Natural Resources Canada / Ressources naturelles Canada

GEOLOGICAL SURVEY OF CANADA / COMMISSION GÉOLOGIQUE DU CANADA

DESCRIPTIVE NOTES

The Port aux Basques map-area is underlain dominantly by high grade Paleozoic gneisses and schists, which form part of the most narrowest tract of the Appalachian Orogen in Newfoundland. This constriction of the orogen marks the confluence of the Gander and Humber zones, (Williams et al., 1988; Piasecki et al., 1990), at colliding promontories of the Laurentian and Gondwanan margins of the Iapetus Ocean collided (Lin et al., 1994). Geological mapping was undertaken to improve understanding of the stratigraphy and tectonic evolution of this area.

The northern and western parts of the map-area lie within the Long Range Mountains, which form a generally barren, deeply dissected peneplane with elevations up to 600 m. The southern and eastern parts forms a gently rolling lowland with elevations up to 300 m, much of which is barren, although south-facing slopes and major river valleys support a forest cover. Irregular dense patches of stunted spruce ('tuckamore') occur throughout the map-area. The sea-coast, Trans Canada Highway, route 470 from Channel-Port aux Basques to Harbour Le Cou, minor roads and tracks, and an abandoned railway line provide access to the near coastal areas of the map-area, but the greater part is only accessible by foot and helicopter.

Gillis (1972) mapped the Port aux Basques area as part of a 1: 250 000 study, and Brown (1977) mapped the area at 1: 50 000 scale. Wilton (1983), O'Neill and Strong (1988) and Dubé and Lauzière (1995) have mapped mineral prospects and related structures within the area.

Port aux Basques map-area comprises four fault-bounded assemblages, which are assigned to three tectonostratigraphic divisions. West of the Cape Ray Thrust, the Dashwoods Subzone consists of mafic to ultramafic plutonic rocks of the Long Range Mafic-Ultramafic Complex (LRMUC; unit **ЄOL**) and relicts of metamorphosed melanges and screens of metasediments of the Fleur de Lys Supergroup (unit **NPOFs**). These are intruded by Lower to Middle Ordovician tonalitic to granodioritic orthogneisses of the Cape Ray Complex (CRC; unit **OC**). The CRC and LRMUC are unconformably overlain by moderately to highly strained LS tectonites developed from Late Ordovician to Devonian conglomerates and volcanic rocks (unit **ODWv**) and sedimentary rocks (unit **ODW**) of the Windsor Point Complex. Between the Cape Ray and the Grand Bay thrusts faults, coticule-bearing, amphibolite-grade pelitic to semi-pelitic schists and amphibolites of the Lower to Middle Ordovician Grand Bay Complex (unit **OG**) are assigned to the Exploits Subzone of the Dunnage Zone on lithology. Between the Grand Bay Thrust and the Isle aux Morts Fault, the Lower Ordovician or older Port aux Basques Complex (unit **ЄOP**) comprises thick-to medium-bedded psammite-pelite rhythmites intricately interlayered with narrow, intrusive sheets of amphibolite and orthogneiss. The Port aux Basques Complex is assigned to the Gander Zone. East of the Isle aux Morts Fault, the Harbour Le Cou Group (unit **OH**) comprises garnet-bearing psammite-rusty pelite rhythmites interlayered with tholeiitic, locally pillowed amphibolite, structurally overlain by coticule-bearing, pyritiferous pelitic to semi-pelitic schists and gneisses. The Harbour Le Cou Group lithologically resembles the Grand Bay Complex, and is also interpreted to form part of the Exploits Subzone. The Port aux Basques Complex thus separates the Exploits Subzone into a western and eastern part.

DASHWOODS SUBZONE

The LRMUC mainly consists of metagabbro, locally containing partially saussuritizised and sericitizised trondhjemite pods and veins, with less common, partially serpentinized layered harzburgite, dunite, troctolite and diabase. Relicts of coarse olivine and orthopyroxene crystals are commonly cut into a mesh texture by intersecting serpentine microveins. Locally serpentine has been partially replaced by talc, tremolite and dolomite-bearing assemblages.

