



Shallow seismic structure of the Pen Duick area, Gulf of Cadiz

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This paper addresses the relationship between structural features, seabed morphology and carbonate mounds in the Pen Duick and Renard Ridge area of the El Arraiche mud volcano field in the south-eastern Gulf of Cadiz, based on seismic and multibeam echosounder data.

In 2006 a grid of 100 high resolution 24-channel seismic lines with a length of about 5 nautical miles and a spacing of about 50 m mainly aligned NE-SW and NW-SE was recorded using an array of three sleeve guns (40, 20 and 10 cu.inch) towed at 37 meters behind the ship. Shooting was done every 5 seconds at a pressure of 100 bars and an average sailing speed of 4.2 knots, thus with an average shot distance of 10.5 metres across the Pen Duick Escarpment and the Lazarillo de Tormes mud volcano. Additional lines were recorded as cross lines for correlation across the western cone of the Gemini mud volcano. During a follow-up cruise in October 2006 with RV Pelagia, the multibeam coverage was expanded to include the Gemini and Al Idrissi mud volcanoes and adjacent area. NMO corrections, CDP stacking and swell correction were applied to improve the raw images.

Results show that the Pen Duick Escarpment is lined along its upper flank with a string of relatively small and steep mound structures. The majority of mounds concentrate on the top and on the western slope of the Pen Duick Escarpment. A large chain of mounds (about 1.6 km long) is situated to the west of the Pen Duick Escarpment. There are also small isolated groups of mounds located to the east of the Pen Duick Escarpment. These mounds do not show a clear internal structure. The seismic facies within the mounds are chaotic. The mounds at the Pen Duick Escarpment occur locally clustered but mainly as isolated structures. They are at maximum about 50 m high, are located in water depths from 500 to 650 m and consist mainly of fine grained (muddy) sediments. Our seismic profiles do not reflect a relationship with the possible presence of gas, gas hydrates or fluid flow in the subseabed. At flanks of mud volcanoes, mud flows may interfinger with stratified sediments (such as at LdT). These, however, provide no evidence for gas or fluid escape either.