Recognition of Tide-Dominated Deltaic Deposits in the Clearwater Formation: Sedimentology, Stratigraphy and Ichnology Working Together to Solidify Depositional Characterization.

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ABSTRACT

Shallow/marginal marine to nearshore depositional environments are by far the most difficult environments to definitively characterize. The range of potential environments in this realm is seemingly infinite and can rapidly change within any given vertical section and laterally from well to well. As geologists, we have to use all our investigative tools in order to sort out the paleogeography by integrating our knowledge in sedimentology, stratigraphy and ichnology. This is especially true for the Cretaceous Mannville section in the Western Canada Sedimentary Basin.

We will be looking at the Lower Cretaceous Albian and focusing our attention on the Clearwater Formation. A number of different environmental interpretations have been presented over the years, however, lately a number of publications have come to an agreement on a tide-dominated deltaic system that has deposited and distributed the sediment observed in the Clearwater Formation.

There are a number of key sedimentological and ichnological characteristics present in cores analyzed (T65-66, R2-4) that have led to this interpretation. These include:

**Physical Characteristics:**
- Oppositely dipping ripple laminations
- Abundant mud intraclasts (armoured clasts)
- Mud drapes
- Heterolithic bedding

**Ichnological Characteristics:**
- Diversity and Abundance – mod. to high
- Bioturbation levels – high
- Larger more robust traces fossils noted
- Impoverished Cruziana ichnofacies, displaying a full range of fully marine traces

An allostratigraphic approach was taken within the study area in which the Clearwater Formation was subdivided into 5 disconformity-bounded allomembers, representing likely 4th order regressive cycles of deposition. Detailed facies mapping of each allomember also revealed successive progradation of deltaic deposits into the Boreal Seaway.

In this presentation, we will walk through some of these facies and lines of evidence and provide context as to the recognition of tidally-dominated deltaic deposits in the Clearwater Formation.