Screens of sillimanite- and garnet-bearing pelitic schists and psammitic gneisses (unit **NPOFs**), which are more abundant immediately north of this map area, have been correlated with the Upper Neoproterozoic to Lower Ordovician Fleur de Lys Supergroup (Williams and St. Julien, 1980; Currie and van Berkel, 1992). Ultramafic and mafic clasts and blocks up to 100's metres in size derived from the LRMUC occur in sillimanite-bearing metamorphosed pelitic melanges spatially associated with the LRMUC. The melanges and the trondhjemite veins in the metagabbros suggests that the LRMUC represents the remnant of an obducted ophiolite slab. Ophiolite emplacement must have taken place before 488 Ma, the age of the cross-cutting Cape Ray granite (unit **OCm**). The LRMUC could therefore be correlative with ophiolites such as Betts Cove and Ste Anthony complexes (Dunning and Krogh, 1985; Dallmeyer, 1977).

The CRIC comprises tonalite to granodiorite (unit **OCt**) and megacrystic granodiorite to granite (Cape Ray granite; unit **OCm**), which cuts both the Fleur de Lys Supergroup and the LRMUC. Although deformation and metamorphism are polyphase, and locally transformed the rocks into high-strain LS tectonites, igneous structures are generally well preserved. The Cape Ray granite gave a U-Pb zircon ages of 488±3 Ma, while a tonalite yielded an age of 469±2 Ma (Dubé et al., 1996). Abundant Precambrian zircon xenocrysts and negative ΣNd values suggest that the CRIC interacted with continental crust during their ascent (Dunning et al., 1989; Whalen et al., in press). The CRIC probably represents remnants of a Lower Ordovician magmatic arc (Dunning et al., 1989; Hall et al., 1994) that formed after obduction of the LRMUC onto the Laurentian margin.

The pre-Late Ordovician rocks of the Dashwoods Subzone exhibit a well developed composite S1/S2 foliation and a moderate to strong extension lineation. These structures formed during a phase of intense crustal shortening, characterized by kilometre-scale F2 folds and shear zones, which are best preserved immediately to the north of this map area. Relicts of a crenulated high- grade metamorphic S1 foliation, characterized by biotite and sillimanite in the paraschists and hornblende and biotite in the orthogneisses, are preserved in the microlithons of the S2 schistosity. Garnet overgrew relatively open F2 microfolds, suggesting growth during F2. Most rocks show evidence of pervasive retrogression to greenschist facies conditions, which mainly took place before or early during F3 folding. Northerly trending F3 microfolds crenulate greenschist-facies assemblages. F3 may have been contemporary with a phase of dextral transpressive deformation localized along the Cabot and Cape Ray faults, indicated by S-C structures, shearbands and other asymmetrical structures.

Some CRIC tonalites cut the S1 foliation and are themselves deformed by F2, and some mafic xenoliths contain a pre-entrainment hornblende foliation, suggesting that emplacement of the CRIC was syn-kinematic with F1 and F2. F1 and F2 are therefore Early to Middle Ordovician, which is consistent with the undeformed, pristine nature of the Late Ordovician to Early Silurian intrusions in the Dashwoods subzone (Dunning et al., 1990; Currie and van Berkel, 1992) and the presence of gneissic pebbles of the CRIC in Upper Ordovician or younger conglomerates of the Windsor Point Complex (ca. 450 Ma, Dubé et al., 1996). A major phase of tectonic burial and exhumation thus took place in the Early to Middle Ordovician (Taconic Orogeny). Late Silurian to Carboniferous deformation and greenschist grade metamorphism associated with deformation along the Cape Ray and Cabot faults (Dubé et al., 1996; van Staal et al., 1992) probably produced F3 in Ordovician and older rocks remote from the faults.

EXPLOITS SUBZONE AND GANDER ZONE

The amphibolite-grade supracrustal rocks of the Grand Bay Complex (unit **OG**) and Harbour Le Cou Group (unit **OH**) are assigned to the Exploits Subzone. Their Exploits affinity is based on their location east of the Cape Ray Fault (Williams et al., 1988), the presence of thinly bedded pyritiferous shale-siltstone rhythmites, abundance of interbedded coticule layers, massive and disseminated sulphides, volcaniclastic rocks and pillow basalts (O'Neill and Strong, 1988; van Staal et al., 1992; Lin et al., 1993; Schofield et al., 1993). However they share a common tectonic history with the Port aux Basques Complex, which has affinities with the Gander Zone. The abundance of coticules is significant as they are typical of Lower to Middle Ordovician units elsewhere in the Exploits Subzone (Williams, 1992). Despite intense deformation and high-grade metamorphism primary sedimentary features such as graded bedding are well preserved locally (van Staal et al., 1992; Burgess et al., 1993).

