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Comment on essd-2021-301

Anonymous Referee #2

Referee comment on "Compilation of a database of Holocene nearshore marine mollusk shell geochemistry from the California Current System" by Hannah M. Palmer et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2021-301-RC2, 2021

Overall, I think this work addresses an important and recurring challenge with paleoclimate/ocean datasets garnered from archaeological samples. This is a nice first attempt to synthesize a wide range of species, ecologies, time periods, and sampling strategies, which is no easy feat!

My main concern is that the geographic designation (Northeast Pacific) of the study area is far broader than the data represented within this manuscript. Most of the data is concentrated along the California coastline. While I do think there may be a greater density of isotopic work on shellfish from California middens, the authors chose to include a handful of data from species found along the coastlines of Washington and southern British Columbia. Therefore, I do think it is important that they also include work that has been done with Saxidomus gigantea (both modern and archaeological) in Washington and British Columbia. Moreover, the usage of Northeast Pacific does imply the coastline of the North American continent, leaving me questioning if it appropriate to exclude work done in the Gulf of Alaska (Hallmann et al., 2009, 2011, 2013; Bassett et al., 2019). To summarize, if the authors wish to include their current data from Washington and southern British Columbia, they also need to include work done with Saxidomus gigantea and if they are truly considering the Northeast Pacific, this does also include Alaska (although I think it's perfectly acceptable to omit work in Alaska and more precisely define their geographic focus instead).

My other comment is that I do not think the discussion of how changes in d18O(water) makes direct cross-site and even cross-species comparisons difficult, if not impossible. This is especially true for SST reconstructions from d18O(shell). The locations of the habits of each of these species varies considerably and so too then does their exposure to terrestrial freshwater influences, which is difficult to constrain in archaeological studies. I think section labeled 3.6 (the sub-headers 3.5 and 3.6 are out of order) could be greatly strengthened by detailing this challenge more thoroughly.

Line 28: Is the comosition calcite for all of the species include in this study?

Line 43: Recommend including additional citations - Schone and Gillikin, 2013; Gillikin et al., 2019

Line 45: Recommend including additional citation for "...as resources for human communities" - Thomas, 2015a, 2015b; Twaddle et al. 2016

Line 47: These citations are only relevant to the California coastline, there are citations for work in southern B.C. as well that should be included since data is included from this region. See Burchell et al. 2013a, 2013b, Cannon and Burchell, 2017. Depending on the final determination of the geographic span of this article, there are several other citations that could be include for northern B.C. and the Gulf of Alaska.

Line 61: "Biocalcite," again, do all of the species featured in this study produce only calcitic shells?

Line 62-3: "... as a proxy for changes in SST, salinity, and ice volume" needs citation.

Line 67-8: Yes, this is correct. I would suggest fleshing out in more detail how biological processes affect oxygen and carbon isotopic values.

Line 105-107: It is unclear how the categories of "multiple subsamples" and "higher resolution sequential sampling" are distinguished from one another. Are you defining these groups based on #samples/annuli? Overall time-averaged?

Line 122: It is unclear to me how you selected data from modern samples. Are they only from museum collections? If you are generally considering live-collected modern samples, there are certainly data from the PNW region as well (see map in Bassett et al., 2019 and citations therein for review of these modern data points).

Line 170-1: Again, there's actually more data from southern Washington and B.C. that could be included. See suggested citations from Line 47.

Line 173-4: Authors state that most of the studies included in the present study analyzed shells collected from open coast sites and few studies analyzed estuarine species. Are there no estuarine species present in middens at any of these sites? Certainly middens in Washington state include one estuarine species (Saxidomus gigantea). Is the lack of

estaurine species in these datasets some kind of sampling bias or an acknowledgement of the difficulty of interpreting SST records from estuarine species?

Line 225: Yes, and I would imagine this is likely a result in shellfish collection technology/methods employed by past inhabitants.

Line 276: Very much appreciate the inclusion of land and data acknowledgement!

