

Final authors response

The authors have done a thorough job responding to reviewer comments. After a few technical corrections, this manuscript is ready for publication.

We sincerely thank Lorraine Lisiecki and Thomas Chalk for accepting our revised manuscript for publication and for their valuable suggestions. We are confident that the final revisions have provided the manuscript with the necessary final polish.

Detailed responses to each comment are provided below in red. Suggested changes to the main text are indicated in *italics*.

Technical corrections:

There are many extraneous-seeming hyphens that should be removed (e.g., lines 49, 103, 109, 404, 409, 631

We have carefully corrected the text and removed all extraneous hyphens, including those noted in lines 49, 103, 109, 404, 409, and 631.

Instead of including the sentences "HS numbering follows Yu et al. (2023), which may differ from the naming convention in other studies, especially for HS older than HS6. The onset of MIS 5e (*sensu stricto*) was defined in the study core after Bauch et al. (2012) as the end of ice-rafted detritus input following MIS 6." repeatedly in figure captions, please include these explanations in section 3.5 "Age Model" plus the sentence about HS numbering in only the Figure 2 caption.

We have removed the sentence from all figure captions except for Figure 2 and have included the following text at line 257 in Section 3.5: *We adopt the HS numbering from Yu et al. (2023), noting that it may differ from the naming conventions applied in other studies, particularly for HS older than HS6.*

Add the demarcation for the start of MIS 5e (*sensu stricto*) to Table 2, so it is clear which depth was identified as the end of IRD and what age it has been assigned on your age model. The tuning target could be listed as "interpolated."

We have included the onset of MIS 5e (*sensu stricto*) in Table 2, indicating the corresponding depth and assigned age from our age model. The tuning target is listed as "interpolated" as suggested.

Consider adding brief y-axis labels, such as ("Mn/Ca" and "Al/Ca") to the subplots in figure 3 (the cross plots), if you can find a way to without increasing the clutter.

We have added y-axis labels ("Mn/Ca ($\mu\text{mol mol}^{-1}$)" and "Al/Ca ($\mu\text{mol mol}^{-1}$)") to the subplots in Figure 3 as suggested, ensuring that the figure remains clear and uncluttered.

Line 420+: rephrase to "multiple lines of evidence for", and either expand or rephrase what is meant precisely by "late thermal maximum" (e.g. why would you consider it late?).

We adjust our statement accordingly: There *are* also multiple *lines of* evidence for prolonged meltwater supply from remnant MIS 6 ice sheets surrounding the Nordic Seas which extended far into MIS 5e (Bauch et al., 2011, 2012) that may have been linked with centennial- to sub-millennial-scale disruptions in NADW formation (e.g. Galaasen et al., 2014). We have decided to remove the sentence “[...] causing a late thermal maximum in the upper ocean (Bauch et al., 2011; Capron et al., 2014; Zhuravleva et al., 2017) [...]” as it is not strictly relevant to the discussion at this line, hence we also removed the statement on “late thermal maximum”. For completeness though, it refers to the delayed sea surface temperature maximum in MIS 5e in the Nordic Seas compared to North Atlantic records (Bauch et al., 2011; Capron et al., 2014; Zhuravleva et al., 2017). This is mentioned in line 435 anyway.

Line 425: The phrase "centuries or few (sub-)millennia" is overly ambiguous. Change "few" to "several" and clarify if you mean sub-millennia or millennia.

As we have demonstrated that our record resolves millennial-scale variability, we now state: Our new bottom water [CO_3^{2-}] data suggest that these additional influences on Nordic Seas surface ocean buoyancy did not hamper deep convection in the Norwegian Sea beyond *several* centuries or *very few millennia*.

Line 429: It isn't clear what "respectively" applies to in this sentence.

We recognised that our initial statement was misleading and removed “respectively” from the text. It now reads: Indeed, modelling studies forced by various future $\text{CO}_{2,\text{atm}}$ scenarios suggest a weakening of the AMOC during the first century and a decline in overturning in the Nordic Seas until ~2050 that is followed by an AMOC recovery to the initial or an even stronger state (depending on the model; Bonan et al., 2022) and a strengthening of overturning in the Nordic Seas (Årthun et al., 2023).