The use of alkenones as proxies for water mass type: developments and constraints in their application to paleoceanography and sea-level studies

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At present there is no well-established sea surface salinity (SSS) proxy available to paleoceanographers. Such a proxy would allow us 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 (SST) - paleodensities and past boundary conditions for deepwater formation. In this communication we evaluate further the use of an alkenone based index as a potential SSS and/or water mass proxy. In the northern latitudes and coastal areas, studies have highlighted increasing relative abundances of the tetra-unsaturated alkenone ($C_{37:4}$) and in some cases have found an empirical relationship between %$C_{37:4}$ and environmental parameters. Moreover, some workers have applied the %$C_{37:4}$ measurement downcore as a tentative proxy to infer paleo-salinity variations. On a global scale it has been demonstrated that there is no discernable relationship of %$C_{37:4}$ to SSS. However, in specific regions %$C_{37:4}$ may yield useful data for climatic/environmental reconstructions. We further investigate the potential of %$C_{37:4}$ by assessing the values of this index measured in the surface waters and in surface sediments of the Nordic Seas. Furthermore, we directly compare alkenone distributions in a core from the Barents Sea (PL-96-126) with data from recently developed proxies for palaeo-SSS, SST and sea-ice cover - based on dinoflagellate cyst (dinocysts) assemblages. We have also studied a range of coastal environments in Northwest Scotland which are representative of a range of marine/brackish

to isolated/lacustrine conditions. In the coastal sites, the results show that $\%C_{37:4}$ is excellent at predicting the original depositional conditions of the sediments and therefore highlight a novel application for alkenones.