Basin-Wide Dolomitization Patterns Along The Lower Paleozoic Laurentian Continental Margin, Anticosti Basin, Eastern Québec

Brennan-Alpert, P., and Desrochers, A., Ottawa-Carleton Geoscience Centre,
Department of Earth Sciences, University of Ottawa,
140 Louis Pasteur, Ottawa, ON, K1N 6N5, pbrennan@science.uottawa.ca,

Lavoie, D. and Chi, G., Centre Géoscientifique de Québec,
Commission Géologique du Canada,
880 Chemin Ste-Foy, P.O. Box 7500, Québec, G1V 4C7.

Paragenetic succession of diagenetic mineral phases, stable isotopes and fluid inclusions together with basin-wide stratigraphic and sedimentologic data were studied in strata and subsurface succession of the Lower Ordovician Romaine Formation along the Laurentian continental margin in eastern Québec. The Lower Ordovician Romaine strata comprise a basal transgressive unit onlapping the Precambrian basement and consist mainly of muddy, bioclastic subtidal and peritidal carbonates arranged in two distinct depositional sequences. The upper sequence is capped by a regional unconformity. Inner shelf sections (e.g. Mingan Islands strata) are characterized by pervasively dolomitized subtidal and peritidal carbonate facies. The outer shelf sections (e.g. Anticosti Island cores) display pervasively dolomitized peritidal carbonate facies but partially to pervasively dolomitized subtidal facies.

Two stages of dolomitization are present regionally: i) an early, synsedimentary to shallow burial stage characterized by different fabric selective replacement dolomites, and ii) a late stage characterized by pore- and fracture-filling dolomites and fabric obliterative, replacement dolomites. Early fabric selective replacement dolomites are finely to medium crystalline with planar-e to planar-s crystal boundaries. Early dolomites replace fine-grained matrix and mimic original calcite components in clasts and cements. Late, void-filling dolomites are ferroan, medium to coarsely crystalline, with parallel to undulose extinction. Late void-filling dolomites are not fabric selective and show various occurrences including: i) intercrystalline micropore-filling of early dolomite mosaics, ii) coarsely crystalline cement in large pores and in fractures, and iii) overgrowths on early, non-ferroan dolomite and on non-ferroan saddle or white dolomite. Late, fabric obliterative, replacement dolomites are medium to coarsely crystalline with non-planar crystal boundaries and replace porous layers in subtidal facies. Significant porosity was locally generated during the formation of early replacement dolomites in peritidal facies, but was partly to completely filled by late dolomite and calcite phases. Significant porosity was also associated with late replacement dolomite. The distribution of the Romaine dolomites together with results of stable isotopes and fluid-inclusion micro-thermometric data suggest that the early replacement dolomites formed in a marine environment during early diagenesis. Late replacement dolomites probably formed during burial in conditions influenced by warm, basin-derived brines.