Grand Bay Complex

The Grand Bay Complex consist mainly of garnet-, kyanite-, staurolite- and in places gedrite-bearing semi-pelitic and pelitic schists (unit **OGs**), transformed into high strain LS tectonites (van Staal et al., 1992). In places greywacke and felsic volcaniclastic psammitic beds are interlayered with the pelitic tectonites. Rusty pyritiferous bands occur locally and culminate into a very thin and long Zn-Pb-Cu-Ag disseminated to massive sulphide body (Isle aux Morts prospect, O'Neill, 1985; O'Neill and Strong, 1988) in the northeastern part of the map-area. They are commonly associated with gedrite blastesis in the surrounding mafic and felsic rocks. All metasedimentary rocks are intricately interlayered with amphibolites and minor ultramafic rocks (unit **OGm**), Kelby Cove orthogneisses (unit **OK**) and highly strained sheets of Port aux Basques Granite (unit **Ogp**). Most amphibolites probably represent highly tectonized mafic intrusions like those present in the adjacent Port aux Basques Complex. However, zones of mylonitic amphibolite, marking the East and West Barachois thrusts are locally interlayered with coticules and these may represent metavolcanic rocks. The latter amphibolites have basaltic and andesitic compositions, characterized by low high-field strength elements, unlike those found in the amphibolitic dykes and sills east of the East Barachois Thrust (Schofield, 1994; O'Neill and Strong, 1988). Furthermore, their spatial association with lenses of clinopyroxenite (largely metamorphosed to hornblendite or actinolitite) and other highly altered ultramafic rocks suggest formation in a supra- subduction zone setting. Similarities between the lead isotope compositions of the galenas of the Isle aux Morts Brook prospect and those from the sulphides of the arc- related Upper Cambrian to Middle Ordovician Victoria Lake Group (O'Neill and Strong, 1988; Dunning et al., 1991) supports such an interpretation.

In general, strain increases from the Grand Bay Thrust to the Cape Ray Thrust. This resulted in complex tectonic interleaving of the ortho and paragneisses and mylonitization west of the East Barachois Thrust, making separation of the various units difficult. The mylonites are characterized by a strong down-dip mineral/extension lineation and reverse-sense kinematic indicators. Ductile thrusting took place before, during and after F3 folding and continued into the brittle-ductile field. The eastern extent of the Barachois and Grand Bay thrusts is interpretive and generally poorly defined because of poor exposure and inaccessibility.

Harbour Le Cou Group

The Harbour Le Cou Group extends into the eastern part of the Port aux Basques map-area (Lin et al., 1993). The Harbour Le Cou Group has been subdivided into the Otter Bay and the Grandy's formations. The Otter Bay Formation (unit **OHo**) consists of thick-to thin-bedded garnet-bearing psammite with thin beds of rusty, pyritiferous pelites. The thich-bedded psammites commonly contain lenses and pods of calc-silicate, probably representing metamorphosed calcareous concretions. Narrow bodies of tholeiitic amphibolite are relatively common and mainly represent narrow, metamorphosed and transposed tholeiitic diabase and gabbroic intrusions (unit **OHom**). These mafic intrusions probably fed lenses of tholeiitic pillows basalts occurring near the contact with the structurally overlying Grandy's Formation (Lin et al., 1993; Schofield et al., 1993). The Grandy's Formation (unit **OHg**) consists mainly of rusty pelitic and semi-pelitic schists and gneisses, interlayered with coticule beds. These are lithologically similar to the paraschists in the Grand Bay Complex. They probably represent metamorphic equivalents of the Lower to Middle Ordovician pyritiferous dark shales and siltstones interbedded with coticules in the northeastern part of the Exploits Subzone (Williams, 1992). Amphibolites are extremely rare or absent and suggest that the Grandy's Formation is younger than the Otter Bay Formation. The Otter Bay Formation is thought to be Lower to Middle Ordovician in age on basis of geochemical similarities between the amphibolites and tholeiitic intrusions in the Margaree orthogneiss, which has a U-Pb zircon age of ca 470 Ma (van Staal et al., 1994); hence the Grandy's Formation is probably Middle Ordovician. Both the Grandy's and the Otter Bay formations have been intruded by dykes of the Late Silurian Rose Blanche Granite.

