Geophysical Research Abstracts
Vol. 19, EGU2017-17870, 2017
EGU General Assembly 2017

Peter Swart and Amanda Oehlert
University of Miami, RSMAS, MGG, Miami, United States (pswart@rsmas.miami.edu)

The δ^{13}C values of carbonate rocks are widely used as proxies for understanding the global carbon cycle. While most workers would prefer to use δ^{13}C values measured in oceanic sediments, during older times the only records that exist are those found in sediments deposited in epeiric seas or on continental margins and carbonate platforms. However, such records are often compromised by near surface diagenesis and therefore care must be taken to exclude altered records. One approach, which has been widely applied, has been to examine the covariation between δ^{13}C and δ^{18}O values, where a positive covariation has been suggested to indicate alteration. In order to test this assumption we present data from a core taken in the Bahamas that has been unequivocally subjected to both freshwater and marine diagenetic processes. Our data suggest that the majority of the zone which has been altered by freshwater shows no correlation between δ^{13}C and δ^{18}O values, with small intervals associated with sub-aerial exposure exhibiting inverse correlations, and only the upper partially altered portion of the core exhibiting positive relationships. The zone below the region of freshwater alteration, previously interpreted as being the mixing-zone, is characterized by a strong covariation between δ^{13}C and δ^{18}O values as a result of the upper portion of this zone having been affected by fresh water diagenesis compared to the lower portion. Within the marine influenced realm a variety of relationships are produced as a result of differences in sediment origin and diagenesis. For example, non-depositional surfaces, where marine diagenetic processes are maximized, are typically expressed by sharp positive correlations between δ^{13}C and δ^{18}O values, while changes related to different sediment sources are expressed as weak positive covariations.

While the data set presented here may not be applicable in every situation, the study certainly emphasizes that care must be taken when rules of thumb such as covariation of δ^{13}C and δ^{18}O values suggest diagenesis.