analysis of other areas exhibiting such features. Rist et al (2002) in Figure 1 indicate basal crevasse rifts a-f but only in a map form. We need the visual identification key.

Good idea. Figure 1 has been modified in response to this comment.