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Dynamics of biological productivity and carbon export in the easternmost equatorial Pacific Ocean over the last 25,000 years

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Export production has been widely studied across the eastern equatorial Pacific (EEP) in an effort to constrain changes in the efficiency of the biological pump in the region over the last glacial cycle. Specifically, sedimentary opal, organic carbon, and barite fluxes as well as Pa/Th excess ratios have been commonly employed to infer changes in organic matter flux at individual sites across the EEP [1,2]. These data have subsequently been combined to make conclusions about overall productivity and atmospheric CO_2 drawdown during the last glacial cycle for the entire region [3]. We present a multi-proxy record of export production (^{230}Th normalized opal, carbonate, and barite fluxes and [^{231}Pa/^{230}Th]xs) from site MV1014-02-17JC (0.180495° S, 85.866737° W) in the Panama Basin to illustrate that the biogeochemistry of the easternmost extent of the EEP was likely much more complex and dynamic over the past 25kyr. Indeed, consistent with the well-established heterogeneity of hydrographic, nutrient, and primary productivity regimes within the EEP [4], we find that these proxies are not always representative of export production, in the sense of organic carbon flux to depth. Rather, phytoplankton community structure is an important driver of sedimentary opal fluxes and, consequently, [^{231}Pa/^{230}Th]xs ratios at our site. We also note a possible transition from a $CaCO_3$ or coccolithophorid-dominated phytoplankton community during the last glacial maximum (22-20 kya) to a SiO_2- or diatom-dominated phytoplankton community in the early Holocene (11-7 kya), coincident with enhanced seasonality during peak boreal summer insolation.

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