

The Lower Cretaceous Mannville Group in southwestern Saskatchewan and southeastern Alberta

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ABSTRACT

The results of a GSC-industry, collaborative, regional mapping project of the Lower Cretaceous Mannville Group in southern Saskatchewan and Alberta (Twp 1-30, Rge 13-30W3 and Twp 1-20, Rge 1-13W4) are presented. The geological history of the Lower Mannville is one of multiple erosion events, creating a complex landscape where accommodation space was generally low.

The lowermost Cretaceous sediment (Hauterivian to Barremian) **comprises** the predominantly braided fluvial **sandstone** of the Success(S2), deposited as a continuous, unconfined sheet directly overlying the basal Cretaceous unconformity. The top of the Success(S2) is a deeply-weathered paleosol **that** represents several million years of **nondeposition** and corresponds to a lull in tectonic activity in the Rocky Mountains.

Renewed Cordilleran tectonic activity resulted in deep incision in the eastern foreland basin, characterized by multiple episodes of incision and slow sediment supply. **Deep valleys were cut** into pre-existing Cretaceous and older sediments. The Success(S2) was preserved as erosional remnants forming valley interfluves. The valleys are up to 75 m deep, 30 km wide and hundreds of kilometres long.

Where incised valleys cut into Mississippian carbonates, the lowermost sediments are called the Detrital; the deposits of a landscape consisting of carbonate scarps, debris-flows deposits, talus cones and karst features.

As relative sea level started to rise and create limited accommodation space, sediments of the Basal Quartz (McCloud Member) were deposited on the valley floors. These quartzose reservoir sandstones were deposited as valley-confined sandy-braided rivers in Alberta, and sluggish meandering rivers in southern Saskatchewan. Brackish to lacustrine, fine-grained sediments of the Bantry/Ostracod were deposited within and overlapped onto the margins of the valleys. Debris flow and colluvium deposits within the Bantry/Ostracod zone indicate considerable local relief, associated with nearby interfluves.

The Glauconite Member represents a complex of different facies types resulting from multiple changes in relative sea level. Shorelines and deeply incised estuarine channel deposits have been identified.

In the predominantly lithic Upper Mannville, accommodation space and sediment supply increased, changing the fluvial style to predominantly meandering with associated fine-grained floodplain deposits.