

A Carboniferous meander belt deposit at New Waterford, Nova Scotia

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The three-dimensional form of fluvial sandstone bodies is an important aspect of their stratigraphy and sedimentology, especially because the bodies may act as reservoirs for hydrocarbons or rest upon economic coal seams. In the Mississippi alluvial plain, meander-belt ridges composed mainly of sand are formed by lateral migration of the river channels. The ridges of abandoned Mississippi River meander belts are 16-32 km wide and rise 3-7 m above the flood-basins; those of the Arkansas and Red Rivers, tributary to the Mississippi, are underlain by at least 30m of sand.

A few cases in the stratigraphic record are well enough exposed to reveal the structure of ancient meander-belt deposits. At New Waterford in the Sydney Basin, excellent cliff exposures of the Pennsylvanian Morien Group show a sheet-like sandstone unit 15m thick and at least 750m wide normal to the mean paleoflow direction. The application of well-established hydraulic equations suggests that the sandstone unit was formed by a large river which formed meander belts averaging more than 4 km in width.

Major erosional surfaces within the unit bound complexes of strata 5-10m thick and 100-300m in apparent extent, in which

lateral accretion sets are prominent. The complexes tend to show upward fining and an upward change from large-scale trough cross-beds to small-scale cross-beds and horizontal stratification. Paleocurrent vector means for the complexes vary by up to 90°, with flow generally parallel to the strike of the lateral accretion sets. The complexes are interpreted as accretionary lenses from one point bar overlapped by that of the next that migrated across the area. Overlap would occur from both sides, hence we see lateral accretion sets dipping in approximately opposed directions within adjacent wedges. No abandonment fills were noted.

The unit rests upon a coal seam 20cm thick and is overlain by red mudstones and thin-bedded sandstones of overbank type. The change from grey, coal-bearing strata below the unit to redbeds above may reflect slight topographic elevation of the meander belt after abandonment, when the river changed its course to a distant, topographically lower location. By comparison with the Mississippi system, the sandstone unit probably represents about 1000 years of deposition during which time the river occupied a laterally mobile but stable meander belt on an extensive low-gradient alluvial plain.