# Stratigraphy and palaeoceanography of a topography-controlled contourite drift system in the Pen Duick area, Southern Gulf of Cadiz

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The northern part of the Gulf of Cadiz has and still is receiving a lot of attention from the scientific community due to (amongst others) the recent IODP Expedition 339 (November 2012- January 2013). On the contrary, the southern part of the Gulf received far less attention, although mud volcanoes, diapiric ridges and cold-water corals are present in this region (Van Rensbergen *et al.*, 2005; Wienberg *et al.*, 2009). The El Arraiche mud volcano field is characterized by a compressive regime (opposed to the extensive regime in most of the Gulf), creating several ridges and aiding the migration of hydrocarbons towards the surface. This study presents seismic and multibeam evidence for the existence of a contourite drift at water depths between 550 and 650 meters along the southwestern flanks of the Pen Duick escarpment (PDE) and Gemini mud volcano (GMV), within the El Arraiche mud volcano field. From the onset of the Quaternary, when the escarpment started to lift and the mud volcano originated, contouritic deposition was initiated at the foot of both topographies. Initially, fairly low-speed bottom currents gave rise to sheeted drift deposits, affected by the uplift of the PDE or extrusion of mud from the GMV. From the Mid-Pleistocene onwards, separated mounded drift deposits formed due to intensified bottom currents. The mounded nature of the deposits increases upward, indicating an increasing bottom current speed. A recent AAIW influence for the drift is proposed based on CTD data and its influence during glacial periods is also likely. However, as the northern extent of glacial AAIW is not yet constrained, glacial north Atlantic intermediate water might also play a role in the formation of the drift. The influence of the Mediterranean Outflow Water (MOW) is not observed at present and the changes recorded within this contourite drift differ from the MOW-dominated contourite depositional system in the northern Gulf of Cadiz and the Le Danois area (Van Rooij *et al.*, 2010; Brackenridge *et al.*, 2013). Drift deposits in the Pen Duick area only occur as early as the base of the Quaternary (compared to the Early-Pliocene for the north) and mounded drift deposits only occur from the Middle-Pleistocene onwards (compared to the Early-Pleistocene). All of these indications rule out a MOW-influence on the drift system. Cold-water coral mounds have been found within and on top of the sedimentary sequence at the foot of the PDE. This implies that environmental conditions in which cold-water corals thrive were present in the past at the foot of the PDE and not only on top.

## References

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