## **DESCRIPTIVE NOTES**

This map shows the geology of the westernmost part of the Tasiuyak gneiss complex of the Paleoproterozoic Torngat Orogen, in particular the complex fold patterns and the anastomosing nature of the Abloviak shear zone in the Rivière Lepers map area, immediately north of Abloviak Fiord. The area is exceptionally well exposed, and trend lines of gneissosity have been drawn from airphotographs in areas that were not traversed. Map coverage was accomplished in 1993 by helicopter-supported traverses, except on the shore of Abloviak Fiord, which was mapped by V. Bodycomb and N. Goulet from an inflatable boat in 1992.

59°45′

In the map area, all rocks have been metamorphosed to the granulite facies. The oldest rocks include migmatitic tonalitic orthogneisses of suspected Archean age APgl, which contain multiple sets of leucosome veins, intrafolial folds, and numerous rafts and inclusions of mafic gneiss, meta-anorthositic and -ultramafic rocks, and paragneiss. These rocks contain folded layers and disrupted pods of medium-grained, granoblastic mafic granulite (10 cm - 2 m wide: too small to show on map) which locally cut the migmatitic fabrics in the tonalitic gneisses and are interpreted to represent recrystallized mafic dykes. Such mafic granulite dykes were not found in adjacent units of suspected Paleoprotero-

The migmatitic tonalitic orthogneisses of suspected Archean age are locally to extensively transformed into diatexite Pigm, or completely homogenized to equigranular, wispy-textured rocks of tonalitic to granodioritic composition Pigd, containing layers and lenses of mafic (and locally anorthositic) granulite derived from remnant inclusions and dykes. The homogeneous rocks may have been derived through assimilation of the older rocks by widespread intrusion of younger magmas, or through in situ partial melting of the older rocks during high-grade metamorphism. The homogeneous rocks have an identical appearance to those of the Killinek charnockitic suite to the north of the map area (see inset map: Van Kranendonk et al., 1992), except that the former contain a greater proportion of mafic

The rocks of suspected Archean age are in sharp tectonic contact with adjacent paragneisses across narrow belts that contain a mixture of rocks, including ultramafic Pumf and mafic Pab gneisses, graphitic and Fe-rich quartzites, impure marble Pscs and rusty-weathering, graphitic shists Psrg. This zone varies from 10-300 m in width, and many of the rock types within the zone are not found outside of it. Except for the rusty-weathering paragneisses, the units within the contact zone are discontinuous, and some occur as slivers within the migmatitic orthogneisses. These features suggest that the contact zones represent thrust faults (see below). Significantly, in areas where Archean protoliths can be recognized, the homogeneous rocks of unit Pigd do not occur across this boundary zone, suggesting that intrusion or partial melting occurred before thrust deformation.

Migmatitic, biotite paragneisses Pspg are characterized by a grey- to brown- weathering surface, abundant leucosome veins, and red garnets; sillimanite is rare. In contrast to this are white- and rustybrown weathering paragneisses with lilac-coloured garnets and abundant sillimanite, known as the Tasiuyak gneiss PsTg. The Tasiuyak gneiss is typically homogeneous on a large scale and does not contain the various other supracrustal rocks that are found in the paragneisses denoted by Pspg. Both units may contain graphite. The contact between these units is locally sharp - as in the northwestern part of the map area - to gradational (map area 24P/7: Van Kranendonk, 1993). A series of sulphidic and graphitic horizons within the Tasiuyak gneiss were found along the north shore of Abloviak Fiord (Bodycomb and Goulet, 1992; Bodycomb, 1992). These horizons, 1-5 m wide, consist of pyrrhotite (40-60%), graphite (30-55%), and quartzo-feldspathic inclusions (≤10%) and may

contain up to 0.1% Ni, 0.26% Zn and 10-160 ppm W (Bodycomb, 1992). The horizons are locally associated with marble, sulphide-bearing metagabbro and rocks with a high concentration of diopside.

