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Of mounds and water masses – oceanic controls on carbonate mound settings along the NE Atlantic margin

Andres Rüggeberg (1), Sascha Flögel (2), Anneleen Foubert (1), Inês Marina Martins (3), João Vitorio (3), Jacek Raddatz (4), Thomas Vandorpe (5,6), David Van Rooij (5), and Wolf-Christian Dullo (2)

(1) University of Fribourg, Department of Geosciences, Fribourg, Switzerland (andres.rueggeberg@unifr.ch), (2) GEOMAR Helmholtz Centre for Ocean Research Kiel, Kiel, Germany, (3) Instituto Hidrografico, Lisbon, Portugal, (4) Institute of Geosciences, Goethe-University Frankfurt, Frankfurt am Main, Germany, (5) Department of Geology, Ghent University, Gent, Belgium, (6) Flanders Marine Institute (VLIZ), Ostend, Belgium

Cold-water coral (CWC) reef ecosystems are an abundant phenomenon along the margins of the Atlantic Ocean, the Gulf of Mexico and in the Mediterranean Sea. At certain areas these ecosystems were able to create large mound structures elevating up to 300 m above the seafloor, forming clusters or being aligned in chains. The ocean with its intermediate water masses plays a fundamental role in shaping the distribution and development of these CWC carbonate mounds in the Atlantic Ocean. However, a modern understanding of the complex interactions between the water masses and carbonate mound processes is still emerging. These processes and dynamics are especially challenging owing the broad range of spatial and temporal scales (cm to tens of km, seasons to million years) and the complex physical and biological feedbacks involved.
This study aims to review recent advances in the understanding of the dynamic processes, ranging from small-scale mechanisms of internal waves and tides at mound– to mound-province–scale to larger, basin-wide patterns of intermediate water mass circulation, and relate their control and effects on carbonate mound development along the NE Atlantic margin through time. Distinct intermediate circulation-driven processes influence the nutrient exchange for the CWC carbonate mound provinces, while climate forcing shape the development of such mounds.