



EGUsphere, author comment AC3  
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## **Reply on RC3**

Xavier Crosta et al.

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Author 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,  
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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 then 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.

**We thank reviewer 3 for their very positive comments.**

Few minor suggestions are listed below.

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

**True. It will be corrected accordingly.**

L375: I would suggest removing "dominantly". Within Antarctic setting I believe thus far only *B adeliensis* was show to be IPSO<sub>25</sub> producer?

**It will be corrected accordingly.**

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

**This very recent reference will be added. Thanks for pointing it out.**

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

**It will be corrected accordingly.**

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

**It will be corrected accordingly.**

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 summery, 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.

**We have used the compilation from Chadwick et al. (2022; cp-2022-15) that presents records covering entirely or partially the 12-130 ka period with no particular focus on the Holocene. Late Holocene sea-ice records are presented in Thomas et al. (2019). As such records that do not cover at least half of the Holocene were here disregarded to avoid redundancy with Thomas et al. (2019). A second criterion was that the published records dealt specifically with sea-ice reconstructions, as many published diatom records were used to infer other parameters (ocean temperature, productivity,...). As such, we disregarded some records that we judged not informative enough. It is also possible that we missed few adequate records though we tried to be as exhaustive as possible.**

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.

**We will enlarge the police font size and improve the overall readability of Figure 1.**

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.

**A reference list will be added to Appendix 1.**