Palaeocene Depositional Record of the Thrust Belt and Rift Shoulder on Eastern Ellesmere Island, Arctic Canada

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The early Cenozoic evolution of the Canadian High Arctic was governed by an evolving far-field stress regime related to sea-floor spreading in Baffin Bay and Labrador Sea. On northeastern Ellesmere Island, Eureka Sound Group sediments (late Palaeocene in age) provide a depositional record of these tectonic events.

This group is locally divisible into three formations, preserved within six outliers. The oldest unit, the Mokka Fiord Formation, is characterised by a brown weathering, medium- to coarse-grained lithic sandstone occurring as decimetre scale trough cross-bedded units. These volcanogenic sediments are at least 740 metres thick and appear to be a rift-related, predominantly fluvial, succession. The overlying and younger Cape Back Formation is interpreted to be fluvio-lacustrine in origin consisting of interbedded fine-grained litharenite and calcarenite, siltstone, and mudrock. Current ripples, climbing ripples, parallel and ripple laminations are common through this formation, which reaches a thickness of 1100 metres. Correlative polymictic boulder orthoconglomerates of the Cape Lawrence Formation range to 1000 metres in thickness. Clast composition consists of a variety of siliciclastics and carbonates. These conglomerate units are interpreted to be proximal alluvial fan deposits, potentially derived from both the ancestral Eurekan thrust belt and the cratonic rift shoulder of Baffin Bay.