

Dawson Creek Graben Complex: growth-faulted soil-imprinted estuarine facies - Carboniferous Stoddart Group, Alberta/BC

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Subsurface stratigraphic analysis of the Stoddart Group and overlying Belloy Formation reveals the sedimentary and regional structural evolution of an E-W Carboniferous-Permian graben complex developed on the "stable" cratonic platform. The graben forms the block-faulted core of a broad craton-marginal Carboniferous-Triassic NW-trending downwarp (the Peace River Embayment). The graben was very long-lived (100 million years), overlies uplifted Precambrian basement (Peace River Arch), and was downwarped along NW and NE high-angle normal growth faults. Estuarine clastic deposition kept pace with growth faulting such that the graben sea-floor topography was generally flat.

Stoddart strata (mainly late Late Viséan) can be divided into four "Depositional Sequences": Golata Formation quiet offshore marine mudstones with an incised soil-imprinted upper surface, a basal Kiskatinaw Formation sandy estuarine valley-fill complex, a lower to upper Kiskatinaw Formation shallow shelf with interbedded tidal mudstones, sandstones and lime mudstones with abundant paleosols and a Taylor Flat Formation (Serpukhovian) carbonate-dominated open marine shelf.

The graben complex controlled sedimentation patterns by providing a rapidly subsiding sediment sink that filled continually with persistently shallow marine and heavily soil-imprinted clastics. The graben geometry focused tidal energy and suppressed wave and storm energy resulting in tide-dominance and also localised an incised valley system during a large relative sea-level drop and localised a mega-estuary during a subsequent relative sea-level rise. Eastward subsidence migration and subsidence pattern changes in the graben suggest that episodic orogenic activity occurred to the west analogous to the Devonian-Carboniferous Antler Orogeny or other western U.S.A. events.