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Testing alkenone δD values as a paleosalinity proxy with particulate and sediment samples from the Eastern Equatorial Pacific

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Abstract

Seawater salinity is a fundamental parameter for ocean circulation yet there are few proxies for past ocean salinity. The $\delta^{18}O$-δD values of seawater closely follow salinity, therefore a proxy for past ocean δD values could provide an estimate for paleosalinity. Initial studies suggested δD values of alkenones closely followed that of growth water and could be used as a proxy for water δD and salinity. Subsequent research suggests a more complicated relationship where salinity, nutrients and growth rate also affect alkenone δD. However most calibration studies to-date have used laboratory cultures that may not be representative of *in situ* growth dynamics of alkenone producers. This proposal will investigate the controls on alkenone δD in natural haptophyte populations collected from surface waters of the eastern equatorial Pacific. The goal is to evaluate how water δD, salinity, nutrients and growth rate affect the δD of alkenones *in situ*, with the ultimate goal of determining whether alkenone δD could be a proxy for paloesalinity or other variables of interest to paleoceanographers. Results from this study will provide the first comprehensive dataset on alkenone δD fractionation in open ocean settings where the effects of salinity, nutrients and growth rate can be constrained from auxiliary measurements. Ultimately the goal is to reliably reconstruct past ocean salinities, complementing $\delta^{18}O$, Mg/Ca-based approaches and perhaps even differentiating salinity from seawater $\delta^{18}O$-δD changes.