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Impact of diagenesis on carbonate triple oxygen isotope values in the Clino core from the Great Bahama Bank

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Understanding the impact of diagenesis on geochemical records is critical when interpreting paleo-environmental information from the rock record. Triple oxygen isotope values (paired $\delta^{17}O$-$\delta^{18}O$ values, referred to as $\Delta'^{17}O$ values) can be used to identify diagenesis in fossils and even 'see through' diagenesis to estimate primary precipitation conditions [1]. Enhanced understanding of how $\Delta'^{17}O$ values are impacted by diagenesis in a well characterized ocean sediment drill core will allow for better application to less characterized samples from the rock record. In this study, we analyzed carbonate sediments from the Clino core of the Great Bahama Bank as an analog for diagenesis of shallow marine carbonate sediments. Previous studies identified 3 main regions of the core: 1) an upper region that experienced diagenesis with meteoric water, 2) a region below number 1 that represents varying degrees of alteration in marine and fresh water, and 3) a lower region that was never exposed to meteoric water [2]. Our preliminary results show differences between the topmost and bottom regions of the Clino core. The $\Delta'^{17}O$ values of carbonates from the region that interacted with meteoric water formed in a ~20°C fluid with a $\delta^{18}O$ value of ~-3‰. A regime where carbonate was dissolved and reprecipitated may better explain these values than a traditional fluid-rock mixing model. Samples from lower in the core formed in cooler (~15°C) seawater with a $\delta^{18}O$ value of ~0‰. These results are consistent with the conclusions of Swart and Oehlert (2018). Future work will examine how the $\Delta'^{17}O$ values change in the context of other geochemical systems (such as $\delta^{34}S$ and $\delta^{7}Li$) so that we can use the trends of $\Delta'^{17}O$ and $\delta^{18}O$ values from the Clino core to better identify how post-depositional alteration may impact the oxygen isotope composition of the rock record.

[1] Wostbrock et al. (2020) *Geochim. Cosmochim. Acta* **288**, 369-388.

[2] Swart and Oehlert (2018) *Sedimentary Geology* **364**, 14-23.