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Dear Editor,

Following your suggestions, we are submitting a revised manuscript of *Response of biological productivity to North Atlantic marine front migration during the Holocene*. Below we list each of the specific comments followed by our response. Please refer to the attached revised manuscript for tracked changes.

L41: Consider updating the reference use and clarify. As you say later, the Polar front separate the Polar and Arctic water, while the Arctic front separate the Arctic and Atlantic water; the Arctic water is the domain in between the Atlantic and Polar water - resulting from intermixing between the two end domains. Now it reads like both fronts are between Atlantic water and either Arctic or Polar water.

After re-reading, we agree that this appears unclear and perhaps misleading. We have reordered the sentences so that we immediately define which fronts separate which respective currents before leading into the introduction of the North Iceland Shelf and its proximity to both.

L80: These might be relevant; new detailed knowledge on the physical oceanography of the North Iceland area:

The emergence of the North Icelandic Jet and its evolution from northeast Iceland to Denmark Strait. S Semper, K Våge, RS Pickart, H Valdimarsson, DJ Torres, S Jónsson. *Journal of Physical Oceanography* 49 (10), 2499-2521

The Iceland-Faroe Slope Jet: a conduit for dense water toward the Faroe Bank Channel overflow S Semper, RS Pickart, K Våge, KMH Larsen, H Hátún, B Hansen. *Nature Communications* 11 (1), 1-10

Several other papers related to the area, involving Våge/Pickart and others, have been published over the last years.

Thank you for these suggestions! We have added both of the Semper papers to the references and also included the IFSJ in Figure 1.

L187: After Belt or Cabedo-Sanz? Clarify the use of references here.

We have removed the Belt et al. (2019) reference as it the same methods are described in Cabedo-Sanz et al. (2016). Thank you for pointing out this redundancy.

L219: How similar/dissimilar are the new and old counts of T.q. and NPS? You provide number of samples counted, however, how densely are the cores sampled - for the different proxies? Make sure is clear if the analysis presented for different are from the exact same samples and of the same resolution, or if there are differences.

The old TQ and NPS records (Cabedo-Sanz et al., 2016) had high-amplitude variability which was subsequently discovered to have resulted from counting errors. These have all been

recounted, which now removes this variability, resulting in considerably more realistic paleoceanographic interpretations. As for the sample resolution, both planktic and benthic assemblages are multi-decadal. Although the benthic record has more samples overall, all planktics are paired with benthics so that they are directly comparable. We have edited the corresponding text to help clarify these points.

L244: What is the difference in resolution between the two cores? What about differing regime shifts between different proxies from the same core - or do you have exactly the same samples analyzed for all proxies for each core? Is the resolution the same for each proxy; new and previously published? Both reviewers raised concerns with respect to the results of the statistical analysis. I would like to see a bit more information specifying the limitations more clearly, and argumentation for why you still consider the analysis worthwhile/for what purpose they are useful (and why) and what they don't help you to solve (and why).

Thank you for bringing up this point again. You are right that the varying resolution between proxies within a single core will limit comparison between regime shift analyses, as well as the different cores, as we have pointed out. We hope that our recent additions and edits to this section help clarify any lingering uncertainties for the reader, and make the interpretations of our regime shift analyses more transparent.

L498: What other records/proxies?

We have added MD99-2266 (Moossen et al., 2015) as another UK³⁷ record that shows an increase in SSTs over the last millennium.

L506: From where should this freshwater lid arise? What is the source for the fresh water?

We realize that perhaps freshwater is not the appropriate term as we are really referring to low-salinity Polar Water, which is sourced from East Greenland and well documented in our proxy records. This has now been edited accordingly.

L595: Please add the link to the data.

Unfortunately, we cannot add a direct link at this time. PANGAEA data submissions are currently back-logged. Our dataset is currently in queue and is estimated to be publicly available in ~2 months.

Thank you again for handling our submission through the review process.

Sincerely,



David J. Harning