

Evolution from Micro-Pores in Limestones to Macro-Molds in Dolostones, Middle to Upper Devonian Swan Hills Formation, West-Central Alberta

Jack Wendte*

Geological Survey of Canada, 3303-33 St. NW, Calgary, AB T2L 2A7
jwendte@gsc.emr.ca

ABSTRACT

The origin of molds in dolostones that formed from the dissolution of large calcitic grains is not well understood. The selective occurrence of these molds in dolostones, rather than in limestones, is virtually ubiquitous in Phanerozoic strata throughout the world, implying dissolution of calcite concurrent with dolomitization.

I propose that molds or partial molds formed by the formation and coalescence of micropores of leached origin. Detailed examination of rocks in the zone of transition from dolostone to limestone is well 10-3-61-24W5 in the Devonian Swan Hills Formation documents an increase in micro-porosity toward the dolostone and suggests that dissolution of calcite occurred in the peripheral, partially dolomitized halo of a migrating dolomite front. Dissolution of calcite in the outer part of this zone initially resulted in the formation of micropores in the undolomitized portion of stromatoporoids. As the dolomite front advanced, micropores continued to form by dissolution in the undolomitized portions of stromatoporoids, and eventually coalesced to produce the molds that ubiquitously occur in dolostones.

Explanations for the dissolution of calcite in the peripheral zone of transition from dolostone to limestone are speculative. There are at least two possible mechanisms. First, calcite dissolves due to the mixing of the dolomitizing fluid with the original connate water in limestones, creating waters undersaturated with respect to calcite but supersaturated with respect to dolomite. Second, as postulated by Graham Davies, calcite dissolves due to the cooling of hydrothermal fluids emanating out, during repeated pulses, from dolostone bodies.