

Interactive comment on “A reconstruction of warm water inflow to Upernavik Isstrøm since AD 1925 and its relation to glacier retreat” by Flor Vermassen et al.

Anonymous Referee #2

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Vermassen et al. present a nice paper on the palaeoceanography of a Greenlandic fjord. In my opinion, the paper is relevant and a good fit for Climate of the Past. However, there are some issues that need addressing and resolving before the paper can be published. I have outlined these below. I am happy to review a revised version of this manuscript.

• I think the paper suffers from focussing solely on one proxy (benthic foraminifera), especially since relatively major oceanographic/environmental changes are inferred from the data. Supporting data, for example TIC/TOC, biogenic silica, stable isotopes of oxygen and carbon etc. would greatly strengthen the interpretations, especially those

C1

regarding productivity. Although this may be outside the scope of this study, I still find it surprising that such relatively standard sedimentary analyses were omitted here.

• One paper – Vermassen et al. (submitted to JQS) is quoted repeatedly, with many of the authors overlapping with the present manuscript; however, this paper is under review and so presumably not available yet. Is the JQS paper focussing on the same core, and if so, what was the reason for publishing it separately rather than having it as one, stronger paper? I think this issue should be addressed, as relevant data from the JQS manuscript may strengthen the current one.

• Since your core was collected at 900 m depth, your benthics record bottom water conditions only. You mention planktonic foraminifera in passing, however [section 4.3; lines 11-12]. Although planktonics may be sparse, I still think this is important and should be expanded on, as they may give you a clue as to the validity of your overall interpretations.

• [section 5.1] The dissolution of calcareous foraminifera also depends on depth – for example, there are almost no calcareous foraminifera in deeper Baffin Bay waters.

• You identify organic linings in your samples and assign them to *Elphidium excavatum*. How confident are you that these linings are those of *E. excavatum*? Did you dissolve specimens of this species to check this? What about the linings of other planispiral species? If you get foraminiferal linings in your samples, you must have more than one type present – what are they? I think the link between linings and a specific foraminiferal species should be demonstrated more clearly, as this forms the basis of your argument regarding dissolution later on [section 5.1], and, especially, the link to Atlantic water inflow.

• Also regarding linings, the abundance in Fig. 5 are rather on the low side (max. 15 linings/g) – is this correct? Does this include all linings or just those of planispiral species? How do you make the leap between dissolution and lining presence, especially in periods that have plenty of calcareous proportions but also the highest rates of

C2

linings (e.g., 1920-1960 on Fig. 5)?

â€” Inflow of Atlantic waters into Baffin Bay and adjacent regions are inferred in previous palaeo-studies (e.g., Knudsen et al. 2012, *Boreas*). How similar or dissimilar are the benthic assemblages in these studies compared to the present one?

â€” The inference of nutrient levels in the fjord [section 5.1, line 24 onwards] is tentative in my opinion, since you don't have other palaeoproductivity indicators (TOC, $\delta^{13}\text{C}$) to support this notion. True, there are some species in your record which indicate high flux of organic matter to the seafloor, but this is mostly *N. labradorica*. I think these inferences between dissolution, Atlantic water inflow, and nutrients should be done with greater caution, therefore.

â€” Fig. 5: this figure is a bit confusing and should be modified for ease of reading. For example, are the abundances shown relative or absolute? What are the stippled lines (very faint!)? I suggest adding lines or points to the silhouette graphs so the number of samples/datapoints can be seen more clearly.

â€” Unless I missed it, a list of all species found, including taxonomic designations, should be added to the paper.

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