

Chasing the Elusive Deltas of the Upper Dunvegan Formation: A Practical Sequence Stratigraphic Model Illustrated in Core

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Allomember A is a thin deltaic package comprising the top 30-50 m of the Late Cretaceous Dunvegan Fm. in west-central Alberta. Six backstepping deltaic sequences recognized in this interval illustrate the response of deltaic shorelines to a period of accelerated tectonic subsidence and eustatic rise. Each unit averages 6-10 m thick, and comprises a complete transgressive-regressive cycle of ~20-30 ky. The transgressive limit of successive units migrates updip, advancing by ~30-40 km per cycle. This suggests a regular cyclic control on sequence development – probably high-frequency eustatic cycles in the Milankovitch band, superimposed on a long term eustatic rise. The lowstand deposits of each sequence form well-defined linear sandstones that are mutually evasive; occupying space unfilled by the previous cycle and sitting on the flanks of earlier lowstand sandstones. Sandstones become thicker and more linear with each successive sequence, suggesting increased wave reworking. The deltas appear to have been starved of sediment by a large flexural moat in the west, leaving them open to reworking by storm and fair weather processes.

Marine and non-marine sandstones in allomember A have been attractive primary and secondary targets in the Deep Basin and Alberta Plains for decades. This study constitutes the first predictive stratigraphic framework for allomember A, and interprets this interval in the context of the overall Dunvegan-Doe Creek clastic succession. Integration of production, drill core, and well log data into this framework will enhance our ability to recognize and exploit these elusive targets.