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Ocean Science Discussions

Interactive comment on "Changes in the composition of marine and sea-ice diatoms derived from sedimentary ancient DNA of the eastern Fram Strait over the past 30,000 years" *by* Heike H. Zimmermann et al.

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In this study, Zimmermann et al. present DNA profiles associated with marine diatoms from selected samples of a well-dated and well-investigated sediment core. This core was previously investigated for the sea ice biomarker IP25, which allows the authors a comparison of their sedaDNA record with this well established sea ice proxy.

The manuscript is well written and will contribute to the understanding for sedaDNA for paleoenvironmental reconstructions.

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Discussion paper

I have only few comments on the manuscripts, and I want to point out that I cannot evaluate the quality of the DNA analysis as I my expertise is with other methods.

Comments:

The term “richness” is used very often, and I have difficulties understanding that term. Could you please add some information on this term, as you use it very often.

Abstract: The Abstract is missing some information on the investigated material/samples.

Introduction: I have the feeling other sea ice proxies should be mentioned. Further, some information on the advantages of the sedaDNA study you present here is missing. It is not clear why sedaDNA may be of advantage for sea ice reconstructions, as the sea ice biomarker IP25 is not as prone to dissolution as microfossils.

Chapter 6: I feel this chapter needs more detail. The mismatch of IP25 and sedaDNA was to be expected, as you do not investigate the IP25 producers. Could you elaborate more on the reasons for the mismatch of biomarker and sedaDNA record? What about seasonality of N. frigida and IP25 production? From SW Greenland, Krawzcyk et al (2015; Polar Biology) found that N. frigida is most abundant in late winter before the main spring bloom – which is expected to be the main production season of IP25 in Fram Strait. What about habitats (under the ice, inside the ice) between the different species? And finally what are your recommendations for future work or when using sedaDN for sea-ice reconstructions?

L36 Krawczyk et al., 2017 should be added here

L59 & L60 overuse of whether

L82 I find the description of the sea ice condition in the working area confusing.

L82 mentioning past sea ice variability feels wrong here, maybe add this information with some more detail to the introduction

L86 should say Epp et al. (2019)

L116 should say Callahan et al. (2017)

L120 should say Dulias et al. (2017) and Stoof-Leichsenring et al. (2012)

L134 I do not understand this Quote.

L150-159 I feel the information on lake studies has too much detail whereas the information on marine studies is too short as the presented study is marine.

L198 This is a major problem. However cannot be changed for your study but I welcome this comment. For future studies the parallel investigation of biomarkers and diatoms in the microfossil and genetic record may be a very promising approach.

I hope these comments help to improve the already good manuscript. All the best, Henriette Kolling

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