fills.

Deposits in the lower Saskatchewan River valley (120 × 80 km), a much wider basin with much slower aggradation rates (± 15 cm/100 years), occur as channel sands flanked by laterally extensive (1 km) sheets of overbank levee deposits of fine sandy silt, which grade into even more laterally extensive thick deposits of mud or peat. With time, dominant channels become sinuous, thus causing increased flow resistance, major avulsions upriver, and eventual channel filling and abandonment. Many channel sand-fill deposits form cross-section geometries, ranging up to 15 cm thick by 120 m wide.

Facies differences of the two anastomosed river systems are believed to be caused by both the rate of sedimentation and width of the sedimentary basin. Other than size differences of similar sedimentary environments, Columbia River channels are less sinuous, avulse more frequently, and contain coarser grained sand. In the Saskatchewan, some crevasse-splay (sheet sands) and associated avulsions are laterally extensive (10 × 30 km) and very complex. Wetlands in the Columbia are dominated by marsh (organic-rich mud) and lacustrine silt, whereas thick (up to 3 m) laterally extensive peat bogs dominate in the Saskatchewan system.

Within the upper Mannville Group of the Lloydminster area there exists a large-scale mappable complex of fluvial channel-fill sandstones that exhibit an anastomosed pattern. The complex has areal dimensions of 250 km (width) by 700 km (length).

Channel sandstones are thick (up to 35 m), narrow (300 m), can be traced for several kilometers, and are stratigraphically variable. The channel fills are multistoried, with the predominant sedimentary structures consisting of plane beds, cross-beds, and climbing current ripples. Interchannel sediments consist of interbedded sheet sandstones, siltstones, mudstones, and coals. The predominant sedimentary structures of the interchannel sandstones are the same as those found within channel sandstones.

From a compare-and-contrast approach, it is concluded that meandering, sandy braided, valley-fill, deltaic, or tidal origins cannot account for the observed sand-body geometries and facies distribution.

The modern model that best explains the sediment and facies distributions within the upper Mannville is the anastomosed fluvial model in which narrow, vertically accreting channels are bordered by extensive aggrading interchannel wetland deposits with interbedded crevasse-splay sands.

Hydrocarbon distributions within the upper Mannville are stratigraphically controlled and oil quality can be directly related to depositional facies. Common trapping mechanisms consist of updip shale-filled channels, structural closure formed by differential compaction, and lateral sandstone pinchouts.

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Sedimentation Within Southern Oklahoma Aulacogen: Viola Limestone

The Viola Limestone (Middle Ordovician) was deposited within the southern Oklahoma aulacogen in the Arbuckle Mountains of Oklahoma. The northwest-trending aulacogen is a basement rift which opened in the Late Cambrian (535 to 525 m.y.a). During the early history of the aulacogen, the thick Cambro-Ordovician Arbuckle Group (2,050 m) was deposited as a predominantly peritidal complex. The conformably overlying Early Ordovician Simpson Group (700 m) shows more variation in water depth but still is dominated by shallow-water deposits. The Viola Limestone rests disconformably on a hardground which was developed at the top of the Simpson Group. Early Viola deposition was below wavebase probably with continental slope bathymetry; this time thus represents the deepest carbonate sedimentation within the aulacogen. Initial results show that the oldest microfacies of the Viola Limestone is a laminated calcisiltite deposited within anoxic bottom conditions by weak traction currents. Progressively increasing oxygenation and wave energy resulted in deposition of a bioturbated wackestone which then grades upward into a washed grainstone. These microfacies indicate a general upward shallowing along the axis of the aulacogen. Early workers, however, suggested that the more cratonward Viola microfacies may deepen slightly upward. As noted in earlier studies, the carbonate ramp model seems to fit best the depositional setting of the Viola. The ramp model can deal with the conflicting water depth trend by having a subsidence hinge axis upslope from the upward-deepening and upward-shallowing sections. In addition, sedimentation rates would have been greater in the aulacogen axis than on the marginal platforms. Shallow subtidal deposits cap the Viola of both the aulacogen and platform. In both areas these shallow-water carbonates were subjected to early diagenesis by meteoric water, confirming their proximity to sea level.

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Computer Applications by Geologists Using Micropaleontologic Data

The role of computers in petroleum exploration is increasing. The large volume of micropaleontologic data in company files is much more efficiently utilized with the aid of computers. In the Gulf Coast, micropaleontology is especially helpful in correlating the very thick Cenozoic section of alternating sands and shales. Micropaleontology is also essential in the interpretation of depositional environments.

Computer applications to micropaleontologic data most commonly requested by geologists are: (1) indexes, listing wells containing paleontologic data, (2) biostratigraphic and paleoecologic summary reports for the wells, (3) base maps illustrating paleo control, (4) structure maps contoured on paleo-marker horizons, (5) isopachous maps on intervals between two paleo-marker horizons, and (6) paleoecologic maps illustrating depositional environments at the time of extinction of a paleo-marker species.

The applications quickly provide the geologist with a structural, stratigraphic, and paleoecologic framework.

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Use of Stand-Alone Computer "Work Stations" for Mapping and Engineering Management of Mineral Fuel Resources

Low-cost microcomputers will be widely used in the future to assemble, evaluate, and map the geologic information and engineering data required to explore and develop oil and gas prospects and mining operations.

Because of recent developments in hardware and software design, exploration geologists and mining engineers can now use low-cost stand-alone computer work stations based around a microcomputer interfaced to a digitizer, plotter, and interactive color graphics display, to reduce the time and cost of planning and design work required to prepare project feasibility and design maps and reports.

Stand-alone computer work stations in the $20,000 to $30,000 range are now available. There is, however, a great need for the development of more and better user-oriented, menu-driven, software that will make it possible for geologists, mining engineers, and many others to enter data and interactively manipulate and edit them through interactive computer graphics systems and