Cold-Water Corals, Carbonate Concretions and Carbonate Mud Mounds in the Gulf of Cadiz

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Since 2004 NIOZ has organised several cruises with the research vessel “Pelagia” to the Gulf of Cadiz (NE Atlantic Ocean) within the framework of the Moundforce and MiCROSYTEMS projects. These projects are carried out as part of ongoing cold water coral and carbonate mound studies at NIOZ along the European continental margin.

Extensive high resolution, partly 2.5D, seismic investigations at the Pen Duick Escarpment (Gulf of Cadiz) and the surrounding area reveal a complex history of compression, mud volcanism, diapirism, erosion and deposition in the area. Cold water corals occurring in this area are likely to be influenced by these relatively long term changing environmental parameters. Short term environmental changes near the sea bed were observed with benthic landers equipped with an acoustic doppler current profiler, temperature and salinity sensors, optical backscatter sensors and a sediment trap. These measurements reveal a strong tidal component in the sediment transport processes. 24-Hour CTD stations show the strong influence of the tide throughout the entire water column.

Sea bed imaging indicates that at present cold water corals show a limited distribution. If present only a few individuals are found. Most of the cold water corals present today are soft corals (for example Isidella). Stony corals (Dendrophyllia, Lophelia pertusa, Madrepora occulata and others) are hardly ever found alive while box and piston cores reveal that in the past this type of corals occurred abundantly during certain periods. The present study aims to investigate during which periods the corals were present, what exactly caused the rise and fall of the coral populations in time and what is their relationship to carbonate mud mound formation.

A second important topic is the presence of various types of carbonate concretions. These objects seem to be omnipresent at some mounds while they are hardly found at others. Within this study we aim to understand how these structures are formed and whether they play a role in the formation and stabilisation of the mud mounds.