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1750 years of hydrological change in southern Australia: a bivalve oxygen isotope record from the Coorong Lagoon

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Review

General Comments

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.

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.

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

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?

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

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?

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?

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

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.

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

Editorial Questions

1. Does the paper address relevant scientific questions within the scope of CP?

   Yes – a high resolution palaoeclimate/hydrology record for a region of significance

2. Does the paper present novel concepts, ideas, tools, or data?

   Yes – new taxa for isotopic records, new high resolution site to contribute to the palaeoclimate story of SE Australia and calculated radiocarbon reservoir effect for the Coorong

3. Are substantial conclusions reached?

   Yes – substantiated correlations with other regional records, attributed to climatic drivers, however with local effects recognised

4. Are the scientific methods and assumptions valid and clearly outlined?

   Yes, although I would prefer the justification for number of individuals in the bulk isotopic samples to be outlined a little more explicitly

5. Are the results sufficient to support the interpretations and conclusions?

   Yes, the interpretations and conclusions are sound – and could perhaps be a little bolder

6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)?

   Yes

7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution?

   Yes

8. Does the title clearly reflect the contents of the paper?

   Yes

9. Does the abstract provide a concise and complete summary?

   Yes – although there are some general statements at the start that could be contextualised more effectively

10. Is the overall presentation well structured and clear?

    Yes

11. Is the language fluent and precise?

    Yes

12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used?

    Yes

13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated?

    As above

14. Are the number and quality of references appropriate?

    Yes

15. Is the amount and quality of supplementary material appropriate?

    Yes