Energy, Mines and Resources Canada — Énergie, Mines et Ressources Canada

Geological Survey of Canada
Commission géologique du Canada

LEGEND

1	Coarse biotite - hornblende ± orthopyroxene tonalitic (ortho?) gneiss. 1450-1300 Ma[1] a: Medium to fine grained tonalitic straight gneiss.
2	Coarse leucocratic to mesocratic clinopyroxene syenitic (ortho?) gneiss. a: medium to fine grained syenitic straight gneiss.
3	Coarsely layered, very coarse grained phlogopite - tremolite - clinopyroxene - serpentine - apatite - hornblende - chondrodite tectonic marble breccia with non-carbonate rock inclusions. a: Tectonic marble breccia with inclusions of 2.
4	Undifferentiated sillimanite - kyanite - garnet - orthoamphibole - cordierite gneiss.
5	Heterogeneously deformed meta-anorthosite to meta-gabbro anorthosite.
6	Medium grained, mildly to non-foliated leucogranite. 1060 ± 6 Ma[1]
7	Regularly layered granitic to syenitic gneiss.
8	Irregularly layered granitic gneiss. a: Regularly layered.
9	Irregularly layered biotite-rich gneiss of beaded aspect. a: Regularly layered.
10	Porphyroclastic Gneiss.
11	Granitic Straight Gneiss. 1065 ± 15 Ma[1]

(1) Van Breemen and Hanmer, 1986.

Straight Gneiss: An annealed 'S>L' tectonite. Continuous, rectilinear layering of granitic and amphibolitic material results from progressive transposition at high strains.

Porphyroclastic Gneiss: A rectilinear 'S>L' tectonite of variable composition, often subtly banded. Contains isolated, round mono- or polycrystalline porphyroclasts and fragments, plus elongate aggregates of feldspar aligned in the foliation.

Regular Gneiss: A well layered 'L/S' tectonite. 'X/Z' sections (perpendicular to both foliation and parallel to lineation; X Y Z, Flinn, 1962) show transposition of low angle discordant features which are still preserved in 'Y/Z' sections.

Irregular Gneiss: A tectonite wherein low angle discordant features i.e. cross-cutting veins, mafic blocks or inclusions, fold inter-limb angles, fold axial planes oblique to layering, are preserved in all sections perpendicular to layering.

Beaded Gneiss: A coarse, biotite-rich gneiss of uncertain origin. Beaded aspect is due to clusters of coarse feldspar porphyroblasts, either scattered evenly throughout the gneiss or concentrated in isotropic quartzo-feldspathic pegmatitic layers.

SYMBOLS

- Lithological Contact (approximate)
- Fault (approximate)
- Foliation (inclined)
- Foliation (horizontal)
- Extension Lineation
- Sense of Shear/Thrusting: Barbs on upper, over-riding member of shear couple

Geology by: Simon Hanmer 1984, 1986; R.H. Thivierge 1984

Compilation by: Simon Hanmer 1984-1988

DESCRIPTIVE NOTES

This map is the result of fieldwork within the Ontario section of the northwestern boundary zone of the Central Metasedimentary Belt (CMBBZ) of the Grenville Province (Fig. 1), completed by the Geological Survey of Canada during the summers of 1984 and 1986 (Hanmer et al., 1985; Hanmer, 1988). The map area is readily accessible by road via highways 121 and 35. Bedrock exposure is excellent along the major roads and fairly good away from the road sections.

The CMBBZ in Ontario is a southeast dipping, upper amphibolite facies, ductile shear zone approximately 10 km thick, characterised by a constant southeast plunging extension lineation and widespread indicators of northwestward thrusting (Hanmer and Ciesielski, 1984; Hanmer et al., 1985; Hanmer, 1988; see also Schwerdtner and Mawer, 1982; Culshaw, 1983, 1986; Easton and Van Kranendonk, 1984; Easton, 1985, 1986a, 1986b). In the Haliburton region, the CMBBZ is composed of a stack of four discrete, laterally discontinuous and overlapping crystalline thrust sheets (Fig. 2) separated one from one another by high strain ductile thrust zones up to 500 m thick, which were active at circa 1060-1050 Ma (Van Breemen and Hanmer, 1985). Parts of three of the thrust sheets lie within the map area (rock units 1 & 2). The age of the tonalitic orthogneiss (1) comprising the Redstone and Dysart thrust sheets is approximately 1450-1300 Ma (Van Breemen and Hanmer, 1986). The lower thrust zones are marked by quartzo-feldspathic ductile tectonites (1a, 2a, 10 & 11) while the upper ones are predominantly carbonate (3). The base of the stack is defined by a particularly well developed zone of porphyroclastic gneiss (10) which truncates structure in the anorthosite (5) in the foot-wall in the area of Haliburton Lake - Percy Lake. Thrust sheets and thrust zones alike are cut by a widespread set of 10 m thick extensional ductile shears. The shears are predominantly southeast dipping, make a low angle to the layering which they cut, are internally granoblastic and show no evidence of metamorphic retrogression. They appear to represent syn-metamorphic collapse of the thrust stack. A discrete 25 m thick carbonate (3) thrust zone occurs within the footwall, 500 m below the basal porphyroclastic gneiss (10). It is apparently late and has little effect on the map configuration.

