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European Cold-Water Corals: Hydrography and Geochemistry. What is the message?

W.-C. Dullo, A. Rüggeberg, and S Flögel
IFM-GEOMAR, Leibniz-Institute for Marine Science, Kiel, Germany (cdullo@ifm-geomar.de, + 49 431 6002925)

Cold-water corals are known to be abundant in the world's oceans forming unique reef structures mainly built up by colonial azooxanthellate scleractinians *Lophelia pertusa* and *Madrepora oculata*. Focusing on the European continental margin, these cold-water coral reefs occur on moraine ridges off Norway to small coral topped mounds and huge coral banks in the Rockall Trough, the Porcupine Seabight, the Gulf of Cadiz, but only have a patchy occurrence in the Mediterranean Sea.

Living cold-water coral reefs occur over a wide bathymetric and hydrographical range. We found that cold-water coral reefs are limited to different intermediate water masses. Measurements of the physical and geological properties showed that parameters such as temperature, salinity, dissolved oxygen content, current intensities, and different substrates vary widely without specifically impacting the distribution of living cold-water coral reefs. The habitat of living reefs along the Atlantic European continental margin comprises a temperature-salinity field, with its lower boundary equivalent to the Intermediate Salinity Maximum (ISM). Therefore, cold-water corals of these reefs may report environmental changes, present and past, if the proper geochemical tools are applied. Sr-isotopes seem to be a very promising proxy, since they portray very well the temperature conditions of the ambient seawater from which the coral precipitates. The correlation of established proxies such as δ^{18}O and δ^{13}C with temperature is possible as well, however, it remains difficult since there is no direct temperature equation applicable as in shallow-water corals. Other temperature proxies such as Sr/Ca, Mg/Ca and U/Ca are in?uenced by the complex microstructure of the aragonite skeleton, the rate of calci?cation, and other vital effects observed for coral species. We will present a variety of established and new proxies and will discuss their application and interpretation potential.