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IODP Expedition 307: Analysis of a complete sediment sequence through a cold-water coral carbonate mound

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During the spring of 2005, IODP Expedition 307 drilled continuous recovery boreholes through the Challenger cold-water coral carbonate mound (Belgica mound province, eastern Porcupine Seabight margin), from its summit to below the base, as well as boreholes through an adjacent a contourite drift sequence. For the first time, this provides an opportunity to study the genesis and development such a mound in tandem with a study of background environmental conditions (see poster abstract O'Donnell et al.).

Examination and sample analysis from these boreholes in ongoing with the view to provide a high-resolution story of carbonate mound development throughout the Quaternary and late Tertiary. As well as revealing changes in biogeological growth processes as a function of autogenic and allogenic controls, the rapid growth rates of the mound provide an opportunity to perform high resolution palaeoclimatic and palaeoenvironmental studies in this area for selective time intervals during this period.

Studies will focus on the use of particle size analyses as a means of differentiating sedimentary components contributing to mound growth and the reconstruction of the hydrodynamic microenvironmental on the mound. Provenance studies will identify sedimentary component sources area and, in conjunction with a derived chronostratigraphy (see below), will also allow an appraisal of variation in sedimentary flux from the various sources and their controls. Preliminary studies suggest a strong palaeoclimatic control on mound growth with changing coral density, sedimentary input and hydrodynamic regime being the key drivers. The mound sequence also contains a number of hiatus suggesting that mound growth is also punctuated and possibly sporadic. Further investigations will provide insight into the nature of the growth mechanism and

the specific drive and allogenic controls driving these processes.

The development of a robust chronostratigraphy for the boreholes will facilitate borehole correlation and flux studies and will be based on coccolith and foraminiferal biostratigraphy independently supplemented by extensive AMS ^{14}C and U/Th datings.

Given the proximity of the regional context of the carbonate mound within a contourite drift sequence, information derived from the contourite cores (see poster abstract O'Donnell et al) will provide a regional hydrodynamics and paleoenvironmental context to the mound story and help elucidate allogenic on carbonate mound growth throughout the Quaternary and into the late Tertiary.

Although much effort has been invested in geobiological growth mechanism of cold-water coral carbonate mounds in recent years, this project is unique in having access to the only complete sequence through such a mound.