Within the paragneisses are bodies of white-weathering, garnetiferous granite Psdx which contain numerous schlieren and inclusions of paragneiss. The granites have diffuse contacts with the paragneiss, and veins and clots of similar material may be found in paragneiss across the map area,

comprising up to 40% of some outcrops. The granites are interpreted as diatexites derived from partial melting of the paragneisses. Black-weathering quartz diorite bodies with a colour index of 25-30% (orthopyroxene -hornblende ± biotite) underlie a large part of the the eastern part of the map area. In contrast to the homogeneous tonalite-granite rocks Pigd in Archean gneisses, these rocks contain a simple fabric and lack a migmatitic character, locally show intrusive contact relationships with adjacent metasedimentary rocks, and rarely contain inclusions or xenoliths of fine-grained diorite. A sample of this unit to the southeast (map area 24P/7: Van Kranendonk, 1993) was dated by the U-Pb method on zircon, as 1895 ± 2 Ma

Migmatitic planar fabric elements within rocks of suspected Archean age APgI, that are cut by mafic dykes, are of suspected Archean age and are denoted as Dn. Neither these structures, nor the dykes which cut them, have been recognized outside of this unit.

(D. Scott, pers. comm., 1993).

Paleoproterozoic structures (Dn+4).

Structures of interpreted Paleoproterozoic age occur throughout the map area and affect those of suspected Archean age in the migmatitic tonalitic gneisses. The earliest set of Paleoproterozoic structures (Dn+1) include a migmatitic gneissosity in paragneisses and a foliation in metaplutonic rocks. The tectonic intercalation of units within the contact zone between migmatitic tonalitic gneisses APgI of suspected Archean age and paragneisses **Pspg** is also interpreted as belonging to this generation of structures, as the zone is affected by the regional folding and shearing event, Dn+2. If the tonaliticgranitic rocks Pigd which homogenize the migmatitic tonalitic gneisses APgI are similar in age to the rocks of the Killinek charnockitic suite (1895  $\pm$  3 Ma: Scott et al., 1993), then thrusting post-dated this time, as such rocks have not been found across the boundary with the paragneisses.

Some large-scale isoclinal folds which are re-folded by the dominant NW-SE trending set of Dn+2 folds, are probably also the result of Dn+1 deformation. Upright, to steeply inclined folds (Fn+2) of migmatitic gneissosity and foliations (Sn+1) occur in all units across the map area, and belong to the Dn+2 set of structures. The interference between Fn+1 isoclinal folds and Fn+2 upright folds is the cause for the "type 2" fold interference pattern (Ramsay and Huber, 1987) in the map area. Axial planar foliations are commonly associated with fold closures, and a regionally-developed, NW-SE striking, steeply-dipping foliation is defined across the map area. This foliation intensifies from east to west, culminating in mylonitic schistosities throughout the Abloviak shear zone. Accompanying the development of Dn+2 foliations is a prominent mineral elongation lineation (Ln+2) which is most commonly defined by quartz, but also by orthopyroxene, hornblende, and sillimanite. Within the Abloviak shear zone, quartz grains are transformed into ribbons, and kinematic indicators of sinistral transcurrent movement (rotated garnet porphyroblasts, shear band structures, S-C fabrics) are ubiquitous. The Abloviak shear zone anastomoses around lozenge-shaped areas of lower strain, in which tight folds of migmatitic gneissosity are preserved; within the shear zone, folds are entirely transposed and isoclinal. In the eastern part of the map area, N-S trending open to tight folds and locally developed zones of

## References

amphibolite-facies mylonite are interpreted to be associated with a Dn+3 stage of deformation. Late,

brittle faults, commonly with pseudotachylite breccia, are believed to represent a fourth generation of

Bodycomb, V. 1992: Graphite and base metal (Ni, Zn, ± Cu) showings of the Abloviak Fjord, eastern Ungava Bay, Québec: ideas on their origin and the metallogenic implications for the region; in Wardle, R.J. and Hall, J. (editors), Eastern Canadian Shield Onshore-Offshore Transect (ECSOOT), Report of Transect Meeting, The University of British Columbia, LITHOPROBE Secretariat, Report No. 32, p.74-82.

