

Hard water, old water-hydrologic cycling in the Florida Keys reef tract and its effect on interpreting radiocarbon reservoir ages

R. A. VENTURELLI¹, L.T. TOOTH², B.E. ROSENHEIM¹

¹ College of Marine Science, University of South Florida, 140 7th Ave S, St. Petersburg, FL, 33701, USA
Email: Rventurelli@mail.usf.edu

² U.S. Geological Survey, St. Petersburg Coastal and Marine Science Center, 600 Fourth Street South, Saint Petersburg, FL 33701, USA

A recent study using Holocene-aged corals from the shallow-water environment in the Florida Keys reef tract (FKRT) demonstrates significant variation in the ΔR within the last 11,000 years. Maximum ΔR values (399 ± 29 yr) in the early Holocene and 3kya and minimum ΔR values (-157 ± 44 yr) occurring 7kya. Variations in ΔR in this region have been attributed to broad-scale oceanographic changes, rather than local upwelling, but the hydrography in this region is dynamic and strongly influenced by Florida Bay flooding.

Reconstruction of paleo-salinity using clumped isotope composition, oxygen isotope composition, and Sr/Ca ratios of coral skeletal aragonite can deconvolve variations in ^{14}C from an 'old carbonate' effect in this region. We show, through detailed error analysis, the utility of clumped isotope measurements as an independent paleothermometer in deconvolving the oxygen isotope composition of water.

Variations in $\delta^{18}\text{O}_{\text{water}}$ on this time scale can then be attributed to changes in salinity reflecting changes in groundwater influence on the FKRT. This region has been suggested as a critical link between tropical and high latitude Atlantic, and a thorough understanding of ΔR is imperative in properly interpreting paleoceanographic records recording climate and ocean circulation in this region.