Carbonate cement as an indicator of sea level during the last glacial period: IODP Exp. 325, Great Barrier Reef Environmental Changes

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The carbonate grain and intergranular cement of grainstone provide helpful information for reconstruction of past sea-level and paleo-environments. We examined grainestone samples cored from the shelf edge of the Great Barrier Reef (GBR) off Mackay (HYD-01C, 02A, 19.7°S) and Cairns (NOG-01B, 17.1°S) during Integrated Ocean Drilling Program (IODP) Expedition #325 under petrographic microscope and scanning electron microscope energy-dispersive X-ray spectrometer (SEM-EDS). We observed low-Mg calcite cement precipitated under meteoric environment in the shelf-edge reef cores. The presence of freshwater cements shows a sea-level fall was occurred in the last glacial period during the development of shelf-edge reef. We also observed distinct early submarine cements in some grainstone samples by the precipitation of intergranular cements of bladed Mg-calcite spar or the growth of scalenohedral or rhombohedral crystals of Mg-calcite on spherulitic fascicles of peloids. These early submarine cements reflect the sea-level lowstand associated with the last glacial period by indicating the place of shallow fore-reef.