



Reconstruction of past sea surface salinity with alkenones: calibration and applications

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At present there are no well-established sea surface salinity (SSS) proxies available to paleoceanographers. Such proxies would be useful to obtain information on past evaporation, precipitation and runoff inputs to the surface ocean mixed layer and - combined with estimates of past sea surface temperature - the investigation of paleo-densities and past boundary conditions for deepwater formation. In this communication we evaluate further the use of an alkenone based index, %C37:4, as a potential SSS proxy, and report values of this index measured in situ in the surface waters of the Nordic Seas. We have also studied a range of coastal environments off Northwest Scotland which are representative of a range of marine/brackish to isolated/lacustrine conditions. Unusually high percentages of the tetraunsaturated alkenone were measured in the Polar waters, with %C37:4 of up to 77% in 80% of sea-ice cover of the East Greenland Current. Values of %C37:4 across the transects studied showed a strong association with water mass type. Analysis of coccoliths in filters indicated that calcified *Emiliana huxleyi* could not be discounted as the biological precursor of alkenones in all the water masses. In the coastal sites, the results suggest an excellent efficiency for %C37:4 at predicting the original depositional conditions of the sediments. Our results prevent confirmation of %C37:4 as a quantitative palaeo-SSS proxy given the multivariate nature of the data sets. However, we show that %C37:4 can be used to reconstruct the type of water mass in the original setting (i.e. marine vs freshwater) or changes in the surface ocean freshwater budget. This can be applied to reconstruct the relative extension of polar water masses in the Atlantic, meltwater

events, or as an indicator of sea-level change in sediment cores in coastal isolation basins. Therefore, %C37:4 can be used as a qualitative palaeo-SSS proxy.