

Facies and Geochemical Variations within Cretaceous Clinoforms, Western Canada Sedimentary Basin

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ABSTRACT

The Carlile and Niobrara formations of the Colorado Group were deposited in a distal shelf environment in the Cretaceous Interior Seaway, during the latter part of the Greenhorn Transgressive-Regressive Cycle and the beginning of the Niobrara Transgressive-Regressive Cycle. On the eastern platform area of the foredeep the succession are dominated by mudstone, with variable amounts of interbedded siltstone and minor sandstone. Cross sections of closely spaced induction well logs reveal several shoreline detached mudstone dominated wedges that has clinoform geometries. Cores show the clinoforms was formed by bedload transport of sand, silt, and hydrodynamically equivalent mudstone aggregates. The Carlile Formation particularly contains numerous mudstone aggregates observable in thin section. These are likely derived intrabasinally from erosion by subaqueous currents or wave erosion of muddy substrates. Geochemical XRF data show variations between the systems tracts indicating changes in sediment source, likely caused by changing circulation patterns of subaqueous currents transporting mudstone aggregates with distinct compositions from varying parts of the basin. Further, redox sensitive trace elements show variable amounts of oxygenation along the dip of the clinoforms, which generally show positive correlation with the organic content. This show that the chemical content reflect both substratum oxygen content but also vertical variations in source area of the mudstone aggregates.