

NW-ATLANTIC TEMPORAL DISTRIBUTION OF COLD-WATER CORALS: A FIRST CASE STUDY FROM CAPE LOOKOUT AREA, NORTH CAROLINA

Matos, L.¹, Mienis, F.¹, Frank, N.², Wienberg, C.¹, Abrantes, F.³, Cunha, M.R.⁴, Hebbeln, D.¹

¹MARUM, Bremen University, Germany, ²LSCE, Gif-sur-Yvette, France, ³LNEG, UGM, Lisbon, Portugal, ⁴CESAM, Dep. Biologia, Aveiro University, Portugal

The climate variability recorded for the last million years has been linked to reorganisations of the North Atlantic thermohaline circulation and water mass distribution. Among other archives, cold-water corals (CWC) have recently become key archives to trace intermediate water-mass history. Aragonite forming CWC can be accurately dated by means of mass spectrometric U-series dating, thus providing unique records of ocean circulation for the last ~300 kyrs. Moreover, the temporal pattern of CWC occurrences can itself reveal important insights into the oceanographic conditions favouring coral growth. In the Eastern Atlantic a glacial/interglacial see-saw pattern of CWC was observed, with abundant coral growth during interglacial periods (MIS1,5,7) north of 50°N and abundant coral occurrences during glacial periods (MIS2,3,4,6) further south, e.g. the Gulf of Cadiz. Oligotrophic conditions, weak tidal currents and changes in water mass density in the Gulf of Cadiz and along the Moroccan margin have been suggested as the cause for CWC demise during warm climate stages.

To understand the development of framework-building CWC, such as *Lophelia pertusa* and *Madrepora oculata*, at the North Atlantic basin-scale it is mandatory to further study the spatial and temporal pattern of coral distribution along its North-western margin. Here we present, for the first time, fifteen U-series ages of CWC from

the North Carolina margin (34°N), sampled during the DISCOVRE-2009 (R/V Cape Hatteras) and TRACOS-2010 (R/V Pelagia) cruises at Cape Lookout, the northernmost and shallowest CWC area on the Blake Plateau. At present, this area is under the influence of the Gulf Stream. Over 10 large mound structures between 320 and 500m water depth were observed. The coral (on-mound) and sediment (off-mound) samples used in this study were obtained with box- and piston-corers. U-Th dating of fossil coral fragments was conducted using MC-ICPMS technology at LSCE (Gif-sur-Yvette). The chronology of one off-mound sediment core was further investigated through AMS-14C dating (on planktonic foraminifera). CWC within the first 30 centimeters of sediment at Cape Lookout reveal interglacial ages, reflecting Late Holocene (<1 kyr BP) and Mid-Holocene (~6 kyr BP) ages. Furthermore, two CWC samples dated back to the last interglacial, the early Eemian (~125 kyr BP). Hence, we found first evidence that interglacial coral growth occurs in the temperate western Atlantic underneath the Gulf Stream, while the temperate east Atlantic revealed little evidence of interglacial coral occurrence of framework-building species. The temporal distribution of CWC off North Carolina resembles the pattern found much further north in the eastern Atlantic.