

Dear Editor and Reviewers,

We thank you for your time and for the constructive comments on our manuscript, “Conversion factors for Greenland shelf benthos: Weight-to-weight and body size-to-weight relationships.” We have carefully considered all comments and have revised the manuscript accordingly. Below, we provide a detailed, point-by-point response, including the changes made in the manuscript.

Reviewer 1:

1. Abstract - the authors highlight climate change and biodiversity loss as transformative drivers of change, which is entirely correct, but do not include human activity which seems a little remiss as human exploitation of higher latitudes is accelerating. I would suggest including anthropogenic activity in this statement. this also holds true for the similar statements at the start of the Introduction. An example of emerging human impact would be Williams et al. 2024 (DOI: 10.1002/ece3.11702), but there will be others that could support such a statement.

This was amended in line 9 in the abstract and in line 22 in the introduction.

2. Introduction, line 26: I take the point that these areas are not as well constrained as other locations, but the distribution of fauna across some areas of the Arctic are well documented in terms of species assemblage structure and, albeit to a lesser extent, ecosystem functioning (e.g. Jorgensen et al. 2015, doi: 10.1093/icesjms/fsu106; solan et al. 2020, doi: 10.1098/rsta.2019.0365). It would be good to highlight this disparity.

This was amended in line 26–31.

3. Introduction, line 27: the statement about different methodologies being adopted in the deep sea seems out of place and it is not clear what the authors are highlighting. This needs some clarification. Do you mean different ways of estimating biomass? why highlight only the deep sea, and what do you mean by deep (non-shelf?)?

This was amended in line 28–31.

4. Introduction, second and third paragraphs: this section would benefit from stating what will be achieved by having this database, and what these data are explicitly used for and, if appropriate, examples where the derived conclusions have had low confidence because of lack of data. At the moment, whilst correct, these paragraphs are not very compelling to the reader and would benefit from being strengthened.

This was amended in line 43 to 64.

5. the methods section is well written and largely comprehensive. It is, however, less clear on where (which stations?) and how many individuals individual estimates are based on. Some justification should be given, or limitations highlighted or at least explicitly stated, over how confident each estimate of biomass is. The number of individuals on which the biomass value is based varies, as does the location from which such individuals are pooled. For example, if individuals have been pooled across the entire sampling area, that is very different to if the samples were derived solely from the north or south, or from shallow vs deeper environments. Some cross reference to the environmental variability needs to be included alongside these estimates. Perhaps maps of the main groups could be provided simply highlighting the stations from which estimates were derived with a coloured symbol and the value of n from each station annotated next to the station. Such maps could be added to the supplementary information.

Thank you for this detailed suggestion. We have clarified in the Methods section (Lines 95–102) how individuals across the smapling stations were used for each biomass estimates. To provide additional context, we have also added Figure S2 in the supplements, which maps the main groups and highlights the stations contributing to each estimate, including the number of individuals (n) at each station.

6. The morphometrics should be described in the text, or reference to a diagram or whatever is appropriate in the supplementary material to indicate what was measured. Were fauna anaesthetised when they were measured, for example? What was the accuracy of the measurement, and were rulers or callipers or some other method used to obtain the measure?, and so on.

We have added Figure S1 in the supplements to illustrate the morphometric). Details regarding the measurement procedures, including whether specimens were anaesthetized, the measurement accuracy, and the instruments used, are now described in the Methods section (Lines 117 and 124).

7. Section 2.3 - the description of the statistical analyses does not state what was deemed acceptable in terms of the number of values, and the regressions should be provided in graphical form (scatterplots) for the reader to see how good a fit they are to the data. The table should also include the R² value, as well as the value of n, alongside the slope parameter (although i see that some are listed in the next section). i would also like to see some indication of confidence as an extra column, perhaps a simple red, amber, green traffic light system based on number of samples and level of fit criteria.

Thank you for this detailed suggestion. Regarding the statistical details, we have now clarified the criteria used for the number of values deemed acceptable for the analyses (Line 128). We also provide the slope parameters alongside the corresponding R² values, the number of samples (n) and a “traffic light system” for confidence (Table 3–8). In addition, scatterplots of the regressions have been added to the supplements Figure S3–S8.

8. In the results section some wider statements would be interesting to the reader, such as what the range of the slopes were and which groups had the more or less of a slope. Are they consistent with similar groups derived elsewhere? are they within expectation? D they vary spatially, and if so, by how much? Provide some context to the results.

Thank you for this valuable suggestion. We have expanded the Results section to include additional explanations of the slope ranges and observed patterns (Lines 160–169, 171–198 and 233–261). With regard to spatial differences and comparisons to other regions, we note that such comparisons are currently limited. As outlined in the Introduction, conversion factors are not yet available for the majority of the taxa considered here, and existing studies often apply differing methodologies, which complicates direct comparisons. With this paper we focus primarily on presenting the dataset rather than extensive comparative analyses. We therefore consider a more detailed comparison, also considering environmental factors, to be beyond the scope of this data description paper.

