Geophysical Research Abstracts
Vol. 20, EGU2018-11750-1, 2018
EGU General Assembly 2018


# A closer examination of El Niño events during the 'quiet period' 5,000-3,000 years ago

Helen McGregor (1), Matthew Fischer (2), Michael Gagan (3), Henri Wong (2), and Steven Phipps (4)

(1) School of Earth & Environmental Sciences, University of Wollongong, Wollongong, Australia (mcgregor@uow.edu.au), (2) Environmental Research, Australian Nuclear Science and Technology Organisation, Sydney, Australia, (3) School of Earth & Environmental Sciences, University of Queensland, Brisbane, Australia, (4) Institute for Marine and Antarctic Studies, University of Tasmania, Hobart, Australia

El Niño-Southern Oscillation (ENSO) is naturally highly variable on interannual to decadal scales making it difficult to detect a possible response to climate forcing. Despite the high variability, several lines of evidence from tropical corals, mollusc, lake sediments, and foraminifera suggest that 5,000-3,000 years ago ENSO variance was reduced by 60-80% compared to the present day. While there are suggestions that this millennial scale reduction in ENSO was a response to orbital forcing, the picture is less clear on shorter time scales. We investigate the seasonal-to-centennial variation in ENSO amplitude and tropical climate during the ENSO 'quiet period' 5,000-3,000 years ago. We combine a 175-year-long coral $\delta^{18}$O and Sr/Ca SST record from a 4,300-year-old coral with new $\delta^{18}$O results from a $\sim$300-year-long *Porites sp.* coral microatoll. Both corals were discovered on Kiritimati (Christmas) Island, an optimal ENSO 'centre of action' in the central tropical Pacific, and radiometric dating indicates that the corals have a 25-year overlap. Together, the unprecedented contiguous $\sim$450 year-length of the combined results shows the frequency of weak to moderate amplitude El Niño events and that their amplitude is modulated on multi-decadal scales. Furthermore, composites of individual El Niño events show the month-by-month changes in SST and rainfall during these events. The results provide a robust baseline of intrinsically generated ENSO modulation, against which to quantify the response of ENSO to past and future external forcings.