The metamorphic conditions of stack assembly are determined from the complex mineralogy of the aluminous supracrustals (4) which comprises a mimetically annealed syntectonic assemblage and a post-tectonic assemblage. The former consists of sillimanite - garnet - cordierite - biotite - 2 feldspars - quartz, aligned and enclosed in the foliation and/or the lineation, broadly indicative of the upper amphibolite facies. Particularly ferro-alluminous horizons contain the post-foliation assemblage gedrite - cordierite - kyanite - biotite - garnet(?). Relics of staurolite associated with sapphirine occur within cordierite, and minor sillimanite replaces kyanite. In the absence of partial melt, this assemblage suggests minimum conditions of 650 degrees at 6 kb. Rare metamorphic orthopyroxene within the Redstone thrust sheet (Fig. 2) suggests that the tonalitic gneiss (1) had experienced granulite facies metamorphism prior to stack assembly.

The alternation of tonalitic (1) and syenitic (2) compositions within the stack, coupled with the gneissic character of both tonalitic (1) and syenitic (2) material within the thrust sheets prior to assembly of the present stack suggests that the ductile thrust zones may represent out-of-sequence thrusts re-stacking an older thrusted configuration (Hanmer, 1988).

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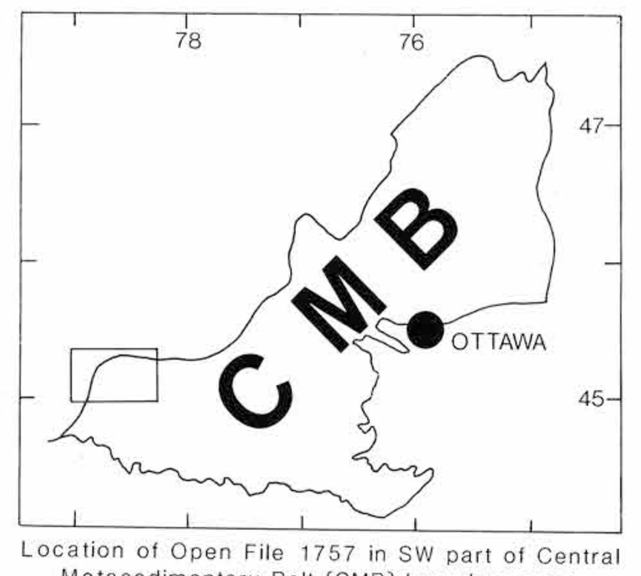
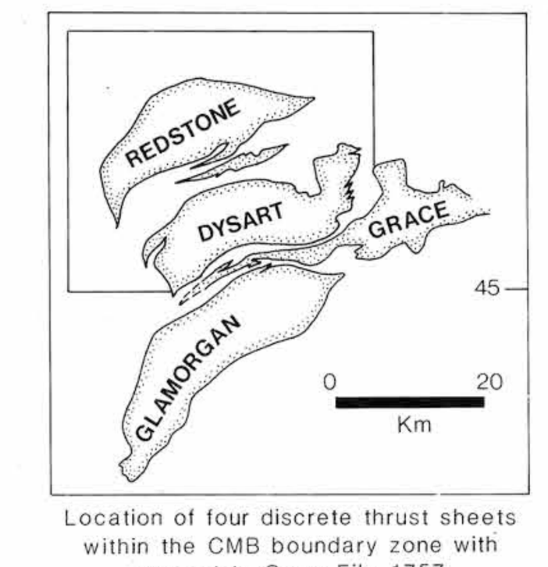


Location of Open File 1757 in SW part of Central Metasedimentary Belt (CMB) boundary zone



Location of four discrete thrust sheets within the CMB boundary zone with respect to Open File 1757

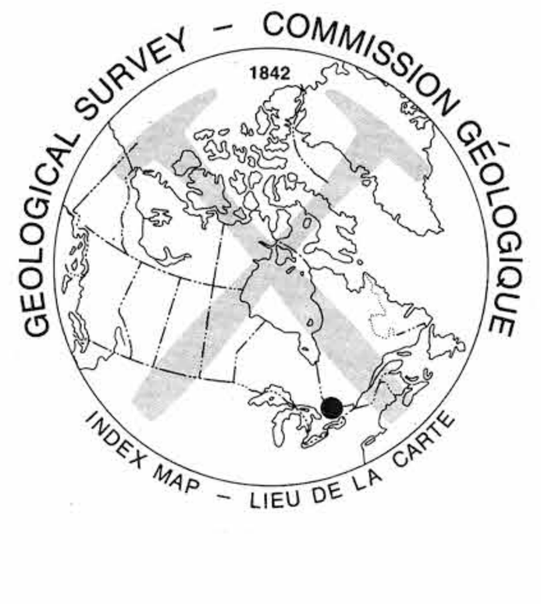
Geology

Western portion of the Central Metasedimentary Belt Boundary Zone, Grenville Province ; parts of the Haliburton, Wilberforce, Kawagama Lake and Whitney map areas, Ontario

Scale 1:50 000 - Échelle 1/50 000

Kilometres 1 0 1 2 3 4 Kilomètres

Universal Transverse Mercator Projection — Projection transverse universelle de Mercator



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