Mixed siliciclastic- carbonate systems and their impact on the development of the Nova Scotian continental margin

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The progradation of deltaic systems that reach the shelf-edge is considered a primary mechanism to deliver sand to the slope and basin floor region at continental margins. Sediment bypass processes can dominate the outer-shelf to upper-slope transition causing poor preservation of reservoir quality sandstones in the upper slope. Turbidity flows can carry the bulk of the coarse fraction downdip with deposition of a thicker sand pile once the channel-to-lobe transition is reached. Predicting this lateral and vertical variability along the slope is challenging; however, this configuration can be further complicated when mixed siliciclastic-carbonate systems are present.

In this work, we use the Roseway/Missisauga case study from Nova Scotia to explore potential implications associated with the development of deepwater turbidites within slope systems that are time equivalent to outer-shelf mixed siliciclastic-carbonate units. Two scenarios are possible: (1) the carbonate factory is still dominant and the development of extensive carbonate reefs and pinnacles in the outer shelf prevents the passage of siliciclastic systems beyond the shelf-break; in this case the siliciclastic component is sequestered within the inner/outer shelf; (2) favorable conditions for carbonate production gradually deteriorate by the activation of major fluvial/deltaic systems that prograde outboard reaching the slope region. In this second scenario, low relief and lateral discontinuous carbonate shoals tend to be ubiquitous in the outer shelf representing the last outboard remnants of the carbonate factory. Shelf-edge deltas can circumvent or breach these carbonate shoals establishing sedimentary pathways in the shelf-break region that connect with deepwater turbidites. Our observations suggest that this second scenario is the more likely in this part of the Scotian margin during Berriasian to Barremian time.

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