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Climate variability from *Diploastrea heliopora* corals from the southwest tropical Pacific at ~1ka

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Understanding El Niño Southern Oscillation (ENSO) variability prior to anthropogenic influence is crucial to understanding natural climate variability and to informing predictions of future climate change. Coral-based climate records from ENSO-sensitive regions provide unique high-resolution archives of past ENSO variability. However, the massive coral most commonly used in climate studies, *Porites spp.*, rarely provide climate record lengths in excess of 200 years. This presents a challenge because recent work suggests that proxy records of ENSO variability need to exceed 500 years in length in order to capture the full range of natural variability of the ENSO system. Here we present preliminary oxygen isotope ($\delta^{18}O$) data from a slower growing *Diploastrea heliopora* coral from Lambumbu Bay, Vanuatu (LBV; 16.19°S, 167.39°E), located at the southern edge of the Western Pacific Warm Pool (WPWP), a species which has the potential to live continuously for up to a millennium. Coral-based climate records from this region have been shown to be reliable recorders of ENSO-related variability of the South Pacific Convergence Zone (SPCZ). The LBV coral was drilled live in 2010 and data over the period 1980-2007 is used as a comparison to a $\delta^{18}O$ record from a nearby *Porites lutea* coral (Sabine Bank, Vanuatu, ~130 km away). Our initial observation is that 20th century *D. heliopora* coral $\delta^{18}O$ variability agrees well with previously published *Porites lutea* $\delta^{18}O$ variability, providing us with confidence in using *Diploastrea heliopora* corals for multicentury, continuous coral-based paleoclimate reconstructions. Following this, we analyzed coral $\delta^{18}O$ from a fossil *D. heliopora* coral head drilled nearby the live colony at Lambumbu Bay. Here we present a 45 year $\delta^{18}O$ time series from ~1ka that shows similar annual and interannual variability to the modern. Modulations of the amplitude of the interannual signal are present, displaying a period of quiescence followed by a period of increased variability. This pattern is similar to that observed during the 20th century, suggesting that such modulations are a natural part of interannual variability in the southwest tropical Pacific. Data acquisition from the ~1ka coral core is ongoing.

Keywords: ENSO variability, coral geochemistry, climate variability at ~1ka