Integrated Ichnology, Sedimentology and Stratigraphy of the Along-Strike Changes in Parasequences of the Lower Cretaceous Boreal Seaway, Central Alberta, Canada

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The along-strike depositional variability recorded in the coarse-grained parasequences that prograded into the Lower Cretaceous Boreal Seaway of Alberta is understudied. High-resolution facies analysis of subsurface core can be used to differentiate non-deltaic (strandplain) shoreface deposits from contemporaneous wave-dominated deltaic complexes. In the western part of the basin, facies are strongly overprinted by storm processes. Successions are dominated by sporadically burrowed, stacked sandy tempestites, passing upward into current ripple and trough cross-stratification, and capped by low-angle planar-stratified sandstones, pebbly sandstones and, locally, conglomerates. Subtle ichnological and sedimentological characteristics captured in units preserved between tempestites indicate the local presence of river-sediment influx. At point source locations, conglomerate beds are more abundant.

Roughly time-equivalent strata lying along the southeastern margin of the basin exhibit a marked and progressive decrease in the degree of storm influence. Sandstones show laminated-to-burrowed bedding with composite trace fossil suites attributable to the Skolithos Ichnofacies and the Cruziana Ichnofacies. Foreshore conglomerates are less abundant eastward, and the system appears more brackish. In these positions, storm influence is less effective in masking deltaic effects, and facies characteristics distinctive of river discharge can be discerned and applied to more strongly storm-influenced successions to the west.

Understanding and predicting the along-strike variations in parasequence character will constitute an integral step towards understanding the distributions of economic oil and gas in the Boreal Seaway of central Alberta. In the west, in particular, point-source accumulations of fluvially supplied gravel can be better predicted by carefully delineating these deltaic influences.