Response to comments by reviewer 2

The authors thank the anonymous reviewer 2 for the valuable comments on the manuscript. We have carefully taken note of the comments and will make the necessary revisions to address the suggestions. Our responses are given in black colour.

Reviewer comment:

I think the marine reservoir age discussion has to be clarified. Usually the marine reservoir age refers to the 14C age difference between upper ocean (mixed layer) and the atmosphere. However, this study discusses benthic 14C ages at a present depth of about 1000 m (less during the deglaciation). The setting is not an open ocean setting and, therefore, I assume that the authors have good reasons to relate their 14C offset to Marine20. However, this is not at all explained and should be discussed thoroughly.

Reply:
Thank you for this comment. We agree that usually the marine reservoir age refers to the ^{14}C age difference between upper ocean (mixed layer) and the atmosphere. However, in our study, we used radiocarbon ages of mixed benthic bivalves and mixed benthic foraminifera to construct our initial age-depth model using ΔR value of -110±28 ^{14}C years BP. The benthic bivalves and foraminifera species live close to the sediment surfaces and reflect the carbon and oxygen isotope record of the bottom water in their shells. Therefore, they are recording deep water signals and we relate our calculated deglacial ΔR value to be a benthic value. We agree that Marine20 provides a surface MRA, however, within the first 1000 m of the water column, $\Delta^{14}C$ gradients are still relatively small and especially changes in the MRA, which are set at the surface, will be comparable. Offsets on the other hand, are included through the application of a ΔR. A paragraph has been added in the discussion section in the revised manuscript to clarify these points.

Reviewer comment:

If I understood correctly, the authors assume a constant reservoir effect in their calculations. Is there any discernible trend in the reservoir age over the deglaciation and wouldn't one expect a trend considering the changing setting (affecting so strongly 10Be/9Be).

Reply:
Thank you for this suggestion. From our data, we cannot robustly infer a trend in the reservoir ages (See also reply to Reviewer 1), but we also cannot rule this out completely with the method that we employed. However, we note that applying a constant ΔR leads to a good agreement between the 10Be-records, thus not providing any evidence for a time-variable ΔR. Furthermore, we believe that we cannot match single 10Be-wiggles as the noise in the data is quite high. We think that our conservative approach best serves the reliability of our findings.

Reviewer comment:

The authigenic 10Be/9Be record is dominated by a large trend and the residual variability appears to be largely within the measurement uncertainties (see e.g. Fig 4a where few points deviate from the trend lines exceeding their uncertainties). I recommend that the authors elaborate more if these deviations from the trend can be considered statistically significant.

Reply:
Thank you for this insightful suggestion. We took this into account and the measurement uncertainty are entering into the calculation of this match (see equation 1; more details were given in lines 247-252). We have elaborated on these deviations from the trends and we show that our results are robust against different detrending techniques. By jointly analyzing all samples, we achieve statistically significant results that support the reliability of our findings.

Reviewer comment:

The authors mention replicate measurements but do not seem to discuss them. I assume that they are shown in e.g. figure 4 but it could be discussed more (e.g. where the replicates separate samples from the same depth or e.g. replicate measurements on the same sample after leaching). To which extend do the replicates agree?

Reply:
Thank you for pointing this out. In Table S2 in the Supplement, 5 replicate samples are given (260, 320, 360, 390 and 514 cm) and their corresponding values are shown. Table A1 below shows the coefficient of variation results expressed in percentage (%) for each replicate. The agreement between replicate measurements of $^{10}Be/^{9}Be$ ratios was assessed using the Coefficient of Variation (CV) for each depth. We observe that the authigenic $^{10}Be/^{9}Be$ ratios demonstrated relatively low CV values, ranging from 0.98% to 7.11%, which is in agreement with the stated uncertainties of the $^{10}Be/^{9}Be$-ratio. The CV results and description has been added in the revised manuscript.

Table A1. Coefficient of variation values.

Depth (cm)	Authigenic 10Be/9Be (at/at) [x10^-8]	sigma [%]	Authigenic 10Be/9Be Coefficient of Variation [%]
260	1.08	7.87	7.11
260	1.04	6.34	
320	0.85	5.46	2.45
320	0.88	5.35	
360	0.74	5.43	3.72
360	0.78	5.75	
390	0.72	5.39	0.98
390	0.73	5.36	
514	0.72	5.37	5.39
514	0.70	5.40	