

We thank reviewer 3 for their comments on our paper. Our responses can be found below. Reviewer comments are in black and our replies in blue.

On behalf of all co-authors,

Kind Regards,

Stephen Livingstone

Reviewer 3

This paper presents new mapping of esker-bead chains in central Nunavut, Canada identified using the high-resolution ArcticDEM dataset. Consistent with previous research, the authors found the beads to be associated with De Geer moraines. Based on this association and the fact that De Geer moraines have an annual deposition cycle the authors reconstruct the rate of ice-margin retreat for this sector of the Laurentide Ice Sheet. Such precise quantitative information is relatively rare. A previous reviewer states that the finding that esker-bead chains have a regular deposition phasing is not new. This literature is cited by the authors. Nevertheless, the paper remains important as supports the previous findings in a new geographic location, thus confirming the regular phasing of these landforms and role to provide information on rates of retreat where they are found, when De Geer moraines may be absent. Figure 5 is excellent in this regard.

I found the paper to be well written and a pleasure to read. The description of the mapping methods and results are comprehensive and clear. Figures are high quality, although see comments below.

Thank you for these kind comments.

Figure 2/7: There is a lot of colour on A in these figures – which I appreciate, but I wonder if the figures have been checked for colour-blindness suitability. Some of the dots to indicate area (A) are overlapping, I wonder if these could have been displayed as relative size empty circles to account for this? Without testing, this may or may not improve things.

We agree there is a lot of colour in these figures, potentially making it difficult to decipher, and especially if you are colour-blind. We have therefore made the map panels (subpanel A) full page width so more detail can be seen, and made the background colour greyscale. When constructing the figures, we initially tried using relative size empty circles, but this becomes quite messy and difficult to identify patterns/colours so we prefer to stick with the filled dots even though we agree there is some overlap (we have made the dots partially transparent to help with this a bit).

Figure 8. There is a lot of information in this figure and it took me some time to understand. As for figure 2 and 7 the colour choice needs checking. For B the bin size of 5 km seems quite high considering most esker beads are <1 km apart. Although this would likely not change the conclusion that similarly-spaced beads are associated with the same retreating margin transverse to the orientation of the chains.

As with the above figures, we have changed the background to greyscale to make the coloured points easier to see. We prefer to stick to the 5 km bins – we chose these to try and reduce some of the noise to identify broad general trends.

95: practice 310: These appear to be reasonable (if relatively fast) retreat rates for a marine-terminating margin. Suggest that a citation is added here to make comparison to other former retreat rates in similar glaciological settings (either modern or palaeo).

This is a good idea and we have added the following sentence to put the retreat rates into context: "These retreat rates are consistent with, but towards the upper end, experienced by marine palaeo-ice streams (e.g. Winsborrow et al., 2010; Livingstone et al., 2012) and contemporary marine terminating outlet glaciers in Greenland (e.g. Howat & Eddy, 2011; Murray et al., 2015)."

343: suggest insert - 'that spacing of subglacial channelised...'

Done

361: add - 'accepting this interpretation' or similar to caveat this statement

Done