Editor assessment of revised manuscript: Krause et al. Icebergs

Dear authors,

Thank you for your thorough revision of the manuscript and response to the reviewers' requests. I find the manuscript much improved, but would like to request some further amendments to improve clarity, slightly reduce the length, and ensure it is suitable for the journal's audience.

The requested changes are listed below, and refer to the line numbers in the tracked changes manuscript uploaded. My main criticism is in the use of 'atmospheric origin' as an explanation of NO3 and PO4 sources. I understand that you can argue that these compounds only reach the icebergs' base via incorporation into the ice matrix, either as snow or via cryoconite or supraglacial sediment. However, in the nomenclature of glacial literature it is rather misleading, since atmospheric tends to denote transport from the upper atmosphere to ice/snow surfaces, rather than anything from the air (which could include wind-blown debris). Instead, I request that they are labelled as sourced from ice sheet or glacier surfaces. The origin may then be from chemical or biological scavenging from supraglacial sediment (which may be windblown, and thus technically atmospheric, although not strictly from the atmosphere), or from aerosol deposition (N species), or from precipitation (N species). I give specific suggestions below.

Thank you for your contribution to the Cryosphere, I look forward to reading the next iteration of the manuscript.

Editor, Dr Liz Bagshaw.

Requested amendments

L19: add 'low' prior to availability of Fe and Mn

L29-30: rewritten sentence does not make sense 'whilst total dissolvable Fe and Mn retained a strong relationship with sediment load, where weaker relationships were observed…' Please correct (could just remove 'whilst'). Suggest also removing 'retained' – not necessary.

L34: remove 'however' and unclear what you mean by meltwater flux here. Suggest removing from abstract since it is a minor component of your work.

L41 and throughout manuscript: I don't like the use of 'atmospheric origin'. P is not sourced from the atmosphere – I see that you argue that it is from cryoconite thus 'atmosphere' but I think this is too confusing. Instead, can you note that N and P are likely from glacier and ice sheet surfaces, where Fe, Mn and occasionally Si are from en- or subglacial sources.

L61: arguably the polar oceans are the cryosphere, so please change to 'interface between glaciers and ice sheets and the ocean' or further simplify to 'marine-terminating ice'. This whole section could be simplified to 'Icebergs are reported to be sources of fertilizing nutrients to low productivity zones of the ocean, particularly in the southern ocean (Refs). Fe is thought to be the main nutrient limiting phytoplankton growth, so changes to regional Fe supply can have widespread ecosystem impacts. Whilst icebergs are recognized as important sources of Fe (Refs), the sensitivity of this source to climatic impacts (IF YOU ACTUALLY DO THIS?? IF NOT, CUT) and the relative importance of delivery of other critical micro- and macro-nutrients remains to be analysed. Recent work has suggested that low dissolved manganese concentrations….'

L96-109: I dislike the argument that nutrients are atmospheric in origin. Whilst this link can be tenuously proven, I think it can be simplified as 'nutrients in icebergs are either sourced from the ice crystal structure (Fischer) or from sediments either deposited on the ice surface or entrained in the interior or basal structure. Internal cycling may redistribute these nutrients and affect their relative abundances….'

L148: cut the first sentence and ensure these references are incorporated elsewhere if they are critical to your narrative. The paper is too long to include 'commented on' – this is a paper not a PhD thesis.

Figure 1: very nice, thank you for this addition. Can you plot one above the other so we can resolve some of the detail?

L392: I think rather than 'runoff-sediment interaction is limited' you could explicitly state that there is unlikely to be significant subglacial chemical weathering, since this is a cryosphere journal.

L450: this sentence is very awkwardly expressed. Would recommend simplifying: 'the similarity between nutrient ratios in sea ice (Henley et al) and some of our samples suggest seawater is an important contributor to iceberg nutrients, albeit unevenly distributed because of the differing structure of sea ice and glacial ice (refs).' Recommend cutting L453-460.

Figure 5: can you note the distance that defines 'inshore' and 'offshore' in your caption?

L534: once again, I request removing 'atmospheric' origin of P. Suggest just cutting L534-535.

Figure 6a: not quite sure what this is showing. Could remove to make more space for 6b which is arguably more interesting.

L533: remove 'when approaching ice fragments'.

L562: misnumbered figure? Is there where you use 6a?

L569: remove 'atmospheric deposition of NO3 and PO4 varies regionally' and 'reported concentrations of PO4 are more sensitive to the method used due to universally low concentrations' – neither are required for your argument and rather muddy the water. The statement of PO4 concentrations in ice cores from Kjaer et al is sufficient.

L582: I don't think it can be argued that no PO4 can be released from subglacial weathering. It may be that PO4 is taken up prior to measurement, so all remains bound in organic phases. Regardless, I don't think this affects your argument and I suggest just removing L582-584 ('in contrast, no, or very limited release of NO3 or PO4 is expected from weathering, which is supported by the correlations').

L605: suggest adding 'some basal layers are lost prior to…' since not all layers will be scoured

L613: 'glacial origin' rather atmospheric? Or cut this sentence again.

L639: latter not later. Can just stick with 'the former generally having higher sediment loads'

L641: overlong correction here. Keep it simple: 'Arctic icebergs are generally smaller because they are typically sourced from tidewater glacier fronts rather than calved from larger ice shelves. They are also logistically easier to observe and access than Antarctic icebergs.'

L657: misnumbered figure?

L667: I think this is cool, but you've already discussed it so I think this paragraph can be cut

L691: not sure the cryoconite explanation helps here. Suggest just leaving with 'the mechanism of this process remains unclear'.

L746: other N 'phases' rather than 'sources'. I also wonder about adding P to this sentence, since a survey of organic P fascinating. Thus it would become 'considering the universally low concentrations present in icebergs, other phases of N or P (e.g. DON, NH4, DOP) may be important'

L759: 'below or at the standard analytical detection limit for PO4 and NO3' – to make it clear to readers who are just skimming your conclusions which macronutrients you assessed!