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The Barremian–Early Cenomanian Bjarni Formation on the Labrador Shelf overlies rift-related volcanic rocks of the Alexis Formation or Paleozoic or Precambrian basement. Seismic sections show that it accumulated in tectonically deforming rift basins trending NW-SE. We sedimentologically logged all available conventional core from 9 wells, assessed sediment sources by point counting and bulk geochemistry of sandstones, and examined diagenetic features. Most sediments are lacustrine, fluvial or alluvial fan, or at the top of the formation, marginal marine. Some of the marginal marine facies appear tidal, others show dominance of river flood supply. Sandstones are arkosic, but show differences in petrology and geochemistry from south to north. As in correlative rocks of the Scotian basin, Ti is unusually abundant and Ca particularly low. Sediments appear to have been supplied locally. Diagenetic kaolinite is present in places. Diagenetic siderite is concentrated at abrupt changes in sedimentation rate. In Bjarni O-82, sandstones assigned to the top of the Bjarni Formation are of Turonian–Coniacian age and include tuff beds alternating with silicified shales.

The Bjarni Formation is of similar age to the Chaswood Formation of Nova Scotia, which is also a terrestrial unit deposited in syn-tectonic basins. Major offsets in basin trends on the Labrador Shelf are associated with sinistral wrench faults. Sinistral strike-slip faults appear important in localising the Chaswood Formation and were also important in the Lower Cretaceous of Orphan Basin. The sedimentology and diagenesis of the Bjarni Formation is, however, quite different from that of the Chaswood Formation, as a result of the generally continuous subsidence of the Bjarni Formation basins compared with episodic uplift of the Chaswood Formation. The same NE-trending fault trend may be responsible for uplift on the inner Scotian Shelf in the Early Cretaceous.

Sedimentology, detrital petrology, and regional linkages of the Lower Cretaceous Bjarni Formation, Labrador Shelf

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