

Late Devonian - Early Carboniferous evolution of the Cobequid Highlands

G. Pe-Piper¹ and D.J.W. Piper²

¹*Department of Geology, Saint Mary's University, Halifax, Nova Scotia B3H 3C3, Canada*

²*Atlantic Geoscience Centre, Bedford Institute of Oceanography, P.O. Box 1006, Dartmouth, Nova Scotia B2Y 4A2, Canada*

We present tentative synthesis of the evolution of the Cobequid Highlands during the early stages of development of the Magdalen Basin. This is based on geophysical data and field mapping, but takes into account recent geochronology.

The earliest basin sedimentation and volcanism in the eastern Cobequid Highlands comprises thick volcanic rocks (Fountain Lake Group: ?late Devonian) and mid-Devonian clastic sediments. The main phase of gabbro and granite pluton emplacement is latest Devonian in age (six U/Pb zircon ages from 361-365 Ma). Magnetic data show three domains of pluton emplacement. (1) West of Parrsboro, predominantly granitic magmas were emplaced along major east-west faults. (2) Between Parrsboro and Portapique, pluton emplacement is more widespread and shows east-west trends. In this domain, pluton margins show northward thrusting, and Neoproterozoic-Silurian country rocks host gabbro and rhyolite sheets along analogous thrust faults. (3) East of Portapique, magnetic data suggest that west-northwest-striking lineaments predominate. These lineaments post-date the main phase of pluton emplacement, which

was associated with the rise of magma along the Rockland Brook fault and widespread northward thrusting. Small fault-bounded basins associated with this thrusting contain lacustrine, fluvial and alluvial fan sediments of the Nuttby Formation, locally containing Tournaisian palynomorphs. Some sediments include plutonic clasts and are cut by marginal granite phases, suggesting that uplift accompanying pluton emplacement was rapid.

The youngest igneous phase in the plutons comprises diabase dykes associated with east-west extension and irregular gabbro sills and pods. Similar dykes cut Tournaisian, but not Viséan, strata south of the plutons and probably correlate with abundant gabbro intrusions in Guysborough Company and southern Cape Breton, dated at 339 Ma by U/Pb. Early Namurian K/Ar ages on secondary biotite and hornblende from mylonite in the Cape Chignecto pluton have been recently confirmed by ³⁹Ar/⁴⁰Ar dating. These point to a phase of dextral strike-slip on the Cobequid fault system that probably correlates with Namurian uplift inferred from sediment dispersal and marginal unconformities in adjacent basins.