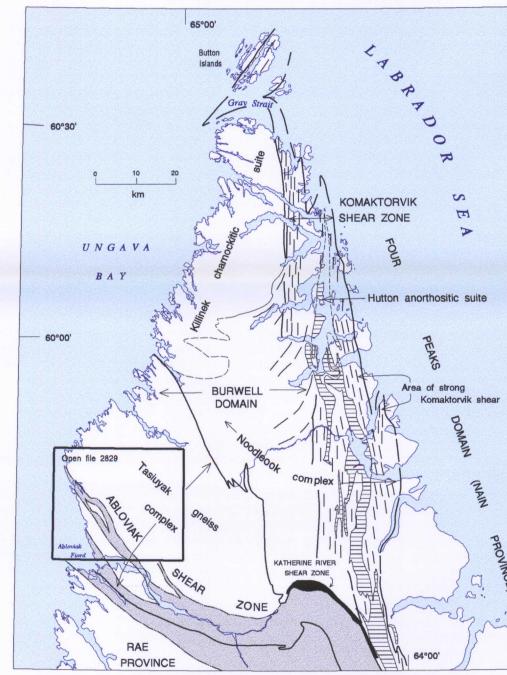
Bodycomb, V., and Goulet, N. 1992: Metallogenic and structural study of base metal (Ni, Zn) showings in the Tasiuyak gneiss, eastern Ungava Bay, Québec; GAC-MAC Abstracts, v.17, p.A10.

Ramsay, J.G. and Huber, M.I. 1987: The Techniques of Modern Structural Geology, Volume 2: Folds and Fractures; Academic Press, Great Britain, 700 p.

Scott, D.J., Machado, N., Van Kranendonk, M., Wardle, R. and Mengel, F. 1993: A preliminary report of U-Pb geochronology of the northern Torngat Orogen, Labrador; in Current Research, Part C; Geological Survey of Canada, Paper 93-1C, p.341-348.

Van Kranendonk, M.J. 1993: Geology, Mont Jacques-Rosseau, Québec-Newfoundland (Labrador); Geological Survey of Canada, Open File 2738, scale 1:50,000.

Van Kranendonk, M.J., Wardle, R.J., Mengel. F.C., Ryan, B. and Rivers, T. 1992: Lithotectonic divisions of the northern part of the Torngat Orogen, Labrador, Québec, and N.W.T.; in Wardle, R.J. and Hall, J. (editors), Eastern Canadian Shield Onshore-Offshore Transect (ECSOOT), Report of Transect Meeting, The University of British Columbia, LITHOPROBE Secretariat, Report No. 32, p.21-31.



Structural (UPPER CASE) and lithological (lower case) subdivisions of the

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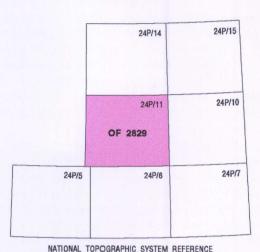
northern part of the Paleoproterozoic Torngat Orogen, Labrador, Québec and Northwest Territories. Location of map area outlined by square box.



LOCATION MAP - LOCALISATION DE LA CARTE

RIVIÈRE LEPERS QUÉBEC - NORTHWEST TERRITORIES

Scale 1:50 000 - Échelle 1/50 000 Kilometres 1 0 1 2 Transverse Mercator Projection Projection transverse de Mercator CM 100°45', Scale Factor 1 M.C. 100°45', facteur d'échelle 1 © Crown copyrights reserved © Droits de la Couronne réservés



SYSTÈME NATIONAL. DE RÉFÉRENCE CARTOGRAPHIQUE

LEGEND

Unconsolidated Quaternary deposits and felsenmeer PALEOPROTEROZOIC ROCKS

mphibolite-facies ductile shear zone and/or mylonite

META-PLUTONIC ROCKS Grey- to black-weathering melanocratic quartz diorite (colour index = 20-30%) at Piqd granulite facies (orthopyroxene-hornblende-biotite); commonly with relict igneous plagioclase megacrysts and cognate xenoliths of fine-grained diorite/quartz diorite. Weakly foliated to massive outside of the Abloviak shear zone, but mylonitized within. Dated by U-Pb on zircon as 1895 +/- 2 Ma (D. Scott, pers. comm., 1993: see map 24P/7 for location)

Massive to foliated, leucocratic, orthopyroxene-bearing granitoid identical to those rocks of the "Killinek charnockitic suite". Dominantly buff-weathering, medium-grained, equigranular granodiorite. Sample from McLelan Straight (NTS 25A10) dated by U-Pb on zircon as 1895 +/- 3 Ma (Scott et al., 1993), and one from NTS 25A2 as 1886 +/- 4 Ma (D. Scott, pers. comm., 1993)

Leucocratic, medium- to coarse-grained, orthopyroxene tonalite to granodiorite, with wispy-layering and mafic granulite inclusions; typically very homogeneous, although amount of mafic granulite inclusions varies from 1-30% of rock. Derived through wholescale assimilation or insitu melting of granulite-facies Archean tonalitic orthogneiss (APgl) which locally occurs as indistinctly-bounded, gneissic inclusions.

