

We thank the reviewers for their comments. Our response is in *italics*

Reviewer 1

Preliminary remark. This reviewer is not competent for the review of the statistical analysis in the manuscript.

In general: this is an excellent manuscript. The authors are to be congratulated for their extensive and important work on the non-marine ostracods of Greenland. The text has been carefully written. The figures are of excellent quality. The references are up to date. I agree with the identifications of the species recorded.

I have only a few comments and suggestions for improvement. I recommend publishing the ms after a minor revision.

Here are my comments:

1. I propose to add 'Greenland' to the title. The title will be more informative.

The title has been updated to "Environmental and habitat controls on non-marine ostracod distribution in Greenlandic Arctic lakes"

2. Line 51: 022 > 2022.

Done

3. Throughout the manuscript, I suggest adding the 'inferred salinity' to the EC values. This has not been done in all occurrences.

To avoid confusion, where salinity was used to describe higher conductivity, this has been replaced to use electrical conductivity or EC. This prevents any confusion whether salinity or EC was measured and maintains consistency

4. Line 424, Patagonia: a reference is needed.

Added

5. Line 475: variable > variables

Done

6. References.

a. References. The DOIs are given for 2 of them. I suggest adding them for all the references where available.

DOIs can be added if this is the style of referencing required by the journal at the typesetting stage

7. Meisch, C. 2000. Gustav Fischer > Spektrum Akademischer Verlag. Gustav Fischer.

Changed

8. Supplementary Table S2 is a bit uneasy to read. I suggest moving the species names in the title row to the right to match the columns below.

Species names and counts have been aligned to the left of the column

Claude Meisch

Reviewer 2

This manuscript by Roberts et al. provides important and new information about the distribution of freshwater ostracods in Greenland and the ecological preferences of the recorded species. Such information is very relevant and needed in regions where lakes are affected most intensively by current climate warming.

The manuscript is generally well-structured, well-written and well-illustrated. The inferences are supported by the presented data.

I have only a single major concern:

The authors describe that ostracod specimens were collected alive and as those represented by empty carapaces and disarticulated valves. These different specimens were apparently carefully differentiated. Such dataset is very valuable because those specimens collected alive are directly linked to the measured environmental parameters. In addition, the timing of the occurrence of the specific species during the year's seasons can be assessed based on such data. However, the authors did not make use or full use of this differentiation. In the discussion section, the different recorded species are discussed with respect to measured environmental parameters such as nutrients, apparently regardless whether actually specimens collected alive or as empty carapaces and disarticulated valves were recorded. I suggest to differentiate more clearly between those specimens collected alive on the one hand side, and those collected as empty carapaces and disarticulated valves.

We agree that this point is important. Regular (e.g. monthly) sampling of both ostracods and physico-chemical variables would be the ideal strategy for determining controls on ostracod assemblages, but this is generally unfeasible in remote Arctic lakes. Our approach represents a compromise that is used in most such studies in remote regions. In these lakes it is not unreasonable to assume that all the specimens (living or dead) obtained from surface sediment samples are representative of the time-averaged "present day" living fauna.

The reviewer's comments have been addressed as follows:

- 1) *Symbols have been added to Figure 3 to highlight which species were collected with soft parts in which lakes. The figure caption has been updated to include "The stars indicate the occurrence of individuals with soft parts, suggesting that they were collected alive. Table S2 provides a detailed breakdown of valves, carapaces and individuals with soft parts."*
- 2) *All figure captions have been updated to clarify when abundances are based on specimens collected alive, from empty carapaces and valves, or include all individuals collected. Figure 3 now reads as above, "Ostracod abundance is given in valves per gram and includes all specimens collected. Table S2 provides a detailed breakdown of valves, carapaces and individuals with soft parts" has been added to the caption for figure 4 and "The analysis includes all specimens collected. Table S2 provides a detailed breakdown of valves, carapaces and individuals with soft parts" has been added to the caption for figure 5.*

- 3) Text reading “Our results also provide a time-averaged “present day” living ostracod fauna, which is not an unreasonable approach in these remote environments, but it is likely that different ostracod species will be abundant in different seasons and that the measured parameters do not reflect the full range of habitat and environmental preferences.” Has been added to lines 589 to 592. The statement on lines 586 to 589 “Due to the sampling strategy, it is also likely that variables such as pH, Chl-a, macrophyte cover and bioavailable nutrients vary within and between seasons, particularly in the late summer with longer ice-free periods (McGowan et al., 2018).” Was already in the original manuscript.

Minor comments follow below. I added also some suggestions for improvements in an annotated pdf file.

We have gone through the pdf and made some of the stylistic changes. Most of the edits relate to comments below and have been addressed in turn. Other suggested changes are a stylistic choice (for example the use of e.g. with citations) and the original has been kept.

The abstract

The abstract could provide some more detailed information. The authors state that ostracods from lakes in a specific region in Greenland were systematically investigated. How many lakes were sampled? What are the depth ranges for all these samples? Which ranges of conductivities or pH or alkalinities (or other important factors) were sampled?

Two species are mentioned in the abstract. How many species were recorded in general? Which are the three or five most abundant taxa?