Port aux Basques Complex

The Port aux Basques Complex comprises thick- to medium-bedded psammite-pelite rhythmites (unit **ЄOPs**) intricately interlayered with narrow sheets of amphibolite. Amphibolite commonly makes up 20 to 50 % of the outcrop and includes hornblendite and epidosite laminae and pods. Locally it forms mappable bodies (unit **ЄOPm**). The Port aux Basques complex is interlayered on map and outcrop scales with sheets of Margaree and Kelby Cove orthogneisses (units **OM** and **OK**), and Port aux Basques Granite (unit **Ogp**). The U-Pb zircon age of ca. 470 for the Margaree orthogneiss indicates that the metasediments were deposited before the Middle Ordovician. Rare preserved grading and cross-bedding indicate that the psammites change from relatively clean quartz-rich psammites to micaceous and feldspathic psammites stratigraphically upwards. This change in composition of the psammites is difficult to map regionally as an increase in migmatisation towards the east obscures regional separation. The predominance of Lower Ordovician or older quartz-rich psammites suggest correlation with the Gander Group. Calc-silicate lenses are very rare in the psammites as are coticules and their general absence together with the presence of interlayered orthogneisses and Port aux Basques granite distinguishes them from the metasediments of theHarbour Le Cou Group.

The amphibolites are rarely thicker than a few meters and represent intrusive dykes and sills. Despite transposition as a result of isoclinal F1 and F2 folding, low-angle cross-cutting contacts have been preserved locally.

Margaree and Kelby Cove orthogneisses and Port aux Basques Granite

The Margaree orthogneiss mainly comprises a white biotite and/or hornblende-bearing granodiorite to tonalite (unit **OM**) containing abundant intrusive sheets of amphibolitic diabase, gabbro, diorite and pyroxenite (unit **OMu**). The granodiorite/tonalite and mafic plutonic rocks have been intruded by a white, rarely pink, biotite granite (unit **OMg**). U-Pb zircon dating has shown that all Margaree orthogneisses crystallized at ca 470 Ma (van Staal et al., 1994), demonstrating that mafic and felsic plutonism was essentially coeval. Intrusion in small shear zones indicates that mafic and felsic plutonism was accompanied by some ductile deformation. Outcrop-scale interleaving of Margaree orthogneisses and rocks of the Port aux Basques Complex, and geochemical similarities between the amphibolites in both units suggest that the Margaree orthogneiss represent intrusive sheets. Parallelism between contacts and compositional layering is probably the result of F1- and F2-related transposition.

The Kelby Cove orthogneiss (unit **OK**) comprises similar plutonic rocks as the Margaree orthogneiss. They are distinguished by the occurrence of garnet and gedrite in the Kelby Cove orthogneiss and the more common pink colour displayed by the Kelby Cove granitoids. In addition the Kelby Cove includes a white muscovite-bearing gneissic granite (unit **OKg**), which is absent in the Margaree orthogneiss. The Kelby Cove is probably the same age as the Margaree orthogneiss because it is cut by the Upper Ordovician (ca 450 Ma) Port aux Basques Granite. The presence of the Kelby Cove orthogneiss in both the Port aux Basques and Grand Bay complexes suggest that these two complexes were together by the end of the Early Ordovician, possibly in a basement (**OP**) cover (**OG**) relationship.

The Port aux Basques Granite (unit **Ogp**) consists of narrow, pink, rarely white, locally garnet-bearing sheets of annealed, high-strain granitoid gneisses, ranging in composition from trondhjemite to granite. These narrow sheets can be traced for kilometers along the composite S1/S2 foliation and form excellent structural markers. They outline major F2 and F3 folds, and probably intruded into early D1 shear zones (van Staal et al., 1994).

The Margaree and Kelby Cove orthogneisses, and Port aux Basques Granite are absent in the Harbour Le Cou Group; hence assembly of the latter with the already assembled Grand Bay and Port aux Basques complexes likely took place after 450 Ma, probably in the Late Silurian.

