Advances in Mesozoic–Cenozoic stratigraphy in northern and offshore eastern Canada, with emphasis on palynological event stratigraphy

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Traditional biostratigraphic work in northern and offshore eastern Canada focussed primarily on the development of zonation schemes. More recently, starting with a Late Cretaceous–Cenozoic scheme for the Scotian Margin, an event stratigraphy approach has been followed. This scheme employed data from palynomorphs (dinoflagellate and other algal cysts, spores and pollen), nannofossils, and foraminifera. This approach was further developed in collaboration with academia and industry for the Play Fairway Analysis (PFA) project funded by the Nova Scotia government. A collaboration with the Geological Survey of Denmark and Greenland (GEUS) led to the formulation of a Cretaceous–Cenozoic event stratigraphy scheme for the Labrador–Baffin Seaway, based primarily on dinocysts, which enabled an improved correlation between offshore Greenland and offshore Canada. Work in northeastern Canada continues through analysis of surface sections on Bylot Island, as well as additional offshore studies as part of the Geoscience for Energy and Minerals (GEM) Baffin "region of interest" project at the Geological Survey of Canada (GSC). Similar activities are underway in the Mackenzie and Western Arctic GEM regions of interest. Specifically, palynological analyses have been carried out on two middle Cretaceous sections in the Mackenzie Plain area west of Norman Wells, Northwest Territories; and Upper Jurassic to Upper Cretaceous sections at Glacier Fiord on Axel Heiberg Island, Nunavut. The aim is eventually to compile a trans-Arctic event stratigraphy, synthesizing all known events in Time Scale Creator software. In addition to the biostratigraphic work, palynomorphs in the regions studied yield important paleoenvironmental information. For example, dinocyst to miospore ratios and relative abundances of individual dinocyst taxa allow for the identification of non-marine, marginal-marine, inner-shelf, outer-shelf and bathyal paleoenvironments. Climatic trends can be determined using both dinocysts and miospores, such as Early Cretaceous 'cold snaps', which provoked terrestrial ecosystem change preserved in pollen and spore records from Arctic Canada. Maastrichtian dinocysts from the Labrador Sea show remarkable similarity to those found in higher latitudes of the Southern Hemisphere. A predominance of the dinocyst *Apectodinium* in one Labrador Shelf well denotes the Paleocene–Eocene Thermal Maximum, when Cenozoic temperatures peaked. Further, statistical analyses of pollen and spore assemblages from the Glacier Fiord section allow for the identification of ecosystem changes that may be correlatable within and between basins correlation. Another important aspect of work at the GSC is to develop atlases of palynomorphs (PalyAtlases) to stabilize taxonomic communication, which is vital for accurate applied studies.

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