

Clim. Past Discuss., author comment AC1
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Reply on RC1

Briony Kate Chamberlayne et al.

Author comment on "1750 years of hydrological change in southern Australia: a bivalve oxygen isotope record from the Coorong Lagoon" by Briony Kate Chamberlayne et al., Clim. Past Discuss., <https://doi.org/10.5194/cp-2022-39-AC1>, 2022

This paper is one in a series by the authors which look at the use of the bivalve *Arthritica helmsi* as an indicator of past hydrologic and climate change. It builds upon previous papers which look at modern and museum specimens of this species and its suitability for isotopic studies. This study is located in an area of significant interest in Australia, with regards water management, cultural connections and understanding past hydrologic conditions. The study is well-constructed, and the findings clearly presented. The establishment of the local reservoir effect for radiocarbon dating is particularly to be commended. The results are of significance not only in addressing a long-running debate in the palaeohydrology of the Coorong Lagoon, but also in adding another high-resolution climate record for southeast Australia over the past ~2000 years, allowing more robust comparisons regionally and globally.

Specific comments

Line 12: advise giving some context to the conservation and restoration efforts and how palaeoclimatic records can be useful in addressing these.

R: We agree that more context would clarify how studies such as this one can benefit conservation. We will add context to the Introduction section of this manuscript to keep the Abstract succinct.

Line 30: the reference to arid and semi-arid regions here seems a little out of place. Perhaps set the geographic context of the study first.

R: We will delete the reference to separate regions to simplify the text.

Line 39-40: where are these located in relation to the study site – geographically and climatically? Would you expect these to be congruent?

R: We will add a map showing the locations of the study sites from these studies in relation to the site in the current study. The sites are mostly from southeast Australia so the authors would expect that the locations are influenced by the similar climate drivers as the site in the present study. A map illustrating the proximity of records will be a good addition to the manuscript – thank you for the suggestion.

Line 130-1 and Figure 3: You are to be commended for do analysis on individual valves as well as the bulk samples. However, the individual valves show a very broad distribution in oxygen isotope values, at any given depth. What is the justification for 5 valves per sample being representative?

R: Thank you for this comment, we agree this information is important and should be added to the text. Five valves was selected as it meant there would be consistency across the study as the number of valves in each sediment layer was variable. It was also found in the lead authors Honours Thesis (Chamberlayne, 2015) that five valves was representative of the trace element value in a larger sample size of 16 valves. The authors will add this information to the text of the present study.

Line 210: relatively dry in the context of the record or in comparison with other areas?

R: The authors are stating that it is relatively dry in the context of the record. We will edit the text to make this clear.

Line 239: Perhaps show on a map where the records in Dixon et al, 2019 are in relation to the current record. Climatically, would you expect the same response or not?

R: We will add a map showing the locations of the study sites from these studies in relation to the site in the current study. The sites are mostly from southeast Australia so the authors would expect that the locations are influenced by the similar climate drivers as the site in the present study. A map illustrating the proximity of records will be a good addition to the manuscript – thank you for the suggestion.

Line 335-337: I would recommend expanding on this correlation a little. How are you defining the region here and how do each of the drivers you mention here relate to wetter or drier conditions? Can you unpick the influences of each of these with respect to the

variability in your record – and the regional context? How does it help build the story?

R: The authors will add text to the manuscript stating the influence of the mentioned drivers on the climate of the region. We will clarify the region and how similarities in the record to others in the region show a common influence. The next comment suggests splitting the conclusion section into two paragraphs. The authors will implement this suggestion which will provide more space for the expansion on conclusion statements as suggested in this comment.

Conclusions: Suggest splitting into two sections – Firstly the palaeoclimate, and then the Coorong and management implications as separate paragraphs.

R: The authors will split the conclusion into two sections for clarity of ideas.

Figure 1: I would suggest including a map showing major climatic zones or influences of major climatic drivers. May also be worth including a map showing the locality of this site in relation to others mentioned in the text – both in SE Australia and globally.

R: The authors will edit Figure 1 to contain both the major climate drivers in the region and the locations of the study sites from other studies mentioned in the text.

Figure 4: Consider annotating which of these records were utilised in the Dixon et al., 2019 compilation

R: The authors will add this information to the figure caption

The authors wish to thank the reviewer for their positive and constructive comments which have improved the clarity of this manuscript. We will add context to the sections suggested by the reviewer in addition to editing Figure 1 to include the locations for the studies included in the Dixon et al. 2019 paper.

References:

Chamberlayne, B., 2015. Late Holocene seasonal and multicentennial hydroclimate variability in the Coorong Lagoon, South Australia: evidence from stable isotopes and trace element profiles of bivalve molluscs, honours thesis, University of Adelaide,

Adelaide.