

Individual foraminiferal Mg/Ca as a proxy for ENSO variance: Core top validation and Last Glacial Maximum application

T. MARCHITTO^{1*}, B. RONGSTAD¹, G. SERRATO MARKS²,
K. KARNAUSKAS³

¹Dept of Geological Sciences and INSTAAR, University of Colorado Boulder, CO 80303 (*correspondence: tom.marchitto@colorado.edu)

²MIT-WHOI Joint Program, Cambridge, MA 02142

³Dept of Atmospheric and Oceanic Sciences and CIRES, University of Colorado Boulder, CO 80303

Reconstruction of past El Niño – Southern Oscillation (ENSO) variance requires paleo-proxy archives with annual to sub-annual resolution. Individual planktic foraminifera fit this bill, because their lifespan is typically only several weeks. Hence a probability density function of individual foram paleotemperatures from an ENSO-sensitive site may record the frequency and/or magnitude of El Niño and La Niña events, as reflected in the warm and cold tails of the distribution, respectively. We first test the utility of this approach by measuring Mg/Ca in two species, the surface dwelling *Globigerinoides ruber* and the thermocline dwelling *Neogloboquadrina dutertrei*, in nine core tops across the equatorial Pacific ($n \approx 70$ per core for each species). We show that populations of individual Mg/Ca measurements in both taxa reflect site-specific temperature distribution shapes and variances across the equatorial Pacific, after accounting for regional differences in depth habitats. We then apply this tool to the Last Glacial Maximum (LGM) at two sites in the eastern equatorial Pacific. At one site, LGM variance is increased in *G. ruber* but unchanged in *N. dutertrei*, while at the other it is increased in *N. dutertrei*. When combined with other published results, our observations paint a spatially variable picture of LGM changes in eastern tropical Pacific temperature variance.