Reconstructing ENSO-Like Variability in the Eastern Equatorial Pacific from Individual Foraminifera Analyses, 120–140 ka

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The El Niño-Southern Oscillation (ENSO) is a major source of global climate variability, influencing sea-surface temperatures, winds, and precipitation across the tropical Pacific and beyond. Understanding the mean state of ENSO during past climate conditions provides valuable perspective on its potential future evolution. However, most reconstructions of past ENSO variability focus on younger time intervals, and records from different background climate states, including the Last Interglacial, remain limited. Here, we reconstruct eastern equatorial Pacific surface-ocean variability during 120-140 ka using the oxygen isotope composition ($\delta^{18}O$) of individual *Globigerinoides ruber* shells from ODP Site 1240 (0.02°N, 86.46°W, 2921 m) near the Galápagos Islands in the eastern equatorial Pacific. Individual-shell $\delta^{18}O$ distributions record changes in sea-surface temperature and salinity during the approximately one-month life cycle of planktic foraminifera, and can therefore be used to estimate changes in ENSO-like variability. The sensu stricto and sensu lato morphotypes were analyzed separately to determine whether morphotype-related differences contributed to the observed variability. The peak interglacial sample at 125.8 ka had a substantially more negative combined mean $\delta^{18}O$ value (-2.390‰) than the older deglacial-to-early-glacial samples at 133.7 and 138.2 ka (-0.760‰ and -0.676‰), showing a major change in the average surface-ocean conditions from warmer to cooler. The peak interglacial sample also had the lowest combined variance (0.088), whereas the two older samples had higher variances of 0.253 and 0.215. Their broader individual-shell distributions in the two older samples are consistent with stronger ENSO-like variability during glacial-to-early-deglacial conditions. The sensu lato morphotype contributed most strongly to the elevated variability in the two older samples, although this pattern may reflect ecological differences or limited sample size. This record provides a new comparison point for understanding how tropical Pacific variability responded to a different background climate state and may help improve interpretations of future ENSO behavior.