

Unravelling the 4D architecture of cold-water carbonate mounds

De Mol, L.¹, Pirlet, H.¹, Van Rooij, D.¹, Blamart, D.², Henriët, J.-P.¹, the R/V Belgica 07/13 & 08/13 shipboard parties and the Marion Dufresne 169 shipboard party

DE MOL, L. , PIRLET, H., VAN ROOIJ, D., BLAMART, D., HENRIËT, J.-P., the R/V Belgica 07/13 & 08/13

1) *Renard Centre of Marine Geology, Dep. Geology and Soil Science, Ghent University, Ghent, Belgium*

2) *LSCE-IPSL-UVSQ, Gif-sur-Yvette, France*

Cold-water corals are widespread along the Atlantic European continental margin. At some locations, these cold-water corals constructed carbonate mounds, for example in the Gulf of Cadiz. Previous studies in the Rockall Trough and the Porcupine Seabight off Ireland already revealed more information about these structures. Nevertheless, few details are known regarding the genesis and architectural framework of these mounds.

During the R/V Belgica 07/13 CADIPOR III cruise, thick cold-water coral rubble plates were discovered on top of the carbonate mounds in the El Arraiche mud volcano field in the Gulf of Cadiz. Based on these data, combined with data, previously obtained in the Porcupine Seabight, an important question was raised: can these coral plates be the building stone of a carbonate mound? To unravel this hypothesis the 3D characterization of these coral plates will be investigated.

ROV 'Genesis' of Ghent University was used to investigate the distribution, spatial characteristics and biodiversity of these rubble plates. Facies interpretation maps were made and compared with side-scan sonar data. Next, four on-mound gravity cores were obtained during the R/V Marion Dufresne 169 cruise for sedimentological and palaeoceanographic analyses in order to unveil the history of the uppermost meters of these cold-water coral build-ups. In parallel, four on-mound cores were acquired on approximately the same location for microbiological and biogeochemical analyses. By comparing and correlating both results, more information will be revealed about the sedimentological and (micro)biological processes acting in the dead coral rubble fields. In conjunction with dating and palaeoenvironmental analyses of the corals and the sediment matrix, this will yield valuable information about the build-up of the cold-water coral mounds in the Gulf of Cadiz and the palaeoenvironmental characteristics at the time the corals were living.

Finally, these results will be compared with other regions, for example with the Bay of Biscay where no carbonate mounds were reported. During the R/V Belgica 08/13 BiSCOSYSTEMS cruise, the cold-water corals reported earlier by Le Danois (1948) in the Penmarc'h and Guilvinec canyons were rediscovered. Based on multi-beam data and ROV video images two different areas were distinguished. First, mini mounds, covered by dead cold-water coral rubble were found in a shallow area in a water depth of 290 m. Secondly, living and dead cold water corals were observed in water depths of 650-750 m. At some locations they form coral fields with a size of about 25-50 m with mostly dead corals and a few living ones. Why did these cold-water coral reefs not develop into carbonate mounds and what is the missing link between reef formation and mound development?