



## **Regional scale Gamma Ray signature of the Gulf of Cadiz Contourite Depositional System over the last 1 My**

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Contourite Depositional Systems (CDS) generated by bottom current activity have been described on continental slopes, rises and abyssal plains. Beside an economic light, CDS form sedimentary archives that can be crucial for paleoceanographic reconstructions. Recently, IODP Expedition 339 was conducted in the Gulf of Cadiz and west off Portugal in order to investigate the CDS under the influence of the Mediterranean Outflow Water (MOW). Five sites were successfully drilled, cored and logged, making this area an ideal ground for testing the contourite paradigm over a 5 Ma long record. Following opening of the Gibraltar Gateway, preliminary results show that contourite deposition started from 4.2-4.5 Ma, increasing in the Quaternary. Significant widespread unconformities, present in all sites but with hiatuses of variable duration, are interpreted as a signal of intensified MOW, coupled with flow confinement.

Expedition 339 data allows characterization of CDS from both seismic, core and well log data. Downhole logging measurements acquired during the expedition provided continuous in situ Natural and Spectral Gamma Ray (GR) records of the drilled formation, allowing for the analysis of the interaction between bottom circulation and sedimentary deposits at several scales. At the borehole scale, the good core recovery allows core/log integration. Grain size analysis and carbonate content measurements performed on cores from Sites U1387 and U1386 have been combined with Gamma ray data (primarily tracking clay content) measured on cores and in open hole. The correlations confirm that GR signal depends mainly of both the CaCO<sub>3</sub> and sand contents. Low GR values most of the time reflect carbonate rich intervals and/or coarse-grained intervals (often correlating with contourite deposits). At a larger scale, site to site correlation of the GR logs has been performed for the last ~1My. The general GR trends correlate well across the sites drilled in the CDS, but also with site U1385 located out of the MOW path. GR logs have also been tied with  $\delta^{18}O$  curves based on the existing offshore age model, updated with several points from ongoing works. The logs correlate well with the  $\delta^{18}O$  signal, with a possible lag. About 50 "low GR" horizons have been identified and dated at the regional scale, allowing us to investigate climate and eustatic controls on the sediment supply, and factors controlling the MOW intensity and its variability in space and time.

This research project is undertaken as part of IODP Expedition 339.