Figure 1: Some of the greens are quite difficult to distinguish from one another and in black in white it would be impossible (also important to note that this color gradient is not very accessible to colorblind readers).

Figure 3: Species names are very difficult to read (in fact, in print they are impossible to read). I do think the color gradient works much better here than on the map, where the greens are difficult to distinguish from one another.

Suggested citations:

Bassett, C., Andrus, C. F. T., and West, C. F. 2019. Implications for measuring seasonality in the marine bivalve, Saxidomus gigantea. Chemical Geology. 10.1016/j.chemgeo.2018.07.004

Burchell, M., Cannon, A., Hallmann, N., Schwarcz, H.P., Schöne, B.R., 2013a. Inter-site variability in the season of shellfish collection on the central coast of British Columbia. J. Archaeol. Sci. 40, 626–636. https://doi.org/10.1016/j.jas.2012.07.002

Burchell, M., Cannon, A., Hallmann, N., Schwarcz, H.P., Schöne, B.R., 2013b. Refining Estimates for the season of shellfish collection on the pacific northwest coast: Applying high-resolution stable oxygen isotope analysis and sclerochronology. Archaeometry 55, 258–276. https://doi.org/10.1111/j.1475-4754.2012.00684.x

Cannon, A. and Burchell, M., 2017. Reconciling oxygen isotope sclerochronology with interpretations of millennia of seasonal shellfish collection on the Pacific Northwest Coast. Quarternary International.10.1016/j.quaint.2016.02.037.

Gillikin, D., Wanamaker, A.D., and Andrus, C. F. T., 2019. Chemical Sclerochronology.

Chemical Geology. 10.1016/j.chemgeo.2019.06.016.

Hallmann, N., Burchell, M., Brewster, N., Martindale, A., Schöne, B.R., 2013. Holocene climate and seasonality of shell collection at the Dundas Islands Group, northern British Columbia, Canada-A bivalve sclerochronological approach. Palaeogeogr. Palaeoclimatol. Palaeoecol. 373, 163–172. https://doi.org/10.1016/j.palaeo.2011.12.019

Hallmann, N., Schöne, B.R., Irvine, G. V., Burchell, M., Cokelet, E.D., Hilton, M.R., 2011. an Improved Understanding of the Alaska Coastal Current: the Application of a Bivalve Growth-Temperature Model To Reconstruct Freshwater-Influenced Paleoenvironments. Palaios 26, 346–363. https://doi.org/10.2110/palo.2010.p10-151r

Hallmann, N., Burchell, M., Schöne, B.R., Irvine, G. V., Maxwell, D., 2009. High-resolution sclerochronological analysis of the bivalve mollusk Saxidomus gigantea from Alaska and British Columbia: techniques for revealing environmental archives and archaeological seasonality. J. Archaeol. Sci. 36, 2353–2364. https://doi.org/10.1016/j.jas.2009.06.018

Schöne, B.R., Gillikin, D.P., 2013. Unraveling environmental histories from skeletal diaries - Advances in sclerochronology. Palaeogeogr. Palaeoclimatol. Palaeoecol. 373, 1–5. https://doi.org/10.1016/j.palaeo.2012.11.026

Thomas, K.D., 2015a. Molluscs emergent, Part I: Themes and trends in the scientific investigation of mollusc shells as resources for archaeological research. J. Archaeol. Sci. 56, 133–140. https://doi.org/10.1016/j.jas.2015.01.024

Thomas, K.D., 2015b. Molluscs emergent, Part II: Themes and trends in the scientific investigation of molluscs and their shells as past human resources. J. Archaeol. Sci. 56, 159–167. https://doi.org/10.1016/j.jas.2015.01.015

Twaddle, R.W., Ulm, S., Hinton, J., Wurster, C.M., Bird, M.I., 2016. Sclerochronological analysis of archaeological mollusc assemblages: methods, applications and future prospects. Archaeol. Anthropol. Sci. 8, 359–379. https://doi.org/10.1007/s12520-015-0228-5