This information has been added to the abstract lines 30-35

Introduction

line (l) 57: The mentioned relationship between light penetration and changes in mixing depth is not very obvious and a short hint to explain this link here would be helpful.

Text reading “as heat is transferred deeper into the water column” has been inserted into line 61

2.1 Study area

The mean annual temperature is provided here but the seasonality is very important in such Arctic environment, and mean January and July temperatures should be added.

Anderson et al. (2012) is provided as reference for the climate data but this is apparently not the source of the original climate data. Is it possible to refer to the original source which is possibly some weather monitoring authority?

The following sentences have been added at lines 137-140 “the mean annual temperature between 1961 to 1990 was -5.7 °C (DMI, 2026). For the period July 2020 to July 2021, mean annual temperature was -2.2 °C with a maximum of 21 °C and a minimum of -34.6 °C. Mean January air temperatures in 2021 were -16.5 °C and mean July temperatures were 11.1 °C (DMI, 2026).”

I suggest to add some information about the local geology in the catchments of the lakes. The authors mention the many lakes in the region and the potential to use lake-sediment records as climate archives. However, preservation of ostracod valves in cold-water lake deposits can be poor in regions with igneous crustal or volcanic rocks. Also, “geological weathering of the glacial bed” is mentioned in the discussion section but not very helpful without information of the local geology.

“The bedrock of the area is Precambrian gneiss.” has been added to line 130-131

2.2 Field methods

The authors describe (l 140) that the top ~1 cm of sediment was sampled **where submerged macrophytes were present**. So, was the top sediment not generally sampled, and were therefore, empty carapaces and disarticulated valves mostly not included in the survey? Sampling with a net is surely very appropriate to collect specimens alive, but endobenthic taxa and those not present as larger instar or adult stages during the sampling period might not be included.

How were sediment samples collected at positions where macrophytes were present? Which type of grab or corer or dredge was used and how much sediment or which area was sampled?

The sentence (lines 155-156) has been edited to clarify that the top 1cm of sediment was always sampled and that a net was used for all sampling. It now reads: “Ostracods were collected in a 250 µm mesh zooplankton net from the littoral zone by sampling the top ~1 cm of sediment. Where submerged macrophytes were present, samples were collected with the net from amongst the vegetation and included sampling the top ~1 cm of sediment.”

Results

l 230

The authors describe that the electrical conductivity in these lakes ranged from 0.9 to 4.1 mS/cm but Table 3 includes lake 15 with a conductivity of 0.01 mS/cm and some more lakes with conductivities <0.9 mS/cm.

This has been corrected on line 251

l 231

Water temperature data are provided here with two decimal positions. Is this precision justified? Are temperatures in the lakes laterally very stable, is the used device very accurate and are temporal changes insignificant to support this precision?

Updated to 1 d.p. as it is in Table S1

Figures

Fig. 1

A study-area map such as those shown in Fig. 1 should include coordinates.

Since the map includes an insert of Greenland, we do not feel it is necessary to include the coordinates. Coordinates of the lakes are also given in Table 2 – the figure caption has been updated to highlight this “Coordinates of each lake are given in Table 2” The Arctic Circle has been added to the insert, however. We will adjust the map if required for journal formatting.

Fig. 2

The caption should explain the abbreviations “LV” and “RV”.

Done

Fig. 4

Abundances of ostracods are shown in Fig. 4 and the unit is “values per gram”. Are these values specimens collected alive, carapaces, disarticulated valves, or all together? It is important because some of the measured lake parameters may change seasonally and it can be useful to differentiate here specimens collected alive from empty carapaces and valves.

This was an error and should have read ‘valves per gram’. All figure captions have been updated to include a statement about soft parts, valves and carapaces.

Tables

Table 2

Genera names should be written in italics.

Updated

Format, style

- The authors write about ostracod valves and shells in the text and figures. A consistent term should be used.

Occasionally ‘shells’ is the most appropriate term since valves could be taken to mean only disarticulated single valves. Where ‘shells’ has been retained (e.g. line 208 and 292) the following has been added “Ostracod shells (i.e. carapaces and valves)”

- Numerals and numbers are not used in a consistent way. A consistent format should be used to write about records from three lakes (or 3 lakes). In general, numerals are used for such items and numbers smaller than 11 or 13. Consistent use of numerals is important here to avoid confusion of “3 sites and lake 3”, for example.

These have been changed and made consistent. Only where a number above 11 or 13 is the first word in a sentence has a numeral been used in its place.

- Italics are sometimes not used in tables and the text.

Updated

- The author refer to figures in two ways, for example “Fig 4” and “Fig. 4”.

Updated

- Two salinity classification terminologies were used, for example “oligosaline” and “oligohaline”. The latter is part of the more commonly used Venice system for the salinity-related characterisation of waters.

Oligosaline on line 134 has been updated to oligohaline

- Literature references in the text are a bit inconsistent regarding the use of commas. Which format is needed: “Smith et al. 2000” or “Smith et al., 2000”? Same for papers authored by two persons.

This has been updated so all include a comma

- Units are inconsistently formatted such as “mS cm⁻¹” and “µgL⁻¹” (with and without space).

These have been updated to be consistent throughout, including in the figures.

I tried to spot and mark issues 2 and 3.