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Authigenic carbonates from cold-water carbonate mounds in the Gulf of Cadiz: Microbial diversity and imprint on carbonate minerals.

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The Pen Duick Escarpment off Morocco consists of recent carbonate mounds in water depths of 500-600 m, flanked by giant mud volcanoes. These mounds are covered by mainly lifeless cold-water corals and have been associated with extensive fields of seep-related carbonates in off-reef regions. Three piston cores (from 350 to 640 cm long), coming from different sites on these juvenile mounds, were sampled and analyzed for mineralogy, stable isotopic composition of carbonates, geochemistry, and microbial communities. Most of the sediment comprises pelagic calcite (coccoliths), detrital quartz and authigenic dolomite, often observed encasing coccoliths. The decalcification of the sediment resulted in a dolomite dominated matrix that showed stable carbon istotope values of as low as -30 permil in contrast to the bulk sample values of -7 to -15 permil, which implies the involvement of microbes in the production of bicarbonate ions. Initial results from 16S rRNA gene clone libraries support the theory, that anaerobic oxidation of methane is one of the most important biogeochemical process leading to carbonate precipitation. Preliminary results of stable carbon isotopes of bulk samples from different carbonate mounds from the same area, indicates that the sulphate-methane transition zone moves in depth through time. We will show and discuss multidisciplinary data obtained after several cruises aimed to elucidate the impact of microorganisms on the construction of these carbonate mounds. The special emphasis in this research will be on the correlation between microbial ecosystems and

their metabolic influence on mineral formation and diagenesis.