

Dear Editor,

Thank you for your very helpful suggestions in improving this manuscript. Below are our point-by-point responses to your comments. The comments appear in back, the responses are in blue and the proposed changes to manuscript are in *bold italics*.

Best regards

Qi Liang

Thank you for your thorough response to the reviewer's comments and the revised manuscript. I am satisfied that the changes you have incorporated address the majority of their concerns, though I note they both asked for a little revision of the language. I therefore add some suggestions below that should aid interpretation and style.

I suggest beginning the paper at paragraph 2. Paragraph 1 is largely not necessary. The final sentence could be incorporated into paragraph 2, for example:

'Sixty-four subglacial lakes have been identified beneath the GrIS in Greenland from airborne radio-echo sounding (Bowling et al., 2019; Livingstone et al., 2022). Most of them are stable, showing little or no evidence of volume change or input from the surface, and are located above the Equilibrium Line Altitude (ELA) and the relatively flat, frozen-bedded ice sheet interior (Bowling et al., 2019). Only a few hydrologically active lakes that are recharged by surface meltwater have been identified from ice surface elevation change measurements (Bowling et al., 2019; Howat et al., 2015; Livingstone et al., 2019; Livingstone et al., 2022; Palmer et al., 2015; Willis et al., 2015). Compared to the more widely distributed stable subglacial lakes, active subglacial lakes are affected more directly by surface meltwater and their drainage would may significantly influence the glacier flow dynamics (Davison et al., 2020; Livingstone et al., 2019). Despite this importance, our understanding of Greenland's subglacial lakes has been primarily developed from theoretical studies or inferences from geophysical exploration due to sparsity of the limited direct observations (Davison et al., 2019). The presence and movement of meltwater at the ice bed interface significantly affect ice dynamics (Meierbachtol et al., 2013). Given the expected increases in surface meltwater production in a warming climate (Mottram et al., 2017; Sellevold and Vizcaino, 2021), it is of critical importance to understand the hydrology of the Greenland Ice Sheet (GrIS), especially the routing, storage, drainage and recharge of subglacial water'

Thanks for your suggestions. Indeed, these changes will make the text easier to follow and read. We have made modification accordingly.

I am not sure why all the methods have changed from past to present tense: I suggest reverting

Thank you for the suggestion. We have changed to the past tense.

L216: 'relatively low polar latitude' – I know what you mean, but it is confusing to have 'low latitude' and 'polar' in the same sentence. Suggest removing the final part of the

sentence, so it ends with ‘sparse track density’.

Agreed. We have removed the final part.

L218: replace ‘in addition’ with ‘finally,’

Changed.

L220: missing ‘which’

Added.

L221: remove ‘despite this’

Removed.

L224: ‘remove ‘as a result’ – the collapse basin did not form as a result of Willis et al discovering it

Thanks for catching this. We have removed it.

L253: rather than ‘Lacking elevation measurements’ suggest ‘A lack of elevation measurements’

Changed.

L258: ‘the volume of water drained in the 2019 event was likely much less’

Changed.

L259: How do you know this process is rare, when you’ve told us there are so few observations? Suggest instead ‘The ubiquity of partial subglacial lake drainage is unknown in Greenland, but similar processes have been observed....’

Agreed. We have changed the text as you suggested.

L270: remove ‘in addition’

Removed.

L284: ‘increasing efficiency of drainage until’

Changed.

L288: remove ‘Additionally’

Removed.

L289: remove ‘based on the above findings’

Removed.

L290-295 is quite confusing. Please state more simply.

Thank you for catching this. To clarify we have changed these sentences to:

“The elevation profiles through the collapse basin (Figure 2) indicate that the subglacial lake may have not been fully filled when the drainage event occurred in

2019. This drainage is not associated with high surface melt years and the duration of the drainage event is less than one month. We speculate that this subglacial lake exhibits a pattern of slow filling and rapid drainage, similar to all active lakes beneath the Icelandic ice caps (Livingstone et al., 2022). In contrast, three active lakes beneath the GrIS are characterized by long periods of quiescence (Livingstone et al., 2019).”

L311: ‘The remainder may be locally refrozen in the underlying snowpack (Harper) or in firn aquifers that have been detected around the collapse basin area (refs). Ice slabs are also likely to exist locally (ref), so meltwater may be restricted or travel via other drainage paths that our study is unable to detect.’

Changed.

L322-3: this new sentence is awkward here. I suggest moving it to the final sentence of the paper.

Agreed. We have changed this.

L330: remove ‘furthermore’

Removed.