

Thin carbonates in thick siliciclastic successions: a useful key to depositional environments and sequence breaks as revealed by two core examples (#9 limestone in South Desbarres O-76 and West Venture N-91 wells) from the Jurassic–Cretaceous offshore Nova Scotia, Canada

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Paleogeography and climate make Mesozoic and Recent carbonates rare in Canada. High sediment supply with resulting inimical conditions make carbonates very rare in deltas. Yet during the Jurassic–earliest Cretaceous, offshore Nova Scotia had Canada’s only large Mesozoic carbonate platform, and also a thick extensive continent-scale delta with rare thin limestone layers.

Limestone in dominantly terrigenous depositional environments can have a variety of origins. As sediment mainly resulting from in situ biological processes (‘born not made’), carbonates can be sensitive indicators of their depositional setting. As such they have great potential often overlooked to aid in the interpretation of the depositional environment and geological history of the associated siliciclastics. Two thin carbonate examples in core within the Sable Delta illustrate this potential.

Cores at the base of West Venture C-62 sample a shelf-margin delta complex and bottom in the #9 Limestone that defines base of the Missisauga Formation (Berriasian to Barremian). Rather than a condensed unfossiliferous mudstone as once interpreted, the limestone showed a series of facies changes vertically from *Zoophycus*-burrowed marl through microbial mound into a bored deep-water spongemicrosolenid coral reef-red algal reef capped by a pyritized hardground and buried in prodelta mud. Since these shoaling changes occurred over just 10 m, they support the idea of a major relative sea level fall (forced regression) that was previously suggested for other reasons.

The other example is core from South Desbarres O-76 that has thicker limestone beds formed on ramps lateral to the delta during delta switching with lithologies only seen in cuttings. However within coarse terrigenous sediments previously logged as channels there are transported sponge and bryoderm sediments that elsewhere occur in reddened shales and an in situ bioeroded multi-coral reeflet. These show minor varied organic growth and times of non-deposition in channels from fossil communities of different origins and depths.