The Grand Bay and Port aux Basques complexes, all orthogneisses and, the Harbour Le Cou Group experienced the same regional deformation and metamorphic history comprising three generations of folding and amphibolite-facies metamorphism. F1 and F2 resulted in sheath folds, a strong LS fabric that locally culminates in platy (annealed) mylonites. Deformation took place pre-to syn-peak metamorphism (ca 416 Ma, van Staal et al., 1994). F1 and F2 thus formed between 450 and 416 Ma and are unrelated to F1 and F2 deformation in the Dashwoods Subzone. The F2 and older structures were overprinted by westerly overturned, F3 sheath folds and west-directed, ductile to ductile-brittle thrusts and reverse faults. Amphibolite facies conditions were maintained until at least the early stages of F3. Subsequent retrogression was accompanied by progressive strain localization. The F3 and related structures are cut by the Lower to Middle Devonian Isle aux Morts Brook (ca 386 Ma, Dubé et al., 1996) and related leucogranites

Peak metamorphism ranges from staurolite-biotite grade in the west through kyanite-garnet to sillimanite grade in the east. The pressures of metamorphism were generally high (7-9 kb; Burgess et al., 1993) consistent with the onset of migmatization in the kyanite zone and the presence of garnet in the amphibolites.

COOPERATION

COOPERATION AGREEMENT MINERAL DEVELOPMENT / ENTENTE DE COOPÉRATION SUR L'EXPLOITATION MINÉRALE

Contribution to Canada-Newfoundland Cooperation Agreement on Mineral Development (1990-1994), a subsidiary agreement under the Economic and Regional Development Agreement.

Contribution à l'Entente de coopération Canada-Terre-Neuve sur l'exploitation minérale (1990-1994), entente auxiliaire négociée en vertu de l'Entente Canada/Terre-Neuve de développement économique et régional.

Canada — Newfoundland / Terre-Neuve

Copies of this map may be obtained from the Geological Survey of Canada 601 Booth Street, Ottawa, Ontario K1A 0E8

Published 1996

LOCATION MAP

Geology by C.R. van Staal, L. Hall, D. Schofield, and P. Valverde, assisted by A. Buschman, N. Giroux and K. Venance

Geology of the Windsor Point Complex is largely based on Dubé and Lauzière (1995). Isle aux Morts Prospect in part based on O'Neill (1985). Kyanite-sillimanite Isograd in part based on contribution by J.L. Burgess

Digital cartography by the Geoscience Information Division

Electrostatic plot produced by the Geological Survey of Canada

OPEN FILE 3165

GEOLOGY

PORT AUX BASQUES

NEWFOUNDLAND

Scale 1:25 000 - Échelle 1/25 000

Metres 500 0 500 1000 1500 2000 Mètres

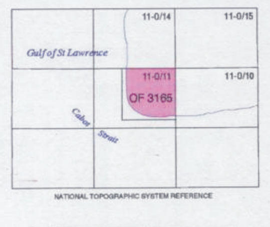
Transverse Mercator Projection CM 59°10', Scale Factor 1 © Crown copyrights reserved

Projection transverse de Mercator MC 59°10', facteur d'échelle 1 © Droits de la Couronne réservés

Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada

Digital base map at the scale of 1:50000 from the Earth Sciences Sector. Modified by the Geological Survey of Canada

Copies of the topographical edition of this map may be obtained from the Canada Map Office, Department of Natural Resources Canada, Ottawa, Ontario, K1A 0E9



NATIONAL TOPOGRAPHIC SYSTEM REFERENCE

LEGEND

Some of the tectonostratigraphic zones and subzones identified in this map-area experienced in part a different structural history. Therefore, the relative sequence of structural elements in a specific assemblage of related rock units may have formed at a different time than those in the adjacent assemblages

DASHWOODS SUBZONE

BARACHOIS GROUP

CBs Carboniferous, mainly red and green sandstone; siltstone; shale; mudstone; minor thin coal seams; conglomerate

OSg Upper Ordovician to Silurian, mainly medium grained, equigranular, pink to white muscovite-bearing leucogranite. Granite is probably consanguineous with felsic volcanic rocks of unit **ODWv**. Foliation-lineation fabrics are uncommon or absent

WINDSOR POINT COMPLEX

ODW / ODWfv Upper Ordovician to Devonian, mainly conglomerate (polygenic to monogenic); greywacke and shale; pebbly sandstone; graphitic shale; limestone; gabbro; chlorite-sericite schist; breccia and cataclastic rocks; includes rhyolite and felsic pyroclastic rocks (**ODWfv**)

