

Dear Dr Pain and co-authors,

Thank you for your response to reviews. I must apologise for the delay in responding to your comments. I have reviewed the responses and would now like to invite you to proceed with the upload of your revised manuscript.

Please consider the reviewers' comments carefully. In particular, Reviewer 2 expresses some concerns about the validity of your assumptions when interpreting the data. I, and the two reviewers, believe that you have an excellent and hard-won dataset, but both reviewers express some concerns in the interpretation. Please consider their advice carefully before resubmission.

When you address the comments from the reviewers, to which you have detailed your responses, I also request the following amendments to the manuscript:

As well as considering the place name nomenclature suggested by Dr Graly and the nominated reviewers, please consider whether you can replace the 'Watson River' with the Greenlandic name, Qinguata Kuussua or Akuliarusiarsuup Kuua, as appropriate. Also note that in Figure R5 in your responses, you label Isunnguata Sermia Glacier: this is nonsensical (Sermia broadly translates as glacier), so please remove the extra 'Glacier'.

I strongly support Reviewer 2's request to amend the naming of the 'Isunnguata Sermia', since your data do not represent the wider Isunnguata Sermia catchment. Perhaps you could consider sub-Isunnguata, Isunnguata-Russell or lateral-Isunnguata, or some other better version that does make it clear that this is a sub-catchment, not the main trunk which drains into Isortoq. The map in R5 is very useful for context, and perhaps an expanded version also showing the main trunk of Isunnguata Sermia to the north could be added to the map figure.

The markers on the map (Figure 2) are very large, meaning it is quite hard to see exactly where the samples were collected. Please could you reduce the size? I also find Figure R1 quite garish: the markers again overwhelm the map. The boundary could be more subtly delineated without detriment; although I do wonder at the utility of this map – I do not think the geological boundary exerts much influence over your sampling sites, since they both lie to the north.

I agree with Reviewer 1 on the presentation of the NH₄ data: it doesn't add much to the story, so wonder if it really needs to be in the manuscript. I appreciate your justification in the response, but I am unconvinced that the data really help in the exploration of the carbonate processes – it seems a rather weak association with the organic matter remineralisation hypothesis.

Does the Pitcher et al. 2020 paper not show that there is only winter flow in the main Isortoq outlet? From my understanding of your sample sites, and the clarifications in your responses, your samples were not collected from Isortoq, but from Akuliarusiarsuup, which experienced no winter flow. Please consider this in your revised description of the flow regimes (as requested by Reviewer 1).

In your response to Reviewer 2, you include some site photos. These are very useful and I hope these will be included in the Supplementary info, or incorporated into the manuscript somehow. Please could you indicate the direction you are facing when the photo is taken? The Isunnguata one is hard to orient. One note: a 'boil' is not a common term in glacier hydrochemistry. Could this be a small subglacial upwelling (eg. Wadham et al. 1998; Irvine-Fynn and Hodson, 2010)?

I also agree with Reviewer 2 in the assessment of the slow flowing section of the terminus of Kiatuut Sermia as a 'lake' rather than a slow flowing section of river (I have in fact kayaked and depth sounded this lake, see Beaton et al. 2017 and Bagshaw et al. 2014). It is hard to see from Figure 2

exactly where your sampling site was, but if it was downstream of this feature, it will impact the residence and transit time of water from the subglacial environment to the sampling site. The presence of this lake should be acknowledged in your revised manuscript.

Your defence of the manuscript in the final paragraph of your response to Reviewer 2 is commendable. I wonder if some of this material could be used in your concluding statement in the main text? The current conclusions are very focussed on weathering implications, and do not really demonstrate the utility of this study to an audience beyond the glacier weathering community, whereas your defence articulates it very well!

Thank you for your patience with the review process; I look forward to reading the next version of the manuscript.

Dr Liz Bagshaw

Editor