Magmatic epidote- and high-Aluminum hornblende-bearing diorites and tonalites of the southeastern Cape Breton Highlands, Nova Scotia

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Six late Precambrian (560 Ma) dioritic and tonalitic plutons occur in the Bras d'Or Terrane of the Cape Breton Highlands. Three of these, Ingonish River Tonalite (IRT), Gisborne Flowage Quartz Diorite (GFQD), and Kathy Road Dioritic Suite (KRDS), contain a high-pressure igneous mineral assemblage that includes epidote and high-Al edenitic and ferrogan pargasitic hornblende. The major mineral assemblage is hornblende + plagioclase (An30-55) ± quartz ± biotite, with rare K-feldspar. Hornblende compositions are consistent with pressures of crystallization of 500-700 MPa for the IRT, 650-800 for the GFQD, and 700-900 MPa for the KRDS. The presence of magmatic epidote (pistacite component = 23-30%) within tonalitic and locally quartz dioritic portions of the plutons limits their minimum pressure of consolidation to >600MPa. Fractionation trends on trace-element variation diagrams indicate that the plutons have undergone a combination of plagioclase and hornblende fractionation. All display flat HREE patterns and slightly negative Eu anomalies, consistent with plagioclase and hornblende fractionation. High LREE content of the GFQD is interpreted as the result of abundant sphene and allanite crystallization in a magma that has undergone more efficient crystal-melt separation than the IRT or the KRDS. Tectonic setting is considered to have been a volcanic arc where melting of inhomogeneous amphibolitic source rocks resulted in emplacement of plutons at depths of more than 20 km.