White, medium- to coarse-grained granite with red-to lilac-coloured garnets: contains grey garnetiferous schlieren (paragneiss restite). Derived through granulite-facies anatexis of paragneiss (PsTg and Pspg)

SUPRACRUSTAL ROCKS

Grey, graphitic meta-quartzite, locally with fine-grained garnet. Psqz Grey, graphine meta-qualities, >80% graphite.

Grey- to buff-weathering paragneiss with red garnet and biotite, abundant leucosome, Pspg Grey- to pull-weathering paragraph and complex migmatitic character

Rusty brown- and red-weathering, graphite-rich biotite +/- garnet paragneiss

Calc-silicate and marble horizons; consists of 1-5m wide layers of impure

diopside-olivine-calcite marble, and light green, massive calc-silicate units (diopside) PsTg

Tasiuyak gneiss; rusty brown and white weathering paragneiss and diatexite, characterized by lilac-coloured garnets and sillimanite. Well-layered on a 10cm-2m

scale, varying from garnet quartzite to semi-pelitic garnet-biotite-feldspar-quartz gneiss, to pelitic sillimanite-biotite-garnet quartzo-feldspathic gneiss; all cut by and/or interlayered with white garnet granite (Psdx) Homogeneous, equigranular mafic amphibolite to granulite; layering

Massive to foliated, homogeneous to layered pyroxenite (clinopyroxenehornblende +/- anthophyllite)

ARCHEAN ROCKS

Tonalite-granodiorite orthogneiss and migmatite, with inclusions and layers of mafic granulite and meta-anorthosite, and recrystallized mafic dykes; at Paleoproterozoic granulite-facies. Veined by Paleoproterozoic leucosome Pigd: grades into Pigm

Lithological contact (defined, inferred) . \_\_\_\_\_\_ Trace of gneissosity from airphoto interpretation . Fault (defined with shear sense where known, inferred) . =----Limit of visited outcrop . . Limit of unconsolidated sedimentary cover + felsenmeer . Limit of granulite-facies ribbon ultramylonite in the Abloviak shear zone . . .\_\_\_\_\_ Location of graphite-rich sulphide (Ni, Zn) horizon in Tasiuyak gneiss . . Inclusion of meta-anorthosite to -gabbro . Paleoproterozoic fabric elements Dn+3 fabric elements: amphibolite facies . F80 F55 F85 Inclined schistosity: no movement sense, sinistral, dextral . THE THE Vertical schistosity: sinistral, dextral . . Lineation: mineral elongation . Dn+2 fabric elements: granulite facies , F69 V 70 Inclined schistosity: no movement sense, sinistral . × × Vertical schistosity: no movement sense, sinistral . /×76 / Fold axial plane: inclined, vertical . Fold axis: symmetrical, s-asymmetric, z-asymmetric . Lineation: mineral elongation, striping . Dn+1 fabric elements Schistosity or gneissosity: inclined, vertical . Archean fabric elements (Dn) Gneissosity: inclined, vertical . . Abbreviations: BI = biotite, QZ = quartz, SI = sillimanite, XL = intersection

Geology by M.J. Van Kranendonk, R. Churchill, A. Haumann, L.M. Campbell, F.C. Mengel, R.J. Wardle, V. Bodycomb, and N. Goulet

Digital map compilation by M.J. Van Kranendonk, Geological Survey of Canada Digital cartography by R.L. Allard, Geological Survey of Canada

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would be welcomed by the Geological Survey of Canada Digital base map from Surveys, Mapping and Remote Sensing published at the same scale. Generalized and modified by the

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Geological Survey of Canada

Magnetic declination 1994, 33° 11' West, decreasing 12.6' annually. Elevations in feet above mean sea level

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