9. Line 163 (and elsewhere) - the authors refer to common names, which is fine for readability, but the scientific group names should be added in brackets so it is clear which group they are referring to as common names vary around the globe.

This was amanded in the entire results section.

10. The conclusion states that the data open the door for estimating biomass from non-invasive methods (e.g. photographs), suggesting that this might be the motivation for the work, but this is not expanded in the introduction. Some reference to ethics and avoiding the use of animals should be referenced to support this point. some reference back to the main points stated in the introduction would round up the paper, particularly a statement of what now can be achieved or some suggestion as to what is now possible given these data.

This was amended in line 334 to 344.

Reviewer 2:

Abstract:

1. line 15-16 “calculated 15 conversion factors for wet mass (WM) to dry mass (DM) (40 families) and to AFDM (39 families) and DM to AFDM (42 families).” Sentence not clear. Suggestion to reformulate as “calculated 15 conversion factors for wet mass (WM) to dry mass (DM) (40 families), for wet mass (WM) to AFDM (39 families) and for DM to AFDM (42 families).”

This was amended in line 14–15.

Introduction:

2. line 44 “recent years”: studies from the 90ies are not recent anymore. Suggest to replace by “in the last 3 decades”.

This was amended in line 45.

3. Line 54: resulting data will form the basis of a growing database. Does this database already exist, and is this a collaborative effort to which other authors can submit data to? Who will curate this database?

This was amended in line 59 to 64.

Methods:

4. Line 76: no mentioning of how samples were stored at this point. This seems as if the organisms were identified alive on board. Sample storage is only described in line 91. Please rearrange to clarify.

This was amended in line 92/93.

5. Line 76: which literature sources were used for identification? SE Greenland is not very well studied in terms of benthic fauna.

This was amended in line 87–90.

6. Line 94 ff on assessing weights and size: this section needs more detail. E.g. wet weight: was this blotted wet weight? Were Echinoderms (especially Strongylocentrotidae) first pierced to remove internal water? Was the same balance used for wet, dry and ash weight? If not, what was the accuracy of the balance for wet and dry weight? What was the accuracy of the instruments used to measure size?

This was amended in line 115–124.

7. Statistics: please start with what you will investigate. Move the used software to the end.

This was amended in line 137.

8. Line 108: “For body size and mass metrics, homogeneity of variance and normality were tested using Levene’s test and the Shapiro-Wilk test, respectively”. Not clear what you will test on body size and mass metrics. To improve readability, first explain which question you will address, then which test you will use to address the question and then which assumptions, corresponding to the chosen test, you have verified.

This was amended in line 128 to 137. In addition, the results of the assumption tests are displayed in the supplements in Table S1 and S2.

9. L111 you have rightfully conducted linear regression analyses, which provide you with a significance test (and corresponding p-value), as well as a goodness-of-fit measure (R^2). Hence, it is not clear why you report Spearman Rank correlation coefficients on top of these results.

This was amended in line 134–137.

10. Were assumptions of linear regression checked by inspecting residuals?

This was amended in line 131 to 134. In addition, the results of the assumption tests on the residuals are displayed in the supplements in Table S1 and S2.

Results:

11. L121 a total of ... was (not were)

Thank you for this comment. We have retained “were”, as the verb agrees with the plural noun “samples” (Line 144).

12. In several locations in the Results section, p-values > 0.05 are reported as indicators of significant regressions/correlations. You probably mean $p < 0.05$?

The p-values were checked and corrected in the entire results section.

13. Table 3:

- i. please clarify “Laetmonice sp. one more not identified”

This was amended in Table 3–8.

- ii. table formatting needed to be able to read the numbers in column N

This has been amended by splitting the previous result tables into six individual tables (Table 3–8).

14. Regression scatterplots should be added in supplementary information to better understand the reliability of results. E.g. the methods state that 10 individuals per species were aimed for, but the tables show that in reality, several species only have 3–5 observations for regression analysis

This was amended by providing scatter plots in supplementary Figures S3 to S8.

15. L160 seems a repetition of the previous paragraph.

Thank you for this comment. While the paragraphs may appear similar, the previous paragraph describes the Spearman rank correlation results, whereas the following paragraph focuses on the conversion factors. Sections 4.1 and 4.2 have been rewritten for more clarity and less repetition.

Conclusions:

16. L200 another benefit of this study is that it can guide future monitoring in identifying which species should be preferentially sampled to increase reliability on the weight-weight and size-weight conversion factors.

This was amended in line 280–282 and 336–337.

We sincerely thank the reviewers for their valuable comments. We hope that our revisions have addressed all concerns satisfactorily and we look forward to your response.

Yours Sincerely,
Johanna Behrisch

On behalf of the co-author Nadescha Zwerschke