

Geochemical Signatures within the Contourite Depositional System of Gulf of Cádiz - Paleoclimate Indicators

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Contourite drifts around the globe are highly influenced by thermohaline-induced deep-water bottom currents and can yield valuable information on the variability of paleoceanographic record as well as the organic carbon movement within the ocean basins.

Among these drifts, Gulf of Cadiz is considered as the world's premier contourite laboratory and thus is an ideal testing ground for the contourite paradigm. The contourite deposits are affected by the Mediterranean Outflow Water (MOW) that attributes to their organic matter distribution as well as their silty-muddy compositions. MOW changes over the geological times reflect controls of tectonics, sediment and organic matter supply, sea-level and climate on the nature of the sediments. Among many research methods, stable isotopes are all excellent tools for reconstructing past productivity, nutrients and hence current changes.

Contourite drifts show two prominent features, namely:

1. Bi-gradational sedimentary patterns: a standard bi-gradational pattern, consisting of full range from mud to sand (reverse grading), and back to mud (normal grading) is recorded in all the contourites related sites (Brackenridge, 2014). This pattern may indicate cyclic changes in the current strength, sediment budget and/or faunal precipitation. Taking an account of these variables, assessment of the cyclicity of sedimentation and its pattern along the section may help in a better understanding of the current changes, and hence past climate change.
2. Large-scale hiatuses: unconformities are significant features within these contourites, possibly marking intervals of changes in the depositional pattern and/or current velocity. Investigation of the sedimentation patterns within these contourite depositional systems along with the elemental distribution pattern should help understanding how such changes in the current nature affecting the contourite deposition.

This grant application is used to support the analysis of 60 samples for the stable isotope analyses of sediments from both the bi-gradational sequences and around the hiatuses within the contourites. The analyses were carried out using the Isotope-Ratio Mass Spectrometry (CF-IRMS) at the Iso-Analytical Limited. Organic carbon-13, inorganic carbon-13 and oxygen-18 were analysed. The results of these analyses contributed to our research programme on contourites and past climate changes funded by NERC and Daphne Jackson Trust. The grant partially supported the production of complete research data sets. Other data collected to support the current project include:

1. XRF core scanning of certain sections to provide the patterns of major and trace elements distribution in the sediments.
2. Grain size analyses of the sediments from the sediment sequences as well from around the unconformity.
3. High-resolution SEM analysis and EDX mapping for a number of samples.

Results from this study will be used in future proposals for larger funds from the research councils or industrial sector. This is to expand the research to cover more sites within Gulf of Cadiz.

MASTS Small Grant DSSG31 was used to pay for the following items:

Description	Cost (GBP)
Organic Carbon-13 analysis of sediment	£788.80
Carbon-13 and Oxygen-18 analysis of carbonate	£838.10
Grinding of samples	£27.25
VAT standard rate	£330.83
TOTAL COST	£1,984.98