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Paired $\delta^{18}O$ and Sr/Ca Measurements to Derive Sea Surface Salinity from a Gulf of Mexico Coral

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Situated approximately 150 km south of the Texas-Louisiana border in the northern Gulf of Mexico, the Flower Garden Banks National Marine Sanctuary (FGBNMS) is the northernmost hermatypic reef in the United States. The scleractinian (stony) corals growing at the FGBNMS incorporate the environmental conditions in which they are growing into their aragonitic skeletons and can be used to reconstruct conditions related to hydroclimate variability during the 20th century. This site is valuable for hydroclimate reconstructions due to its relative isolation from terrestrial runoff, allowing the corals in the FGBNMS reefs to reflect seawater $\delta^{18}O$ ($\delta^{18}O_{sw}$) variations over time with potentially minimal terrestrial interference. The scleractinian coral analyzed in this project are two Siderastrea siderea cores collected in 2023 (core ID 23WFGB1, 27 ° 52.5'N, 93° 48.8'W, 21.3 m water depth) and 2005 (core ID 05WFGB3, 27° 52.6'N, 93° 48.9'W, 21 m water depth) from the western reef of the FGBNMS. Using a monthly-resolved coral Sr/Ca-derived sea surface temperature (SST) reconstruction paired with monthly-resolved coral $\delta^{18}O$ and in-situ $\delta^{18}O_{sw}$ data, we derived a sea surface salinity (SSS) record that we can verify with SSS records from FGBNMS. Results of this study will provide a SSS reconstruction that will help answer questions about hydroclimate variability related to climate change in the Gulf of Mexico from 1931 to 2023. The reconstructed salinity record will be compared to modeled SSS records (e.g., SODA, $\delta^{18}O$-enabled models) and other coral $\delta^{18}O_{sw}$ reconstructions from the Atlantic Ocean to assess coherence and differences through time. Utilizing a multi-proxy approach to climate change investigations at the FGBNMS will provide insight to the degree of hydroclimate isolation the FGBNMS experiences and provide the National Marine Sanctuary scientists with salinity information for their resource management decisions.