

**Late Carboniferous sea-level changes in the Sydney Coalfield:
cyclothems, valley incision and regional correlation**

M.R. Gibling

Department of Earth Sciences, Dalhousie University, Halifax, Nova Scotia B3H 3J5, Canada

Late Carboniferous cyclothems are repeated stratal packages that cover areas of >500 000 km² in midcontinental North America. Carbonate-dominated cyclothems are widely believed to reflect Gondwanan glaciation which caused eustatic fluctuations of 50 to 100 m, in the Milankovitch band. However, terrigenous cyclothems are widely inferred to have formed by local channel and delta-lobe switching (autogenic processes).

Recent work at Sydney has shown that the Emery to Point Aconi Seam interval includes eleven alluvio-deltaic cyclothems, 20 to 70 m thick, that show alternation of widespread coal (coastal) and red mudstone (alluvial) strata. Recently discovered agglutinated foraminifera indicate a marine influence, and the fossil assemblages are, remarkably, co-generic with modern coastal assemblages. Mean cyclothem duration was 200 000 years. The long duration and evidence for widespread transgression and regression preclude an autogenic origin and are consistent with a glacioeustatic origin for the cyclothems.

Most cyclothems show stacked alluvial-channel bodies 20 to 30 m thick that fill paleovalleys incised through marine strata during sea-level fall. Thick red paleosols in adjacent "interfluvies" indicate minimal sedimentation during sea-level lows. Seatearths and roof rocks of the economic coals yield foraminifera, suggesting that the peats formed on a drowned coastal plain during stillstands near the peak of marine transgression.

Coals and, probably, cyclothems coeval with those at Sydney underlie the southern Gulf of St. Lawrence, giving a combined area of ca. 80 000 km². Approximately coeval cyclothem intervals in the Illinois and Appalachian basins include some of North America's major coals (Herrin No. 6, Springfield No. 5, Freeport, Kittanning). Biostratigraphic zonation should permit correlation of some cyclothems between Nova Scotia and the mid-continent, a distance of at least 2000 km.