

Investigating ENSO Variability in the mid-Holocene using a Fossil Coral from the South Pacific

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We investigate mid-Holocene variability in the El Niño Southern Oscillation (ENSO) using geochemical variations in a well-preserved fossil *Porites lutea* coral collected in 2005 at Araki Island, Vanuatu (15.62°S 166.95°E). Vanuatu is a good location to reconstruct ENSO variability because it is located on the edge of the West Pacific Warm Pool (WPWP) and below the South Pacific Convergence Zone (SPCZ). As a result of the location, Vanuatu is salty, dry, and cool during an El Niño event and is fresh, warm, and wet during a La Niña event. The coral core is ~1.64 m in length and has been dated to 7,230 ± 440 y B.P. using U/Th techniques. X-radiography images show that the coral exhibits clear density banding and has an average extension rate of 1.5 cm per year. The coral was sampled for geochemical analysis every 0.125 cm, which is approximately one sample per month. This record will be about 60 years in length once all sampling and analyses have been completed. Our initial results are a monthly resolved, 30-year coral $\delta^{18}\text{O}$ record, which has a mean $\delta^{18}\text{O}$ value of -4.75 ‰ and an annual-cycle amplitude that averages 0.35 ‰. The fossil coral $\delta^{18}\text{O}$ record contains patterns of isotopic variation that match patterns recognized as El Niño and La Niña events in modern coral $\delta^{18}\text{O}$ records from this region. We will continue to explore the nature of interannual variability in our record as it is lengthened and additional data (Sr/Ca) are generated.

Keywords: ENSO, Fossil Coral, mid-Holocene, El Niño, La Niña