ISOTOPIC TRENDS OF CALCAREOUS PLANKTON ACROSS THE EQUATORIAL PACIFIC HIGH PRODUCTIVITY ZONE

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ABSTRACT

This investigation compares zonal oxygen and carbon isotopic trends of planktic foraminifera and nannofossils from plankton and core top samples to physical-chemical and biologically related hydrographic variables in the central Equatorial Pacific. Particle standing stock measurments and mass flux measurments were made with the plankton collections to asses the quantity and quality of material leaving the surface waters and falling to the ocean floor.

The thermal structure and surface current circulation intensity controls the positions of the nutrient, chl *a*, fluorescence and ATP concentrations. Seasonal, and year to year changes in the thermal structure and current circulation intensity produce variations in the concentrations of these parameters. These concentrations are highest at the equatorial divergence and the geostrophic ridge.

Mass flux measurements show a significant correlation to surface water productivity. Particle standing stock of surface waters show a significant correlation to productivity during periods when particles in the surface waters are primarily of biological origin. When large quantities of particles from an outside source are present in surface waters, no significant relationship between particle standing stock and productivity exits, and mass flux correlations to particle standing stock during these periods is not significantly high either.

Carbon isotopic values of the ΣCO_2 dissolved in seawater less than 500 meters in depth in the central Equatorial Pacific is directly related to density. $\delta 018$ and $\delta C13$ values in core top and plankton tow

foraminifera show no significant correlation. δ018 and δC13 values for core top nannofossils do show a significant correlation. The seasonal replicate sample-difference variations (isotopic homogeneity of the foraminifera population) of the oxygen isotopic values of surface and intermediate water dwelling planktic foraminifera increase with increasing surface current circulation intensity. Carbon isotopic replicate sample-differences do not show seasonal trends and increase in the shallow water dwelling species. The δ018 values of Pulleniatina obliquiloculata are in equilibrium with the ΔSigma T maximum (maximum change in water column density), while in Globigerinoides sacculifer, δ018 values are 0.5 per mil depleted with respect to the 25 meter/productivity maximum water temperature. Both species correlate to these hydrographic boundary temperatures with an R^2 value of 0.8169. The F Test of this correlation shows a significance level of .999. Oxygen isotopic values of both species of planktic foraminifera are generally more positive at the equator and more negative in the Counter Current indicating colder and warmer isotopic temperatures, respecitvely. δC13 values of P. obliquiloculata have the same zonal trend as the δC13-ΣCO_2 values of the ΔSigma T maximum, but are 0.6 to 1 per mil heavier. δC13 values for G. sacculifer show no relationship to any hydrographic boundary δC13-ΣCO_2 values. When δC13 values for core top G. sacculifer are compared to nannofossil δC13 values, a qualitative relationship with surface water productivity exists. This relationship, or the trophic carbon productivity index (TCPX), shows that differences in δC13 values between core top G. sacculifer and nannofossils increase with increasing surface water productivity. This

index may be useful for investigating past surface water productivity changes in the Equatorial Pacific by down core isotopic analysis of both foraminifera and nannofossils.