

**Calcareous paleosols as indicators of climato-eustatic change
in the Late Carboniferous Sydney Coalfield, Nova Scotia**

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Three calcareous paleosol associations are present a few metres to tens of metres below the Phalen, Backpit, Bouthillier, Bonar and Point Aconi Coals of the Sydney Coalfield:

- (a) Calcretes: zones about 1 m thick of carbonate-cemented sandstone with stratification strongly disrupted by roots or vadose diagenesis, overlain by a nodular, calcareous crust about 50 cm thick with a pronounced vertical fabric.
- (b) Red calcic vertisols: red mudstones up to 7 m thick, with dispersed carbonate nodules, weakly developed carbonate accumulation zones, concave up joints and slickensides.
- (c) Grey calcic vertisols: grey mudstones with features similar to those of (b). They contain nodular, bivalve bearing carbonate beds that formed by pedogenetic modification of lake deposits (palustrine carbonates).

The calcareous paleosols can be traced for > 25 km and form part of cyclothems with a systematic stratal succession and mean duration of 200 ka. Grey detrital bay fills with hydromorphic paleosols and a restricted-marine biota are capped by one or more calcretes. The overlying alluvial strata contain red calcic vertisols. In the Glace Bay Syncline where groundwater levels were persistently high, grey calcic vertisols and palustrine carbonates are present at these horizons. The cyclothems terminate with further grey bayfills and thick, economic coals.

The calcareous paleosols reflect a profound change in climate (semi-arid, strongly seasonal) at mid-cyclothem level from that indicated by coals and hydromorphic paleosols at the cyclothem base and top (humid, weakly seasonal). At least one calcareous paleosol formed on an interfluvium between paleovalleys and reflects semi-arid pedogenesis during a glacioeustatic lowering of sea level.