Title: Do pelagic grazers benefit from sea ice? Insights from the Antarctic sea ice proxy $IPSO_{25}$

By: Katrin Scmidt et al

In this study the relative importance of three different carbon sources (ice-derived, ice-conditioned and non-ice associated) for Antarctic krill (*Euphausia superba*) is estimated with the use of the sea ice diatom proxy $IPSO_{25}$ (a di-unsaturated highly branched isoprenoid (HBI), $\delta^{13}C$=-12.5 ‰) and the proxy for marginal ice zone (MIZ) diatoms (phytoplankton bloom) a tri-unsaturated HBI termed HBI III, $\delta^{13}C$=-42.2 ‰). The relative importance of sea ice diatoms in krill was related to the performance in krill (mass-length ratio, size of digestive gland and growth rate).

General comment:

This study is of broad scientific interest since the sea ice conditions in the Arctic and Antarctic are significantly changing without us knowing the impacts on marine ecosystems. This is mainly due to methodological challenges and in this study the authors present the use of the sea ice proxy $IPSO_{25}$ to trace/estimate the importance of sea ice diatoms for krill and krill performance in the Scotia Sea, Atlantic sector of the Southern Ocean).

The authors have looked at several aspects and present many interesting results, but I would say the result section is far too long, including too many results/figures which make it challenging for the readers to follow. The result section also includes discussion parts which makes it even longer and hamper the overall structure of the paper. I am positive to the work done. I think it is very promising that the authors bring it one step further by relate the relative importance of sea ice diatoms to the krill performance. The authors have also included copepods performance into the study, but since they did not determine the relative importance of sea ice diatoms for these copepods I will recommend the authors to cut the copepod part in the results and rather bring it in as a "supportive" argument in the discussion instead. The main reason for why I recommend major revision is that the authors needs to "trim down" the number of figures to the half and get the manuscript less wordy and more focused on the most important results – the results that address the main aim/research question in this paper.

Specific comments:

Title: replace pelagic grazers with krill.

Keywords: missing?

Introduction: Somewhat long, but overall ok. Aim of the study/ research question could potentially be more hypotheses driven. At current very descriptive approach.

Methods (Materials and Methods)

Move the chlorophyll a measurements under Oceanography to 2.1 Phytoplankton bloom development,

Remove 2.8 Copepod abundance and stage composition

Results

See my general comments above.

Table 1. Please specify in Materials and Methods from how many stations carbon isotopic signatures of krill were analysed. From Table 1 only values from 4 stations are shown, but in the remaining result section the reader get the impression that many more krill samples are analysed, but this may only be the case for $IPSO_{25}$ and HBI III, shown in Fig. 5D

In **Figure 2** the authors could indicate in the station map with colour codes which analyses have been done from which station.

Figure 3. Remove text in brackets that already are given in the figure panels.

Figure 6 – is this figure of top relevance? I suggest to cut it or alternatively add to supplementary information. The same for Fig. 7 and Fig. 8

Figure 9 A bit complicated at first glance but OK. Panel A: check blue colour. One question to panel F why haven't the authors performed separate correlations for the three scenarios. At present one correlation for all three combined – please explain. The same question I have for Fig. 10 panel D correlation.

Fig 10. See above for question to panel D. In addition, I would suggest another way of presenting these results since they are difficult to follow/see patterns in the current form. I would suggest a table.

Fig. 11 Remove copepods from results

Discussion

I would start the Discussion with the end paragraph (Lines 75-90 on page 16) and down scale a bit the remaining part on the evaluation HBI approach.

Ocean colour data have been used to determine the progress in phytoplankton blooms and I miss some discussion on the "correctness of these data" since deep chlorophyll a max layer can frequently occur and these are not detected by the satellites.

The stage of the bloom/ seasonal progression differs in the study region. Please also discuss if differences in krill performance is likely to level out at the end of the season among the stations/regions sampled.

References

I have not checked references in detail in the current form of the manuscript, but most work referred to is peer-reviewed, easy to find papers. The numbers of references are however very high and the authors should consider to reduce the total numbers.