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FMS resistivity layer characterization in a contourite depositional system. Preliminary results from Sites U1389 and U1390, IODP Expedition 339 in the Gulf of Cadiz.

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Abstract

IODP Expedition 339 (17 November 2011 - 16 January 2012) recently drilled 5 sites in the Gulf of Cadiz and 2 off the west Iberian margin, with an average core recovery of 86.4%. The Gulf of Cadiz was targeted for drilling as a key location for the investigation of Mediterranean Outflow Water (MOW) through the Gibraltar Gateway and associated contourite depositional system (CDS) over the last 5 Ma.

The Gulf of Cadiz is the world's premier contourite laboratory and thus presented an ideal testing ground for the contourite paradigm. Following examination of over 4.5 km of contourite cores, the existing models for contourite deposition are found to be in good working order. The expedition also verified an enormous quantity and extensive distribution of contourite sands that are clean and well sorted. These represent a completely new and important exploration target for potential oil and gas reservoirs.

The Fomation MicroScanner (FMS) downhole logging tool was run during Expedition 339. This tool provides high-resolution electrical resistivity–based images of borehole walls. The tool has four orthogonal arms and pads, each containing 16 button electrodes that are pressed against the borehole wall during logging. Features such as bedding, stratification, fracturing, slump folding, and bioturbation can be ideally resolved. Because the images are oriented to magnetic north, further analysis can be carried out to provide measurement of the dip and direction (azimuth) of planar features in the formation.

Due to the good borehole conditions at Holes U1389A and U1390, preliminary analysis of FMS images performed offshore revealed numerous resistive and conductive intervals whose thickness ranges between several centimeters and few meters. Some of these intervals correlate in cores with

classic bi-gradational contourite sequences. The main objectives of this study are thus to (1) refine the internal architecture of the CDS at the 2 sites by analyzing the high-resolution FMS images to detect small to large scale lithologic variations, to (2) define the characteristics of complete to partial contourite depositional sequences in downhole logging electrical image records and to (3) generate FMS-based contourite distribution logs. In the future, this approach will be applied to the CDS at the more distal drilling sites: U1386, U1387 and U1390 (Ducassou et al., this meeting).

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