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Sandy contourite deposits from the Gulf of Cadiz at Site U1388 (Exp IODP 339): Sedimentological aspects and its evolutionary implication

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The Gulf of Cadiz represents a natural laboratory for contourite research, as well as preserving a unique archive of Mediterranean Outflow Water (MOW) variability since the opening of the Strait of Gibraltar 5.3Ma ago. The aim of this study is to characterise contourite deposits observed at Site U1388 drilled during the IODP Expedition 339. Correlation of detailed sedimentary logging of the Site with XRF scanning, grain size analysis, ichnofacies and smear slide compositional data is presented and the sequences of facies discussed. In addition, the potential for geochemical XRF data as an indicator of MOW intensity and climate variability with respect to the evolutionary implication during glacial/interglacial periods is evaluated.

Site U1388 is located under the influence of the upper core of the MOW, proximal to the Gibraltar Gateway. The site is situated in the scour and ribbon sector of the Gulf of Cadiz Contourite Depositional System (Figure 1) [1, 2], experiencing intense bottom water velocities with high sand content observed at the site. Contourites form the dominant sedimentary deposits although also minor presence of gravity flow deposits is observed throughout the site. XRF scanning data and smear slide analysis highlights a difference in the composition between contourite and turbidite deposits in terms of variations in terrigenous input and carbonate content observed.

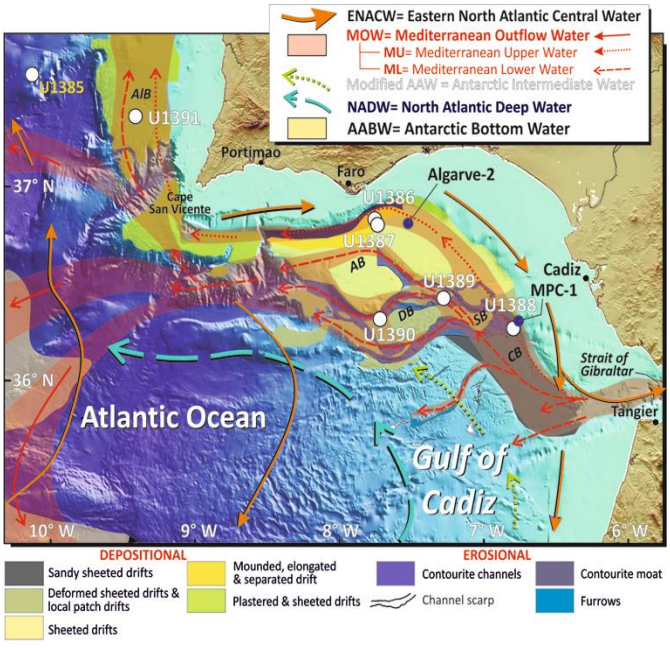

Figure 1: Sketch map of Gulf of Cadiz and MOW pathway. Study site is U1388 dominated by sandy sheeted drifts [2].

Zr/Al ratio has previously been identified as a proxy for MOW intensity [3]. The relative enrichment of zircon over less dense alumnosilicates correlates with increased bottom current flow. The results of this study support Zr/Al as a semi-quantitative indicator of bottom current velocity, supported by increasing grain size observations, and compositional changes. Ichnological features highlight variations in paleoenvironmental (ecological and depositional) conditions, associated with changes between pelagic sediments and sandy contourites. The results provide evidence to distinguish sandy contourites on the present continental margin

with potential identification in the ancient record, as prospective hydrocarbon reservoirs, and as palaeoceanographic markers.

References:

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