Impact of species composition on paleosalinity reconstructions from coastal δD alkenone records

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The hydrogen isotopic composition of haptophyte derived long chain alkenones is a promising tool for paleo-salinity reconstructions. The fractionation factor α between alkenones and growth water is strongly correlated with salinity for all haptophyte cultures studied. However, coastal hapthopytes fractionate approximately 90 ‰ less than open ocean species and this could potentially affect paleo-salinity reconstructions in coastal environments (M'Boule *et al*, 2014 GCA).

In a West African record, off the coast of Namibia, spanning the last deglaciation, we observed less negative δD alkenone values during the glacial compared to the interglacial. This site is minimally influenced by river runoff and the δD seems to reflect salinity changes during an open ocean glacial to interglacial transition. A similar record from the Gulf of Guinea, but strongly influenced by river runoff also shows relatively high δD alkenone values during the glacial compared to the Holocene. However, during periods with the highest river runoff, rather than an expected decrease in δD due to reduced salinity, we observe an increase in δD. A possible explanation could be an input of relatively D enriched alkenones derived from coastal haptophytes that may thrive under these high runoff, low salinity conditions.

A third record spanning the last 40 thousand years from the East African coast close to the Zambezi shows little difference in δD alkenone values between glacial and interglacial possibly explained by a drop in sea level during the glacial, whereby the core site was much closer to the coastline then at present day. The increased influence of freshwater runoff resulted in lower salinities and D depleted alkenones. However, during the glacial alkenone δD is positively correlated with runoff indicators such as the BIT index and log (Ca/Ti) suggesting increased input from coastal haptophytes with increased runoff.

Our results suggest that species composition, as well as salinity, could affect alkenone δD in coastal environments.