Stable isotope and Sr/Ca profiles from the marine gastropod *Conus ermineus*:
Testing a multiproxy approach for inferring paleotemperature and paleosalinity

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**ABSTRACT**

This study tests the fidelity of shallow-water gastropod skeletons as multiproxy archives of paleoenvironmental change by comparing isotopic and trace-metal analyses of specimens of *Conus ermineus*. Four adult specimens were collected live from Stetson Bank in the northwestern Gulf of Mexico during the summer of 2003. Shells were sampled along axes of growth to produce time-series profiles spanning up to 8 years. δ¹⁸O and Sr/Ca profiles show seasonal cyclicity modified by fast summer and slow winter shell growth. The profiles were combined to estimate paleosalinity. This yields variable results that overestimate salinity range; nevertheless, annual salinity minima and maxima are still evident. The overestimates are attributed to interspecimen Sr/Ca variability and error in the δ¹⁸Osw-salinity regression. Profiles of δ¹³C show seasonal variation superimposed on a decreasing ontogenetic trend, the latter ascribed to decreasing metabolic efficiency also reflected by an ontogenetic increase in Sr/Ca. Seasonal δ¹³C variation reflects changes in the δ¹³C of dissolved inorganic carbon (δ¹³C_DIC). Salinity and δ¹³C_DIC at Stetson Bank strongly correlate (R² = 0.80, p < 0.0001), and shell δ¹³C minima coincide with local salinity minima following times of peak river discharge. These δ¹³C minima terminate during annual shelf current reversals. Low-salinity waters directly account for less than half the variability in shell δ¹³C but enhance summer stratification and trap respired CO₂ from sediment pore waters. Specimens from this study show mean δ¹³C values 1‰ lower than *C. ermineus* collected from Stetson Bank in 1971, reflecting the decrease in δ¹³C_DIC from fossil fuel burning.