

Interactive comment on “A novel paleo-bleaching proxy using boron isotopes and high-resolution laser ablation to reconstruct coral bleaching events” by G. Dishon et al.

Anonymous Referee #2

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This is an interesting study that investigates the potential of using boron isotopes to detect coral bleaching events. Further the authors examined past published coral ^{11}B records to see if such events were obvious in the paleo-record.

This may be an important contribution to a big problem. The rationale for pursuing such a study is obvious and the authors are on track in this regard.

Major issues:

1. However, before this study should be considered for publication, the authors need to connect the dots mechanistically between decreasing ^{11}B values and bleaching events. In other words, the authors do not link how bleaching events could actually

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lower coral ^{11}B values. Correlation does not equal causation. Convince the readers by developing a mechanistic relationship between these two variables. The lack of a mechanistic model is a major weakness of the current manuscript.

2. Additionally, ^{11}B values are largely controlled by pH_{sw} (as the authors note) but they are also influenced by seawater temperature and salinity. This needs to be addressed in the introduction. Hence, calculations of paleo pH based on ^{11}B records need to estimate both salinity and seawater temperature. This also needs to be carefully considered. Outside of the experiment described here, how can the authors be sure that decreases in ^{11}B coral values are solely related to bleaching effects rather than changes in seawater temperature, pH, or salinity?

3. The literature review on the controls on ^{11}B in corals is not fully developed. Other proxies are also used to construct pCO_2 of the atmosphere beyond ^{11}B and ice core air bubbles (e.g., paleosols and plant proxies). This needs to be addressed more comprehensively.

4. Please report the error associated with the measurements in the methods section. Currently they are only reported in the figure captions. What is the standard to sample ratio?

5. The authors "cleaned" the organics using NaClO , but that would only remove organics at the surface. How do the organics in the carbonate matrix affect the ^{11}B measurements? Are the authors completely confident that they are only measuring boron from carbonate and not organics within the carbonate matrix? How deep does the laser penetrate the surface of the coral?

6. What about diagenesis? Could diagenesis be partly responsible for the ^{11}B changes in the paleo-record? How can the authors rule this out?

Minor issues:

1. The pictures alongside of Figure 1 are too small to see.

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2. Line 20, page 8134- better to say kinetic effects apparently do not interfere with isotopic equilibrium during calcification.
3. The word correlation (see line 6, page 8135) is used too often in this manuscript. I suggest using relationship instead.
4. Do not use lighter or heavier. Use lower or higher ^{11}B values. See the Sharp textbook for the many reasons why.

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