

Interactive comment on “Rare Earth Elements in oyster shells: provenance discrimination and potential vital effects” by Vincent Mouchi et al.

Anonymous Referee #2

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The authors of ‘Rare Earth Elements in oyster shells: provenance discrimination and potential vital effects’ aim to show how Rare Earth Elements (REE) and Yttrium (Y) conc. in bivalve shells could be used as a provencing and environmental monitoring tool. The authors use a combination of chemical analyses (LA-ICP-MS) and machine learning techniques (t-SNE) to discriminate bivalve specimens between sampled locations/species. Fingerprinting tools such as this are of increasing importance from a food safety standpoint, but the authors highlight their potential within an archaeological and monitoring context too. Despite the novelty of the method used herein, there are some points that I believe require attention prior to publication.

1) As mentioned by the first anonymous reviewer, a significant conclusion made by the authors of this manuscript was that *O. edulis* could not be discriminated spatially be-

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cause of a lack of intraspecific variation in REE and Y concentrations. Yet, the authors did not test this between spatially disparate locations of the same age. I therefore do not believe this conclusion can be supported at this point.

2) In contrast to reviewer #1 I do not believe it necessary to gather water samples to elucidate whether a difference in REE and Y will be likely. Water samples will only provide a snapshot of site-specific conc. at any given time/place and inferences could not be made of the REE and Y concentrations within the slow forming carbonate shells. However, I would agree with reviewer #1 that the conclusions made surrounding *O. edulis* and vital effects here are not supported due to the limited number of sites assessed of the same time.

3) I believe from the outset, the aims of this study are not immediately clear. More emphasis could be placed in the introduction on the rational for this study, where it fits within seafood traceability or in regulatory capacity. Again, the implications of the authors' findings are also not well established in the discussion. The authors place a significant focus on the results at hand, which is of course important, but some emphasis should be placed on where this research now fits within its field (i.e. uses, pros, pitfalls and directions from here).

4) Overall, I found the presentation of results somewhat challenging to follow. For example, I found myself having to refer back to Table 1 often to remind myself of the 'Groups' - site, species and age of the specimens. Simple adjustments could streamline this, making it more user friendly for the reader (i.e. no. for site, code for time, code for species).

5) More information should be provided for quality assurance. Lines 163-167 provide details of this. I would encourage the authors to retain this section but also include a quality assurance table of obtained vs. expected for certified reference material (CRMs) used for simple reference.

6) The authors introduce too many abbreviations. REE is fine, but REY for Rare Earth

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Elements and yttrium is superfluous. Consider REE and Y instead. Same for HREE and LREE, Heavy REE reads fine.

At this time, I would not recommend this manuscript for publication until these points are addressed.

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