

## ***Interactive comment on “Multiproxy evidence of the Neoglacial expansion of Atlantic Water to eastern Svalbard: Does ancient environmental DNA complement sedimentary and microfossil records?” by Joanna Pawłowska et al.***

### **Anonymous Referee #2**

Received and published: 26 April 2019

The authors present new study on multicentennial environmental reconstruction of eastern Svalbard region over the last ca. 4000, the so-called Neoglacial. Well established proxies (sedimentary, geochemical and microfossils) along with very novel molecular approach (foraminifera and diatom derived ancient DNA) were studied in marine sediment core in order to deliver the broad database for the paleo-interpretations. The study area was already investigated in number of studies, however here the authors tested new molecular proxy, which seems to well support and improve the interpretations based on standard tools. In my opinion, the study is well worth to be

C1

published after some, rather minor improvements, particular of the discussion chapter. Please follow the detailed comments below:

Detailed comments:

Abstract: Perhaps it could be more pronounced why the authors choose Storfjorden for the area of study and what is the specific importance of the region.

Introduction: Page 3, line 27. Wouldn't be enough to refer only to the published study of Pawłowska?

Study area: Page 4, lines 27-29. The location of the studied sediment core seems to be rather off the Storfjorden, in the trough, thus I wonder if the study area descriptions, including low energy and high SAR environment, are still applying?

Do you know what is the thickness of AW branch that enters the core location, does it affect the bottom environment directly, do you have modern bottom temperature and salinity data?

Sampling: With a relatively short sediment core, the aDNA sampling resolution could be higher.

Fossil foraminifera: It should be mention somewhere what was the resolution of fossil foraminiferal analysis, I assume it was every 1 cm.

Page 6, line 15. Please provide full name of the species as it is mentioned here for the first time.

Do you have any possible explanation for the low time resolution between 7890 and 2700 cal BP? Strong bottom currents or possible sediment slide?

Page 8, lines 33-34 to page 9, line 1. The mentioned three percentage values, what are they refer to, it is not clear from the sentence, consider rewording.

Foraminiferal aDNA:

C2

The authors focus only on soft walled monothalamea group with regard to molecular record. Do the authors plan to relate the fossil and the molecular records of hard walled foraminifera as well? Perhaps the agglutinated taxa which are also difficult to stay preserved could be investigated molecularly.

Discussion: Overall, I would like to suggest including 'chronological' headlines into the discussion chapter e.g. 'Interval prior to 2.7 ka BP', 'Episodes of enhanced AW inflow' et. al. to make it easier for the reader to follow.

Page 10, lines 25-31. It would be highly recommended to provide summary figure that would visualize the correlation between your results and the cited studies.

Page 11, line 4-7. Can the strong currents provide also unfavorable conditions for benthic foraminifera and explain generally very low fauna abundance? Or this is related exclusively with heavy sea ice cover? Is there any detectable response from current velocity indicators like *C. lobatulus*?

Line 2-5. Might be that IRD and higher mean grain size can also source from extensive transport of shore sea ice?

Page 12, line 6-8. Is it possible to detect the past occurrence of dense brines transport to the bottom in the foraminiferal isotopic signatures measured by the authors?

Line 24-25. Yet, no clear response from *C. lobatulus*.

Page 13, line 12-14. Here, the authors explain brines as a source of water mixing and nutrient supply, with a positive effect of foraminiferal fauna, whereas for the interval prior to 2.7 cal ka BP, brine formation is presented as a hazardous factor, which seems to be a bit confusing.

Line 29-31. Was the strong bottom current activity reflected also in the changes in grain size fraction?

Page 15, line 25. The authors mentioned LIA but what about the other prominent

C3

climatic events that occurred during the last 2 ka. Can the results be related to them as well, if not, can the authors discuss the possible reason for the lack of larger scale climatic signals, e.g. perhaps local variability. The discussion could improve from a bit broader overview of other Svalbard records, that also underly the AW inflow.

General comment, can the authors observe a relation of the reconstructed higher bottom current activities and the diversity of fragile, soft organic-walled monothalamids?

Figures:

Fig. 3. Could you perhaps mark the sampling points on the graphs. It seems as for the interval 4 ka BP to 2.7 ka BP there are very few sampling points, thus there is almost no detectable variability in the data. Would it be reasonable to consider sediment turbation and homogenization of the signals in such a small thickness of sediment?

The dash lines indicating intervals are very useful, you could probably apply them also to figure 4 and 5 and 7 so it is easier to compare the data.

Fig. 4. I would suggest to change scale down to 30% in order to have better overview for the potential variability, except *C. reniforme*.

Fig. 5. The age scale is bit too compacted, please consider stretching it.

Fig. 6. 'Clade I' was not mentioned in the result chapter, does it stand for 'environmental clade' (page 9, line 21)?

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Interactive comment on Clim. Past Discuss., <https://doi.org/10.5194/cp-2019-21>, 2019.

C4