Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.37950

Submarine groundwater discharge into the Plio-Pleistocene Florida Platform suggested by clumped isotope sclerochronology

ZEYANG SUN AND **ETHAN GROSSMAN**
Texas A&M University

The great diversity and density of marine molluscan fauna on the Florida Platform suggest a high marine biological productivity. However, it remains unclear whether this enhanced productivity was driven by upwelling or submarine groundwater discharge (SGD). Here, we applied clumped isotope thermometry (Δ_{47}) to *Conus* shells from two contrasting units of the Plio-Pleistocene Pinecrest Beds to reconstruct the seasonal temperatures ($T\Delta_{47}$) and oxygen isotopes of seawater ($\delta^{18}O_w$). The shell from Unit 7 (2.5 to 3.5 Ma), which contains a typical marine faunal assemblage, shows temperatures ranging from 18 to 27°C. The shell from Unit 4 (2.0 to 2.5 Ma), with its combination of marine and freshwater shells, shows weaker seasonality with $T\Delta_{47}$ between 18°C and 24°C. Reconstructed $\delta^{18}O_w$ values for Unit 7 vary from -1.25 to 1.08‰ VSMOW and correlate negatively with temperatures. In contrast, $\delta^{18}O_w$ values for Unit 4 are unusually high (-0.04 to 3.01‰). Comparison of our data with the seasonal patterns of temperature and seawater $\delta^{18}O$ for the modern Florida Bay indicates that Unit 7 was deposited in an offshore marine environment whereas Unit 4 was deposited in a brackish-estuarine environment. The high $\delta^{18}O_w$ values correlating with summer temperatures point to the input of evaporative freshwater, rather than upwelling, into the Florida Platform through SGD during the summer rainy period. Further study of the clumped isotope sclerochronology of additional gastropod shells from Unit 7, Unit 4, and the Florida Bay will help understand the influence of SGD on the high productivity of the Plio-Pleistocene Florida Platform.