COMPOSITION AND GROWTH PATTERNS OF COLD-WATER CORAL MOUNDS IN THE STRAITS OF FLORIDA

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PROJECT OBJECTIVES

- Determine ages and growth rates in both the Matterhorn and Mount Gay cold-water coral mounds.
- Ascertain if the pattern of pulses of coral growth relates to changes in seawater chemistry using isotopic signatures.
- Assess the variability of species diversity in the two CWC mounds.

PROJECT RATIONALE

Cold-water corals (CWC) and associated facies are important carbonate sediment producers on the sea floor of most ocean basins. This carbonate factory has only been recently recognized and many questions remain with regards to the sedimentation and growth rates of the CWC mounds. This study aims to assess the growth rates of two cores that were retrieved from CWC mounds in the Straits of Florida. We will date both cores and test if the grain size differences in the matrices are related to current strength variations in the Straits of Florida at both sites. In addition, we will assess if coral species change with the glacial cycles and mound site.

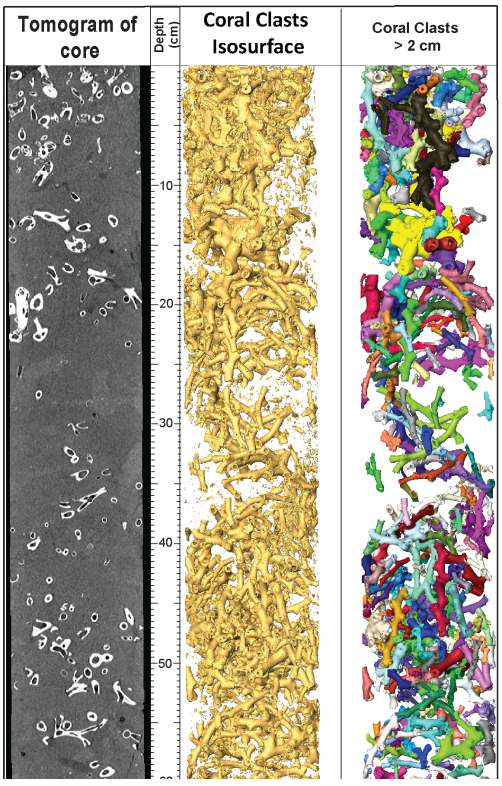

Figure 1. CT scan of 60 cmbsf of Mt. Gay with matrix removed and individual corals distinguishable.

BACKGROUND

One core, 7.03 m in length, was recovered from the flank of the 110 m high "Matterhorn" mound in 770 m water depth. It is composed of an unlithified succession of coral floatstone within a coarse-grained matrix of variable composition. The second core, 3 m in length, was collected from the top of "Mount Gay" mound in 630 m water depth and consists of unlithified coral floatstone within a fine-grained matrix.

The base of the Matterhorn mound core is over 500k years old with coral growth through glacial and interglacial cycles, although intervals of interrupted growth are observed within the core. Mount Gay is significantly

younger than the Matterhorn, reaching only ~10k years at the core base (Wienberg personal communication). There are little to no interruptions within the Mount Gay core indicating that coral growth was continuous throughout the development of the mound.

APPROACH AND WORK PLAN

To address the questions surrounding growth patterns of cold-water coral mounds in the Straits of Florida we will perform additional age determination on the two cores in hand.

U-Th age-dating and isotopic signatures of the various layers will provide the timing of coral growth in both cores, and interruptions of growth in the Matterhorn core. Existing age dates document growth of these CWC throughout glacial and interglacial periods indicating that climate forcing was not the dominant factor in the CWC growth in the Straits of Florida.

The composition of the two CWC mounds is different despite being located within the same seaway. Grain size analysis of the matrix will be conducted in detail to assess if variations in current strength were coincidental with mound growth. The Mount Gay core displays a dense, fine-grained matrix while the Matterhorn core is coarse-grained. Using the high resolution CT scan of the Mount Gay core, CWC clast content as well as shape, size, and orientation of each coral fragment can be quantified (Fig. 1). The same technique will be used on the Matterhorn core to have an accurate comparison.

Because there might be differences in the coral species diversity, we plan to compare coral species in glacial and interglacial periods in both mounds.

SIGNIFICANCE

The recognition of CWC growth in the Straits of Florida during both glacial and interglacial times is rather unusual as many CWC provinces display a preference for one or other of the glacial intervals; e.g. in the Gulf of Cadiz CWC prefer glacial times, whereas on the Irish margin they prefer interglacial (Dorschel et al., 2005; Wienberg et al., 2010). Yet, the coral growth in the Matterhorn is interrupted by periods of non-growth while Mount Gay displays continuous coral growth pointing to another environmental control for coral growth.

REFERENCES

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Wienberg, C., Frank, N., Mertens, K.N., Stuut, J.B., Marchant, M., Fietzke, J., Mienis, F., and Hebbeln, D., 2010, Glacial cold-water corals growth in the Gulf of Cádiz: Implications of increased palaeo-productivity. Earth and Planetary Science Letters, 298. 405-416.