Talk

2e - Terrestrial environments and climates in the Cretaceous

Aptian-Albian Stable Isotope Paleotemperature Estimates From North American Continental Records

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North America contains abundant Cretaceous continental strata that hosts potential archives of paleoclimate records. While detailed work has been done in Late Cretaceous strata which not only contains archives for stable isotope proxies, but also leaf physiognomic data, less study has occurred in the Early Cretaceous which lack angiosperm-dominated floras. Here we present new paleotemperature estimates from multiple stable isotope proxies including $\delta^{18}O$ of pedogenic carbonates, clumped isotope paleothermometry, and paired stable isotopes of aquatic and semi-aquatic taxa. The southern-most data originate from the Hensel Formation of South Texas. Clumped isotope paleothermometry of pedogenic carbonates result in temperature estimates between 35°C and 42°C. Clumped isotope paleo-thermometry of lake and palustrine carbonates from the Cedar Mountain Formation range from 15°C and 31°C for lake carbonates and 20°C to 44°C for palustrine carbonates. Farther north in Wyoming, we utilize the oxygen isotope value of semi aquatic taxa such as crocodilians and turtles to provide a proxy for water and utilize the oxygen isotope value of fish scales and teeth to estimate temperature at 26°C though with significant error. Preliminary clumped isotope paleothermometry provides a temperature of 25°C. The farthest north locality, the Kootenai Formation contains lacustrine, palustrine, and pedogenic carbonates. Utilizing a previous empirically-derived latitudinal gradient of meteoric water, carbonate $\delta^{18}O$ values were used to estimate a temperature range for the Kootenai Formation between 13°C and 28°C. These values provide a temperature gradient for the Aptian-Albian over the mid latitudes of North America of ~-1°C/degree of latitude.