

Shelf Sandstone Body Geometries: Outcrop Examples from the Lower Cambrian Gog Group, Southern Rocky Mountains, Canada

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Summary

Cambrian–Ordovician shallow-marine sandstones in Laurentia are spectacular records of the early Paleozoic transgression. They also comprise important components of petroleum systems in North Africa. However, there is still very little published about their overall architecture and few sedimentary models have been proposed for these types of early Paleozoic sandy shelf seas. The Gog Group of the southern Rocky Mountains is one of the most prominent cliff-forming units, which provides an opportunity for sandstone body architectural studies and high-resolution sedimentologic analysis through the construction of photomosaics. We focus on geometrical attributes of genetically-related sandstone bodies within these outstanding and hitherto poorly understood Cambrian shelf unit.

Four types of geometries were recognized within sandstone packages which show features indicative of uni-directional flows: (1) tabular bodies with local mudstone drapes and few scourfeatures; (2) lenticular bodies isolated within mudstone; (3) lenticular bodies amalgamated within a sandstone package; and (4) asymmetric lenticular bodies with local preservation of mudstone layers. The overall geometries of these sandstone bodies are a response to the interaction of different factors which include: (1) relative position of the sandstone body on the shelf; (2) rate of sediment supply; (3) intensity of currents; (4) periodicity of storm events; and (5) their position within the relative sea-level curve.

The integration of geometrical and sedimentological information provides a clear picture of Cambrian continental shelf facies architecture. Sheet-like sandbar complexes, offshore sandridges and nearshore subtidal sandbars can be distinguished and discriminated, yielding insights into the heterogeneity of shallow shelf sandstones. The Gog Group represents an instructive outcrop analogue for transgressive subtidal sandstone reservoirs.