ODWv Upper Ordovician to Silurian, aphyric and quartz- and feldspar-phyric, locally flow-banded rhyolite, felsic pyroclastic and epiclastic rocks; polygenic conglomerate with abundant felsic volcanic clasts, typically magnetic; greywacke and siltstone; graphitic shale; pillowed, massive and brecciated tholeiitic basalt with magnetic jasper fragments; limestone

CAPE RAY COMPLEX

OCt Lower to Middle Ordovician, mainly medium- to coarse-grained, weakly to strongly foliated tonalite to granodiorite; abundant mafic and sparse ultramafic xenoliths

OCm Lower Ordovician, mainly coarse-grained, moderately to strongly foliated, alkali feldspar megacrystic granite to granodiorite; abundant mafic and sparse ultramafic xenoliths

LONG RANGE MAFIC-ULTRAMAFIC COMPLEX

ЄOLg Upper Cambrian to Lower Ordovician, mainly coarse-grained, layered to massive, locally strongly foliated, largely amphibolitic metagabbro, minor thin layers of ultramafic rock and sheets of trondhjemite

ЄOLu Upper Cambrian to Lower Ordovician, mainly greyish brown largely serpentinized ultramafic rock varying from dunite to harzburgite and pyroxenite

FLEUR DE LYS SUPERGROUP

NPOFs Upper Neoproterozoic to Lower Ordovician, semi-pelitic and pelitic paragneiss and schists, locally containing clasts and blocks of mafic, ultramafic and intermediate intrusive rocks up to 100's of meters.

EXPLOITS SUBZONE AND GANDER ZONE

Dgi / Dg Isle aux Morts Brook Granite: Devonian, mainly coarse-grained, equigranular, locally megacrystic alkali feldspar-rich leucogranite with minor muscovite. Includes related fine-grained hypabyssal aplitic dykes (**Dg**)

Ogp Port aux Basques Granite: Upper Ordovician mainly strongly lineated and foliated pink or white trondhjemite, tonalite, granodiorite, granite and monzonite sheets with aplitic and pegmatitic phases

OM / OMg Margaree orthogneiss: Lower to Middle Ordovician, mainly white, biotite and/or hornblende-bearing granodiorite to tonalitic orthogneiss containing abundant sheets and enclaves of amphibolite, metagabbro, metadiorite, hornblendite and metapyroxenite. Intruded by a white to pinkish biotite granitic gneiss (**OMg**). Characteristic is absence of garnet in any of the Margaree gneisses. Includes minor Port aux Basques Granite

OK / OKu / OKg Kelby Cove orthogneiss: Lower to Middle Ordovician, mainly whitish grey, less commonly pink, gneissic granitoid rock varying from hornblende- and biotite-bearing tonalite to biotite- and/or muscovite-bearing granite; contains abundant bands of amphibolite, metagabbro, metadiorite, hornblendite and pyroxenite (**OKu**). Intruded by white, locally muscovite-bearing granitic gneiss (**OKg**). Garnet and/or gedrite are locally abundant in both felsic and mafic orthogneisses. Includes minor Port aux Basques Granite

GRAND BAY COMPLEX

OGm / OGu Lower to Middle Ordovician, fine-to coarse-grained amphibolite, locally garnet-bearing amphibolite. In places interlayered with thin coticule and pelite bands. Local ultramafic schist (**OGu**)

OGs Lower to Middle Ordovician, mainly thin-bedded, brown to grey semi-pelitic and pelitic biotite-, garnet-, staurolite- and kyanite-bearing schists with common thin coticule layers and sparse volcanogenic, feldspathic psammite beds. Locally gedrite-bearing, commonly associated with sulphide mineralization (e.g. Isle aux Morts prospect). Includes interleaved Kelby Cove orthogneiss

PORT AUX BASQUES COMPLEX

ЄOPm Lower to Middle Ordovician, fine-to coarse-grained, locally garnet-and/or clinopyroxene-bearing amphibolite

ЄOPs Cambrian to Lower Ordovician, mainly grey to greenish grey quartzose to feldspathic psammite interbedded with thin garnet and kyanite/sillimanite-bearing silvery pelite, numerous tholeiitic amphibolite sills and/or dykes and very rare coticule beds; progressively more migmatitic towards the southeast. Includes interleaved Margaree and Kelby Cove orthogneisses and thin Port aux Basques Granite sheets

