AGGRADATIONAL VALLEY-FILL MODEL FOR STRATA OF CRETACEOUS LOWER MANNVILLE FORMATION, SOUTH-CENTRAL ALBERTA

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During late Early Cretaceous time, south-central Alberta was the site of a major north-flowing river channel that eroded a valley into Jurassic shales and Mississippian limestones. As a result of input of large volumes of clastic sediment from the Cordilleran highlands, which paralleled the valley to the west, the river migrated eastward, eroding a 70-metre high, west-facing escarpment. A rise in regional base level produced by subsidence within the evolving foreland basin and by southward transgression of the Boreal Sea during latest Neocomian and Albian time resulted in aggradation of sediment within the river valley and its tributaries. The basal aggradational valley fill, the Sunburst Sandstone, is generally the coarsest grained, best sorted and texturally most mature of the sandstones in the Mannville Group. The Sunburst pinches out eastward against the escarpment and fills minor west-sloping tributary valleys that locally cut the escarpment. The initial phase of gradual aggradation was followed by an episode of accelerating base level rise. Fine grained overbank and flood basin strata deposited by the rapidly aggrading river system give way upwards to lacustrine and brackish-water shales of the Calcareous Member. It was not until the close of Lower Mannville deposition that the escarpment was entirely buried beneath Cretaceous sediments.

The Parana River of South America and the Ganges River of India both are central basin drainages that parallel active orogenic belts; they are comparable in size to the Early Cretaceous river of south-central Alberta. The authors regard them as good modern analogs. The aggradational valley-fill sequence of the Lower Mannville resembles aggradational valley fills that have formed in modern river valleys as a result of Holocene rise of sea level.