Reply to RC2: 'Comment on gchron-2023-7', Anonymous Referee #2, 14 Jun 2023

All reviewer text is in red. Author replies in black.

Pearce et al. present about 100 new marine radiocarbon (^{14}C) reservoir ages (MRA) of coastal and shelf waters around Greenland, Baffin Island, Newfoundland, and Iceland. The data result from ^{14}C measurements on pre-bomb molluscs retrieved from museums. The MRA results are binned to seven regions and discussed with respect to the global Marine20 ^{14}C calibration curve in terms of the regional MRA correction, ΔR_{20}. The authors also discuss their ΔR_{20} results in the light of specific factors such as sample depth, sea ice cover and feeding habits.

The manuscript is well written, the presentation is clear, and the dataset is an important contribution to the MRA / ΔR data base. However, there are a few minor issues that should be addressed before publication in GChron (L = line):

L 30: The half-life of ^{14}C has been slightly revised to 5700 years (e.g., Audi et al., 2003; Bé and Chechev, 2012; Kutschera, 2013)

Thank you for pointing this out. We will correct this and add a reference.

L 124 "marine mammals": "marine" should be removed

Agreed.

Figure 1:

(i) Add a depth scale (such as in Fig. 1 by Pieńkowski et al. 2022)

Good point. Will add a scale for the bathymetry.

(ii) "NFL", "WGC", and "EGC" should be also explained in the caption.

Agreed.

L 214-216 (and Figure 2): Is there a hard objective criterion to separate the three southernmost data points in East Greenland from region 7?

Yes. The reasoning here is that south of the Denmark Strait, there is more influence of Atlantic Water, caused by the southward bending Irminger Current (see also Fig. 1). These boundaries for Zone 6 are explained in the text in lines 218-220.

Figure 2: Explain "CS"

Cumberland Sound. All abbreviations in the Figure 2 caption will be explained.

L 353: Explain "mwd"

Meter water depth. This was explained in Line 272.

Figure 3: Would it make sense to indicate the positions of the outliers in the inserted map?

The outliers are actually included in the insert map, but we realize that their color (light grey) can be confused with land in the current color scheme. We will make sure that this is resolved in a revised version of figures 3 and 4.

L 376: Explain "mwd"

Meter water depth. This was explained in Line 272.

Figure 4:
(i) As ΔR depends on the sea ice concentration, the coordinate axes should be swapped. The situation is different from Figure 3 where the independent variable (usually plotted along the horizontal axis) is depth (typically plotted in vertical direction).
We agree that the dependent variable should normally be on the y-axis, but as you already mentioned, this is not possible in Figure 3 because of depth being plotted vertically. Because figures 3 and 4 use the same styling and layout, we would prefer to keep ΔR on the x-axis for consistency. We believe that it is much easier for the reader to compare the figures if the data is presented in the same way.
(ii) Can you quantify the trends, and are they significant? I wonder if the trends are still visible once the coordinate axes have been swapped.
The dotted lines plotted in Figure 4 are just to illustrate the general trends within each zone and the agreement with the theory of more sea ice resulting in older surface waters. We now have however calculated the trends and significance and found that a significant positive correlation between sea ice and ΔR is only present in Zone 2 (W Labrador Sea). We will make this clear in a revised version of the manuscript. As mentioned in the discussion, ΔR depends on several factors, and to get a real quantified relationship with sea ice, one should eliminate other variables such as water depth or mollusk species. Unfortunately, we don't have a large enough dataset to perform these analyses.
(iii) Would it make sense to indicate the position of the outlier in the inserted map?
As for Figure 3, we will adjust the color palette, so the outliers are more visible

compared to land. The outlier is also referred to in the figure caption with the number reference to the supplementary table for more information.

References:

Audi, G., Bersillon, O., Blachot, J., and Wapstra, A. H.: The Nubase evaluation of nuclear and decay properties, Nuclear Physics A, 729, 3–128, https://doi.org/10.1016/j.nuclphysa.2003.11.001, 2003.

Bé, M.-M. and Chechev, V. P.: 14C - Comments on evaluation of decay data, Laboratoire National Henri Becquerel, Gif-sur-Yvette, http://www.lnhb.fr/nuclides/C-14_com.pdf, 2012.

Kutschera, W.: Applications of accelerator mass spectrometry, International Journal of Mass Spectrometry, 349–350, 203–218, https://doi.org/10.1016/j.ijms.2013.05.023, 2013.