Seasonal Influences on Multiple Benthic Species in an Oxygen Minimum Zone during the last 30 ka

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Benthic foraminiferal responses to seasonal productivity have previously been recognized. Stable isotopic evidence from the Eastern Tropical Pacific (ETP) is presented for prefered growth seasons of multiple benthic formainiferal species controlled by annual productivity events and Oxygen Minimum Zone (OMZ) processes. The Gulf of Tehuantepec, Southern Mexico contains a well-defined OMZ (O_2 concentrations vary between 0.4 and 0.1 ml/l) at 300-800 m water depth. Pore water redox reconstructions from a transect of cores collected from 570 (ME005A 11PC) to 1040 m water depth (ME005A 10JC) demonstrate that the OMZ existed continuously throughout the last 30 Ka. Seasonally high Corg flux in the Gulf result from intervals of intense wind forced upwelling. In winter high atmospheric pressures in the Gulf of Mexico and low pressures in the ETP (associated with the ITCZ) create a strong pressure gradient that is blocked by high mountains except for a gap at the Isthmus of Tehuantepec. Here, air spills over into the Pacific and accelerates downslope into a hurricane force wind (the Tehuanos) that pushes water off the broad shelf, creating non-Ekman upwelling at the coast.

During the Holocene, mulitple *Bolivina* sp and *Buliminella elegans* record average $\delta^{18}O$ values of ~2‰, (varying between 1.6-2.4‰). These results differ significantly from *Uvigerina* sp. values of between 2.4-3.3‰, (ave. ~2.5‰). During deglaciation all benthic foraminifera record similar $\delta^{18}O$ values coincident with low porewater oxygen concentrations. However at the last glacial maximum *Uvigerina sp*. $\delta^{18}O$ continue to average ~2.5‰, while the other benthic species record values between 2.8-3.9‰ (ave. ~3.2‰). Such large $\delta^{18}O$ differences were probably the result of seasonal salinity/temperature variations produced by local hydrology changes. Cool, saline California Current water influences wintertime hydrography while warm, fresh Costa Rica Current water enters the Gulf in summer as the ITCZ moves northward. Another possibility exists whereby water below the OMZ is uplifted during intervals of upwelling bringing higher oxygen, cooler water into the OMZ. *Uvigerina sp*. probably record $\delta^{18}O_w$ associated with upwelling-driven, high Corg deposition, while low oxygen adapted species such as the *bolivinids* likely calcify using $\delta^{18}O_w$ related to a stable, stratified summer water column. These results suggest a complex hydrography associated with the OMZ of the ETP, where ventilation of the OMZ could result from hydrologic changes associated with seasonal upwelling or ocean currents switches.