HARBOUR LE COUP GROUP

OHg Grandy's Formation: Middle Ordovician, mainly thin-bedded, rusty sulphidic pelite to semi-pelite (biotite-muscovite-garnet-sillimanite schist) and minor psammite with thin bands of coticule; sparse to absent amphibolite. Includes some narrow sheets of Upper Silurian; white two-mica Rose Blanche Granite (**Sg**)

OHo Otter Bay Formation: Lower to Middle Ordovician, mainly thick- to medium-bedded, psammite with thin beds of rusty, sulphidic pelite (biotite-muscovite-garnet-sillimanite schist) and sheets of garnet-and/or clinopyroxene-bearing, locally pillowed amphibolite (unit **OHom**). Calc-silicate pods or lenses are common in thick psammite beds. Includes some narrow sheets of Upper Silurian, white two-mica Rose Blanche Granite (**Sg**)

Lithological contact (defined, approximate, inferred)

Disseminated or massive sulphide mineralization

Occurrence of kyanite, sillimanite

Kyanite-sillimanite isograd (half circle on high temperature side)

Composite S_1 / S_2 foliation in Middle Ordovician and older units in the Dashwoods Subzone

Main foliation in Windsor Point Complex and related plutonic rocks

Main S_2 transposition foliation

Main S_2 transposition foliation with sense of shear (dextral, sinistral, reverse)

S_3 crenulation cleavage

Shearband or minor shear zone with sense of shear

Mineral / extension lineation

Asymmetry of F_2 fold; with plunge and plunge direction

Asymmetry of F_3 fold; with plunge and plunge direction

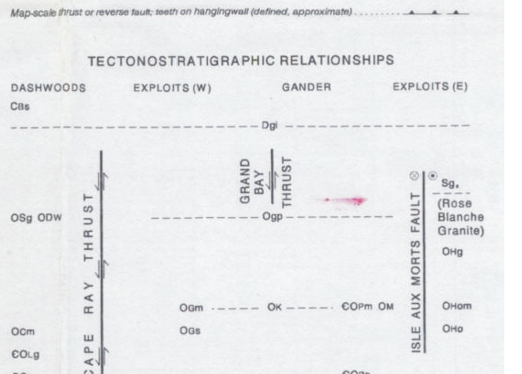
Fault general (defined, approximate)

Outcrop-scale fault (sinistral, dextral, reverse)

Map-scale fault (sinistral, dextral)

Map-scale thrust or reverse fault; teeth on hangingwall (defined, approximate)

TECTONOSTRATIGRAPHIC RELATIONSHIPS



REFERENCES

Brown, P. A.,
1973: Possible cryptic suture in south-west Newfoundland: Nature Physical Science, 245, p. 9-10
1976: Geology of the Rose Blanche map-area (11-O/10): Newfoundland Department of Mines and Energy, Mineral Development Division, Report 76-5, 16p.
1977: Geology of the Port aux Basques map-area (11-O/11): Newfoundland Department of Mines and Energy, Mineral Development Division, Report 77-2, 11p.

Burgess, J.L., Brown M, and van Staal C.R.,
1993: Pressure-temperature conditions and a P-T path for the Port aux Basques area, southwest Newfoundland, in Current Research, part D, Geological Survey of Canada, Paper 93-1D, p. 47-56

Currie, K.L. and van Berkel, J.T.,
1992: Notes to accompany a geological map of the southern Long Range, southwestern Newfoundland. Geological Survey of Canada, Paper 91-10, 10p.

Dallmeyer, R.D.,
1977: Diachronous ophiolite obduction in western Newfoundland: evidence from 40Ar/39Ar ages of the Hare Bay metamorphic aureole: American Journal of Science, 277, p. 61-72

Dubé, B., and Lauzière, K.,
1995: Geological maps (1:20 000) of the Cape Ray Fault Zone. 4 sheets. Open File 2963

Dubé, B., Dunning, G.R., Lauzière, K., and Roddick, J.C.,
1996: New insights into the Appalachian Orogen from geology and geochronology along the Cape Ray Fault Zone,SWNewfoundland. Geological Society of America Bulletin, 108, p. 101-116

Dunning, G. R. and Krogh, T. E.,
1985: Geochronology of ophiolites of the Newfoundland Appalachians: Canadian Journal of Earth Sciences 22, p. 1659-1670

Dunning, G. R., Wilton, D.H.C. and Herd, R.K.,
1989: Geology, geochemistry and geochronology of a taconic batholith, southwestern Newfoundland. Transactions of the Royal Society of Edinburgh: Earth Sciences, 80, p. 159-168

