A GLOBAL DIAGENETIC SIGNAL?

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OBJECTIVE

- To construct a high resolution, multiproxy geochemical record of cores from Enewetak Atoll in the Pacific Ocean.
- To compare with the Great Bahama Bank sediment core records in the Atlantic Ocean basin.
- To ascertain whether shallow-water carbonates can express a global diagenetic signal.

KEY POINTS AND PROJECT DESCRIPTION

We have initiated a geochemical comparison between Pacific (Enewetak) and Atlantic (Bahamas) shallow-water sediment cores to identify globally recorded $\delta^{13}C$ and $\delta^{18}O$ values indicating meteoric diagenesis. Initial clumped isotope analysis and mineralogy have also been examined, indicating diagenetic surfaces and recrystallization in both regions. We also plan to analyze the $\delta^{13}C$ and $\delta^{15}N$ values of the organic material, finish clumped isotope and mineralogical analysis, as well as preform trace element analysis on all of the Enewetak sediment samples. All geochemical data will be assessed using Rolling Window Regression (RWR) to identify and confirm regions of diagenetic alteration in the core records (Oehlert and Swart, 2019). The data from Enewetak will be compared to similar data from the Bahamas and other locations, where available.

PRELIMINARY RESULTS

- The $\delta^{13}C$, $\delta^{18}O$, and mineralogy data from Enewetak sediment cores indicate regions of meteoric diagenesis resulting in negative isotope excursions and recrystallization of aragonite to calcite, in several regions throughout the core.
- Initial comparison between Enewetak and the Great Bahama Bank sediment cores show similar negative carbon isotope trends towards the surface (Fig. 1), indicative of meteoric diagenesis. The presence of this signal in both regions indicates a global diagenetic process which results in global systematic overprinting of the original isotopic signal.
- This initial evidence indicates that periods of extensive sea-level change will be recorded within shallow water carbonate sediments, providing an opportunity to evaluate major diagenetic events in earths past, recorded within the sediment records.
- Utilizing newly analyzed geochemical data paired with the RWR analysis will allow for high resolution identification of diagenetic signatures, furthering our understanding of the influence and relationship global diagenesis has on a variety of isotopic proxies.

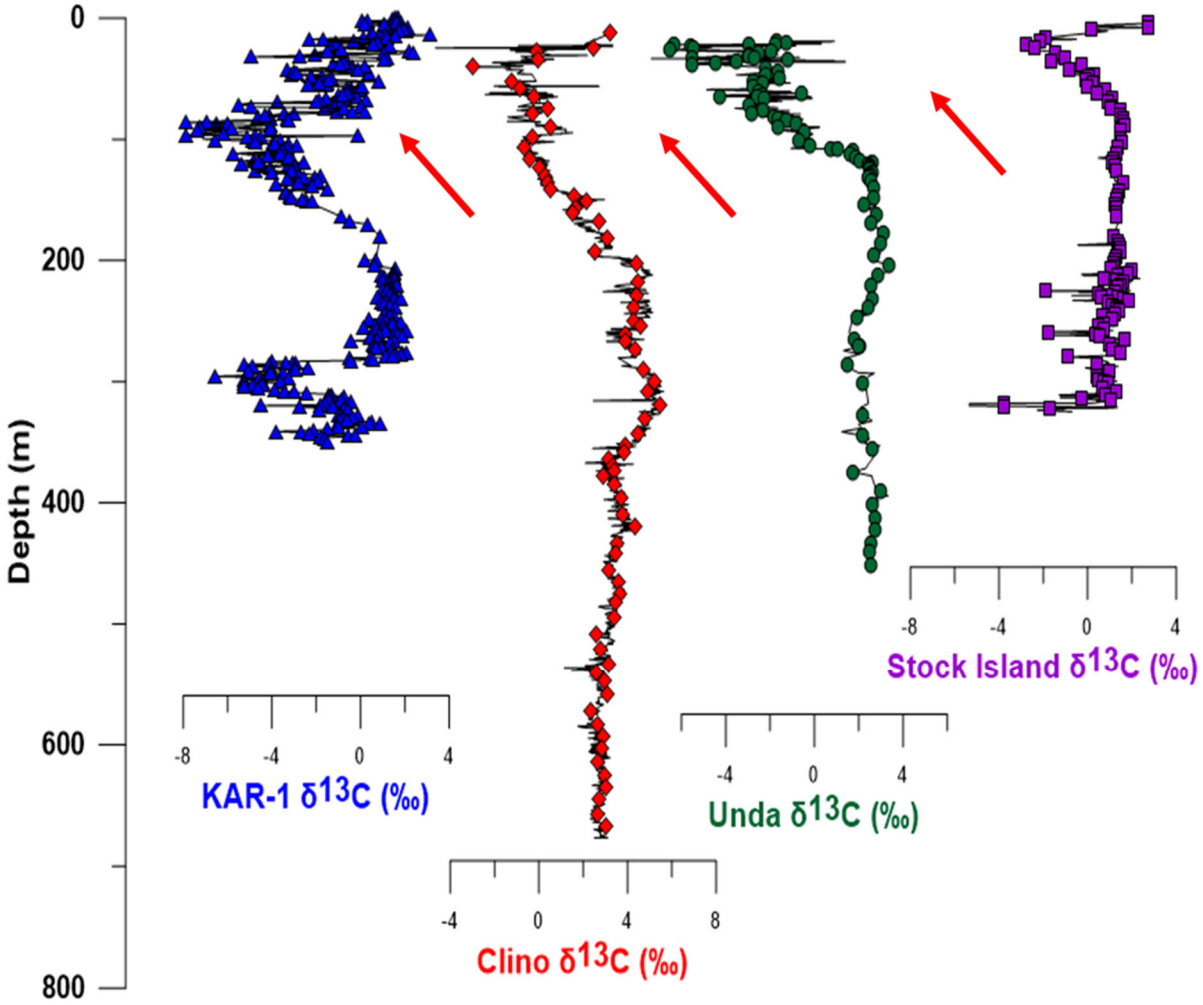

Figure 1. Carbon isotope data comparison between Enewetak core KAR-1, GBB cores Clino and Unda (Melim et al., 2001; Oehlert and Swart, 2014), and Stock Island core (Melim et al., 2004). Red arrows show isotopic resetting trends of meteoric diagenesis in all cores.

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