

[PP51D-1095 Investigating Past Thermocline Conditions in the Eastern Equatorial Pacific Since the Last Glacial Interval Using Oxygen Isotope Gradients from Shallow- and Deep-dwelling Planktonic Foraminifera](#)

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The El Niño Southern Oscillation (ENSO) is a climate variation that occurs in the Eastern Equatorial Pacific (EEP) ocean, which influences the position of the thermocline today. The ENSO cycle is split into three states: a normal state, an El Niño state, and a La Niña state. Each one is marked by different sea surface temperatures (SST). Under normal conditions, the trade winds push warm water westward, away from the coast of South America. This allows cool water to upwell the east and creates a zonal SST gradient. Every few years, the trade winds slow, preventing the flow of warm water. This increases the SST in the EEP and produces an El Niño. The winds can also strengthen and move more warm water westward. The heightened zonal SST gradient forms a La Niña. This project investigates past conditions in the EEP by reconstructing the mean position of the thermocline: a layer in the ocean where temperature rapidly changes with depth. In the modern ocean, the thermocline is shallower in the east, where SSTs are cool, and deeper in the west, where SSTs are warm. The more uniform SST gradient during an El Niño event flattens the zonal slope thermocline; the stronger gradient during a La Niña steepens it.

The temperature proxy used to determine past thermocline positions is the isotopic composition of oxygen in foraminifera ($\delta^{18}\text{O}$). Foraminiferal $\delta^{18}\text{O}$ increases with depth in the water column, as temperature decreases and density increases. Two species with contrasting depth-habitats were analyzed; *Globigerinoides ruber*, which lives near the surface above the thermocline, and *Neogloboquadrina dutertrei*, which lives in the lower thermocline. When the thermocline shifts, it changes their difference in $\delta^{18}\text{O}$. A smaller difference indicates a deeper thermocline and an El Niño-like state; a greater difference indicates a shallower thermocline and a La Niña-like state. The forams were collected from two deep-sea sediment cores. The first was Ocean Drilling Program (ODP) Leg 202 Site 1239 (0.67°S, 82.08°W, 1414 m) drilled in the east near the coast of Ecuador. The second was ODP Leg 138 Site 849 (0.10°S, 110.31°W, 3858 m) toward the west. Rather than identifying specific ENSO events, this method provides insight into the position of the thermocline and therefore the mean state of the EEP during the Holocene and last glacial period.