Clim. Past Discuss.,
https://doi.org/10.5194/cp-2019-100-AC1, 2020

Interactive comment on "Surface and subsurface Labrador Shelf water mass conditions during the last 6,000 years" *by* Annalena A. Lochte et al.

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Received and published: 20 January 2020

Thank you very much for the positive and constructive feedback on our contribution. Below, we address the specific concerns raised by reviewer 1.

1. Additional plots of LC reconstructions

As previous LC reconstructions have mainly focussed on late deglacial and early Holocene glacial meltwater run-off (Jennings et al., 2015, Hoffman et al., 2012; Lewis et al., 2012; Hillaire- Marcel et al., 2007; Rashid et al., 2017), only a few records exist that are comparable to our study. Other LC records of the relevant period include a sea-ice dinocyst abundance reconstruction (Solignac et al., 2011) as well as alkenone-based SST reconstructions of the last two millennia from a fjord in Newfoundland (Sicre

et al., 2014). While these datasets indicate similarities to our findings, they do not help to improve our understanding of LC influence on deepwater formation and we therefore refrained from including them in Fig. 6. Following the reviewer's suggestion, a Mg/Ca temperature plot from the Laurentian Slope (Marchitto & DeMenocal, 2003) representing the Deep Western Boundary Current (DWBC) will be added to Fig. 6 (see below). As stated in the original manuscript (p. 13, lines 25 - 31), a Little Ice Age (LIA) cooling is present in, both, DWBC as well as Labrador Shelf bottom waters, suggesting a coupling between the two water masses through the formation of Labrador Sea Water (LSW). However, other significant correlations between our LC reconstruction from the Labrador Shelf and the DWBC record are difficult to identify for the last 4,000 years, probably because of the lower amplitude in bottom water temperature changes in case of the DWBC.

2. Possible advection of alkenones

While it is not inconceivable that alkenones could have been advected from the Irminger Sea, thereby possibly aliasing the temperature signal of surface waters at the core site, there are two lines of evidence that suggest this to be rather unlikely.

a) If the variation in alkenone concentration would indeed reflect changes in alkenone transport from the Irminger Sea by the WGC, we – together with this reviewer - would expect to find a positive correlation between the alkenone concentration and BWT reconstructions, which we infer to reflect the WGC temperature signal. However, these two variables are not correlated (see figure 1 below).

b) Furthermore, the alkenone concentration appears to be independent of the sedimentation rate (see figure 2 below). This excludes the possibility that variations in the sedimentation rate would have impacted the measured fluctuation in alkenone concentration.

3. Try not to refer to geographical less known names that are not shown on map (Trinity Bay, Placenta Bay etc.

In the text, these lesser known names are always used in conjunction with better known and larger scale regional names such as “Newfoundland”, or with the core names labelled in Fig. 1, or both. We thus prefer to keep these references to specific bays.

4. Inform how far away (km) from the core site the hydrographic sections (apart from the one measured during the cruise) are located.

This information (27 km) is provided in the revised manuscript "Coloured lines mark the profiles at the nearest location (27 km from the core site) at 54°37.50N, 56°12.50W, obtained from the World Ocean Atlas 2013..."

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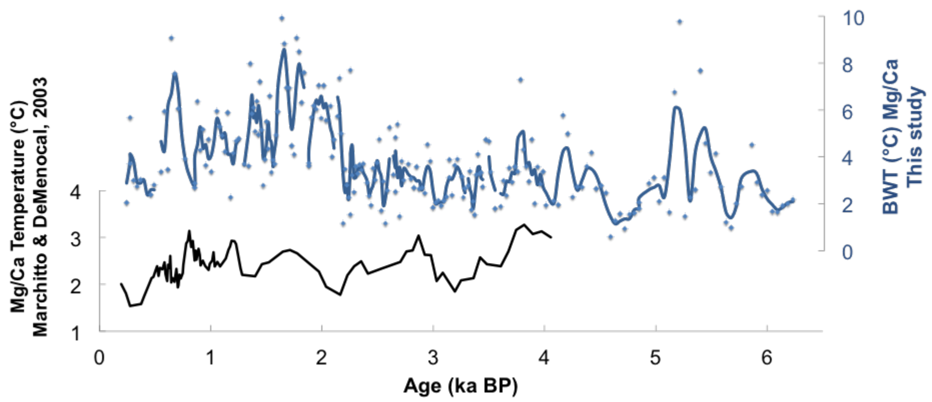

Fig. 1. Our BWT record plotted with an additional temperature record from the Laurentian Slope

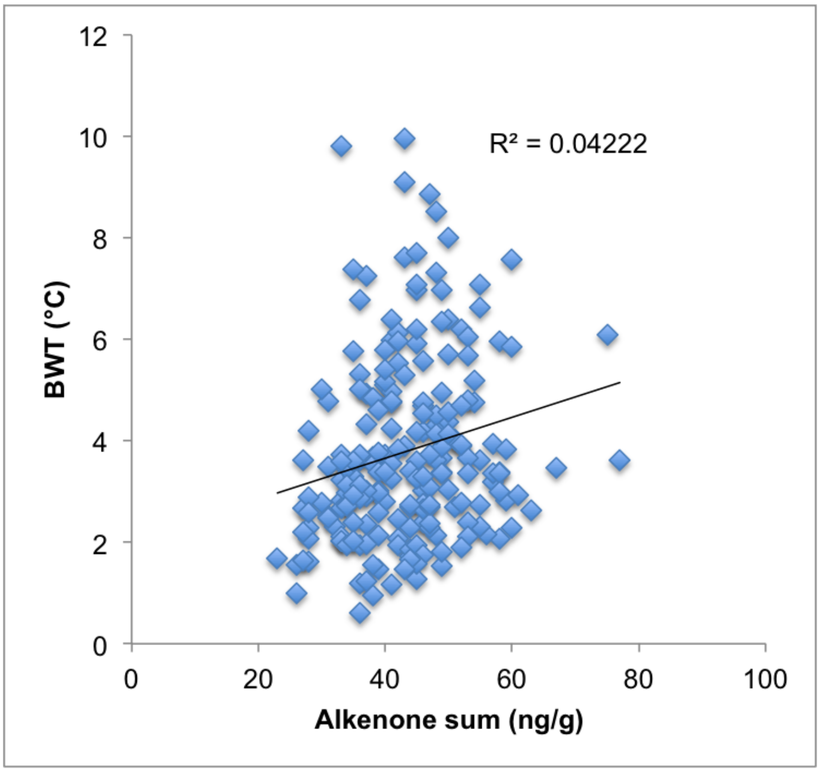

Fig. 2. Relationship of alkenone sum and BWT

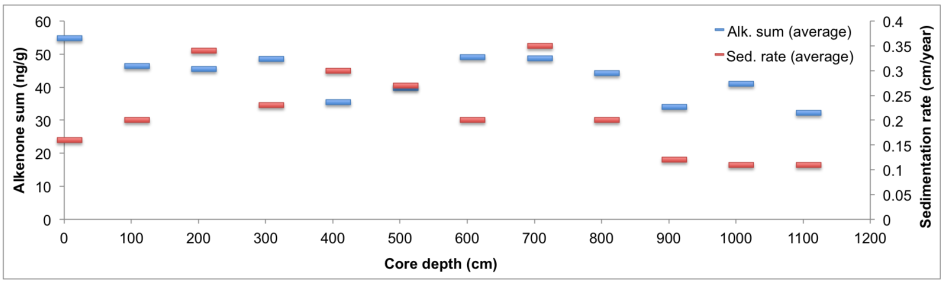

Fig. 3. Alkenone sum plotted versus sedimentation rate