

## ***Interactive comment on “Geochemical and microstructural characterisation of two species of cool-water bivalves (*Fulvia tenuicostata* and *Soletellina biradiata*) from Western Australia” by Liza M. Roger et al.***

**Anonymous Referee #3**

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I feel that the overall work of the manuscript by Roger, et al. entitled “Geochemical and microstructural characteristics of two species of cool-water bivalves (*Fulvia tenuicostata* and *Soletellina biradiata*) from Western Australia.” is fair. Roger, et al. investigates the characteristics of shell mineralogy and geochemistry with micrometer spatial level on the two different marine specimens collected from the southern coast of Western Australia. To understand the relationship between shell microstructures and geochemical signals is highly important because with technical advancing of high resolution analysis on geochemical proxies, the scientists in related fields are realizing that the heterogeneities observed in the microstructures of biogenic carbonates are

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not always influenced only by surrounding environmental changes. The authors show important solid results in this context, however, I am also feeling that this manuscript is lacked some important explanation and data for better understanding and contributing to the scientific communities especially of paleoclimates and paleoceanography. Therefore I believe that this works could be worth to be discussed among the scientists in related fields of sciences.

My suggestions to improve this work are bellow: 1. There is no detail environmental data demonstrated in this manuscript during the period of each shell growing including water temperature, salinity, and nutrients, and so on. The authors insist in introduction part that the geochemical signatures are so important to reconstruct the past changes in environment. However, it is not demonstrated and discussed well in this manuscript and makes difficult to judges whether any of difference and changes of geochemical composition in microstructures are not related to environmental changes or not. 2. There is no detail explanation of the localization of shell mineralogy. The finding different mineral phase other than aragonite but calcite and high magnesium calcite must be one of the most distinct results in this paper. The lack of this explanation leads difficult to understand the mechanisms of the formation of each of mineral phase. On the other word, if the authors could show the mineral phase could be varied with environmental changes, for example, it could be great finding in this wider area of science. 3. There is no direct evidence to explain the geochemical difference among the specimens and changes along growth direction. The organic materials in the shell microstructures seems to be one of reasons to explain it, but without any direct evidence, for instance, the content of organic materials, it is hard to conclude it. The demonstration of the geochemical results obtained by different technique such wet chemistry will help to explain this because laser ablation method is good to get high resolution data but difficult to avoid the material background effects including the content of organic materials.

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