Dunning, G.R., Swinden, H.S., Kean, B.F., Evans, D.T.W. and Jenner, G.A.
1991: A Cambrian island arc in Iapetus: geochronology and geochemistry of the Lake Ambrose volcanic belt, Newfoundland Appalachians. Geological Magazine, 128, p. 1-17

Dunning, G.R., O'Brien S.J., Colman-Sadd, S.P., Blackwood, R.F., Dickson, W.L., O'Neill, P.P., and Krogh, T.E.
1990: Silurian orogeny in the Newfoundland Appalachians. Journal of Geology, 98, p. 895-913.

Gillis, J.W.,
1972: Geology of the Port aux Basques map area, Newfoundland; Geological Survey of Canada, Paper 71-42

Hall, L., van Staal, C.R. and Williams, H.,
1994: Ordovician structural evolution of southwest Newfoundland. GAC/MAC joint annual meeting,abstract with progam, 19, p. 46

Lin, S., van Staal, C.R. and Lee, C.,
1993: The Harbour Le Cou Group and its correlation with the Bay du Nord Group, southwestern Newfoundland in Current Research, Part D, Geological Survey of Canada, Paper 93-1D, p.57-64

Lin, S., van Staal, C.R. and Dubé, B.,
1994: Promontory-promontory collision in the Canadian Appalachians. Geology, 22, p. 897-900

O'Neill, P.P.,
1985: An economic, metamorphic, structural and geochemical study of the Isle aux Morts Prospect, southwest Newfoundland. Unpublished M.Sc thesis, Memorial University, 263 p.

O'Neill, P.P. and Strong, D.F.,
1988: The Isle aux Morts Prospect: the first significant base metal discovery in the Port aux Basques Complex of southwest Newfoundland. Canadian Institute of Mining and Metallurgy, Bulletin 81-90, p 59-68

Piasecki, M.A.J., Williams, H. and Colman-Sadd, S. P.,
1990: Tectonic relationships along the Meelpaeg, Burgeo and Burlington Lithoprobe transects in Newfoundland. Newfoundland department of Mines and Energy, Geological Survey Branch, Report 90-1, p. 327-339

Schofield, D.,
1994: The geology and geochemistry of the Port aux Basques Gneiss, southwest Newfoundland. Unpublished Ph.D thesis, Keele University, UK, 254p.

Schofield, D., Winchester, J.A. and van Staal, C.R.,
1993: The Isle aux Morts metabasalt, southwest Newfoundland in Current Research, Part D, Geological Survey of Canada, Paper 93-1D, p. 39-46

van Staal, C.R., Winchester, J.A., Brown, M., and Burgess, J.L.
1992: A reconaissance geotraverse through southwestern Newfoundland in Current Research, Part D, Geological Survey of Canada, Paper 92-1D, p. 133-144

vanStaal, C. R., Dunning, G., Valverde, P., Burgess, J.L. and Brown, M.,
1994: Arenig and younger evolution of the Gander margin: A comparison of the New Brunswick and Newfoundland segments. GAC NUNA conf.: New Perspectives in the Appalachian-Caledonian Orogen, p. 28-29

Whalen, J.B., van Staal, C.R., Longstaffe, F.J., Jenner, G.A. and Garièpy, C.,
(in press) Tectonostratigraphic zone identification after promontory-promontory collision: geochemical and isotopic insights from southwestern Newfoundland Atlantic Geology

Williams, H.,
1992: Mélanges and coticule occurrences in the northeast Exploits Subzone, Newfoundland. Geological Survey of Canada, Paper 92-1D, p. 121-127

Williams, H. and St. Julien, P.,
1982: The Baie Verte Brompton Line: Early Paleozoic continent-ocean interface in the Canadian Appalachians, in P. St.Julien and J. Beland, eds. Geological Association of Canada Special Paper 24, p.177-207

Williams, H., Colman-Sadd, S.P., and Swinden, H.S.,
1988: Tectonic-stratigraphic subdivisions of central Newfoundland: Geological Survey of Canada, Paper 88-1B, p. 91-98.

Wilton, D.H.C.,
1983: The geology and structural history of the Cape ray Fault Zone in southwestern Newfoundland.Canadian Journal of Earth Sciences, 20, p. 1119-1133

OPEN FILE