



EGUsphere, referee comment RC3
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Comment on egusphere-2022-99

Anonymous Referee #3

Referee comment on "Antarctic sea ice over the past 130□000 years – Part 1: a review of what proxy records tell us" by Xavier Crosta et al., EGU sphere,
<https://doi.org/10.5194/egusphere-2022-99-RC3>, 2022

Manuscript by Dr Crosta and colleagues provides a summary of the current knowledge and gaps in proxy (marine and ice core) based Antarctic sea ice reconstructions over the last 130ka.

Following the overview of the importance of Antarctic sea ice to global climate, authors introduce reader to Antarctic sea ice cycle and provide summary of the recent Antarctic sea ice changes and challenges associated with modelling of these. Authors than describe range of proxies (derived from sediment and ice cores) applied in current research to reconstruct historical Antarctic sea ice changes and further communicate the current knowledge and the gaps in these as depicted by proxy records. Finally authors provide suggestions for future directions of the Antarctic sea ice research.

Manuscript is well written and logically structured. Text is supplemented by great figures. This is really well constructed and presented review and I have no doubt that it will be of interest to both scientific and non-specialist community.

Few minor suggestions are listed below.

L358: I would argue that all rather than most proxy methods are dependent on various assumptions

L375: I would suggest removing "dominantly". Within Antarctic setting I believe thus far only *B adeliensis* was shown to be IPSO₂₅ producer?

L389: You might want to include recent study by Weber et al (2022), which shows HBIs now measured back to ca 240ka. This further links to L566

L579: " ... focused on the LGM." instead of centered on ?

L590: ...during the LGM, instead of ...at the LGM ?

General comment: I was wondering if authors considered record that perhaps do not cover one/more full temporal segments defined in Fig3? I am aware of at least one biomarker record covering last ca 2.5ka which I think authors do not include in their summary, hence more generalised question around selection criteria. Maybe it would be valuable to include a sentence to acknowledge reader that some partial records might not be included in this compilation.

Figure 1: I appreciate this might be slightly thorny task, but could text in Figure 1 be made larger. It is really nice figure, but text is hard to read.

Appendix: Could author please provide full reference list: I think it will be useful to wider scientific community and not all the studies listed in the table are referenced in the manuscript.

Reference: Weber, Michael E., et al. "Antiphased dust deposition and productivity in the Antarctic Zone over 1.5 million years." *Nature communications* 13.1 (2022): 1-18.