
The effects of strike-slip motion along the Cobequid-Chedabucto-SW Grand Banks fault system on the Cretaceous - Tertiary evolution of Atlantic Canada

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The Newfoundland fracture zone, the SW Grand Banks transform, and the Cobequid - Chedabucto fault zone form a linked strike slip fault system from the Atlantic Ocean to southeastern Canada. Geological evidence suggests a history of reactivation of the Cobequid - Chedabucto - SW Grand Banks fault system after the fault zone ceased to mark the transform northern margin of the Atlantic Ocean in the late Jurassic. The oldest Fogo Seamounts predate sea-floor spreading in the Newfoundland basin and their OIB chemical composition and age progression support an origin related to a hotspot. Their early Cretaceous age is synchronous with the Avalon unconformity, deposition of the Mississauga Formation in the Scotian basin, and the older basins of the Chaswood Formation. In Aptian to Albian time, more tholeiitic volcanism in Orpheus graben and on the Grand Banks is synchronous with formation of syn-sedimentary basins in a strike-slip regime in central Nova Scotia in which the upper parts of the Chaswood Formation accumulated. Rapid subsidence occurred on the Scotian margin at this time, and a little later (Albian to Cenomanian) on the deep water margin off the SW Grand Banks, as shown by ODP Site 384 and the Narwhal F-99 well. This subsidence was synchronous with an erosional unconformity on the southwest Grand Banks. These various phenomena can be linked if there was mid-Cretaceous dextral strike-slip motion on the Cobequid - Chedabucto - SW Grand Banks fault system, with extension in the releasing bend. In the Oligocene, sinistral strike-slip reactivation of the Cobequid - Chedabucto - SW Grand Banks fault system could account for the regional uplift of the eastern Scotian Shelf at that time and late deformation of the Chaswood Formation. Offsets in magnetic anomalies in the North Atlantic basin are consistent with these proposed motions.
