

## tc-2021-95: Technical Corrections

We appreciate the careful review of our revised manuscript and acknowledge that we failed to properly align some parts of the revised manuscript with what we had written in the response letter. This was an oversight by me, and I have corrected these issues in the revised paper. In the tracked changes version, we have indicated the sections that have been revised by highlighting them in yellow.

In response to the specific points and suggestions:

1. Reviewer 1, lines 286-288 on the tracked changes version do not quite match your response. *We have corrected this and now add (lines 289-290) that 'Although we recognize that deformed diamictos can be deposited beneath grounded ice (deformation till) or proximal to the grounding line (gravity flow deposits), both options imply deposition close to the grounding zone.'*
2. Reviewer 1, line 507 on the tracked changes version (likewise). *We have added the corrected sentence from our response letter (line 516-518) "The explanation that best fits evidence from terrestrial field studies, and the overall facies succession, is that the condensed diamict of LU3 was deposited when Ryder Glacier retreated inland. In Sherard Osborn Fjord, a relatively deep, isolated marine embayment exists behind a prominent topographic high lying 40 km inland of the modern grounding zone (Fig. 12)."*
3. Reviewer 2, where you indicate that you will "more closely tie the earlier findings of Kelly and Bennike (1992) to our results.". I could not see where you did this in the Discussion with changes tracked. *This comment and our original response largely concerned the interpretation of LU3. Some support for our interpretation that it was a deposited while the ice margin was inland comes from terrestrial mapping and dating which we alluded to in the first submission but were not specific about the details. By providing calibrated ages (using a similar dR as applied to our samples) we had the opportunity to clarify this in the revised manuscript – but failed to do so. Now we have added a final paragraph to section 5.3 that addresses this. It reads (Lines 565 to 570) "In summary, our interpretation is that the end of LU3 ( $3.9 \pm 0.4$  cal a BP, Table 4) marks the re-growth of a marine based glacier and ice tongue. Importantly, this is consistent with existing dates constraining the onset of the Steensby Stade as described by Kelly and Bennike (1992). In particular, peat deposits over which Ryder's ice margin advanced during the Steensby Stade provide a Middle Holocene age of  $5830 \pm 170$  cal a BP (Station 41), while reworked marine macrofossils in lateral moraines at Steensby Glacier yield an age of  $4560 \pm 410$  cal a BP (Station 34; Kelly and Bennike, 1992). Therefore, while the re-advance of the local ice margin likely occurred prior to the Late Holocene, we argue that a marine-based glacier and ice tongue were not established until close to the Middle to Late Holocene transition."*
4. My only other (optional) comment would be that you might want to consider referring to Supplementary Figures more specifically in the revised manuscript, i.e. pointing the reader to the Supplementary Figure S7, rather than just 'Supplementary materials' more generally. *Excellent point and a major oversight on our part. We now ensure that all the supplementary figures are specifically referred to in the text, at the appropriate time.*

*While correcting this, we also realized that some additional information had to be added to the main text, and minor adjustments made to Figure 9 and Figure S7. We have included a new paragraph in section 4.1 that discusses the evidence for erosion in Lu5 and a hiatus/erosion between LU3/LU2 in 10-GC. Examples of these are provided in the supplementary figures which were not called out in the previous version. The new paragraph (lines 414-419) reads:*

*“The transition between LU3 and LU2 in 10-GC is more abrupt than in other cores and is not bioturbated (Supplementary Figure S8). We infer a hiatus across this transition and do not use the younger age (Sample #41, Table 3) to date this boundary. Instead we rely on the numerous other older dates obtained from the base of LU2 to date this boundary (Fig. 9). Similarly, based on the occurrence of truncated laminae seen clearly in the CT-images, frequent intervals of erosion are indicated during deposition of LU5 (Fig. 9). Examples of this in 7-PC, 8-PC and 9-PC are provided in supplementary Figure S9.”*

*The small changes to Figure 9 and Figure S7 amount to the insertion of a symbols indicating possible erosion in LU5 of 7-PC – making these figures consistent with the evidence we present in Figure S9.*

Sincerely,  
Matt O'Regan and co-authors