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southeast of Val d'Or, Quebec**

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LITHO-TECTONIC MAP OF THE GRENVILLE FRONT, SE OF VAL D'OR, QUEBEC

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Introduction

East of Val d'Or, Quebec, the precise location and exact nature of the Grenville Front (GF) have not been established from geological studies either in the Superior Province east of Val d'Or (Voguel, 1978; Marquis and Goulet, 1987; Rocheleau et al., 1990) or in the Grenville Province southeast of the Grenville Front (GF) (Indares and Martignole, 1989). In order to overcome the lack of outcrop in the GF zone, information from various sources have been compiled. The accompanying map (Fig. 2), modified from Ciesielski et al. (1990), combines a remote sensing analysis of the GF zone, an interpretation of aeromagnetic data and a geological synthesis. At the working scale, topographic maps and gravity data did not give pertinent information on the position or nature of the GF.

The Grenville Front: Definition

The Grenville Front is a major NE-trending tectonic break that forms the SE margin of the Superior Province and the NW limit of the Grenville Province; in its southwest and central portions, it truncates the EW structural trends of the Superior Province. The Superior and most of the Grenville Province are respectively considered as the autochthon and allochthon of the Grenville Orogen. The Grenville Province is not lithotectonically homogeneous and contains a parautochthonous terrane mainly composed of Archean orthogneiss, metasedimentary and mafic/ultramafic rocks, located along the SE side of the GF. Both metasedimentary and mafic rocks can be lithologically and structurally related to similar sequences in the Superior Province (Rivers et al., 1986; 1989; Ciesielski, 1990; 1991). In the study area, the GF can be defined as " *a line or zone on either side of which rocks of the Superior Province show different structural and metamorphic levels* ". The upward movement of the crustal block SE of the Grenville Front occurred during the Grenvillian Orogeny, it is considered synchronous with the formation of a narrow zone of overprinted metamorphism located immediately west of the GF and yielding a Grenvillian age (see below; Rocheleau et al. 1990; Baker 1980). Given various lithostructural contexts along the GF, its location changes with the parameters used for its definition (Gower et al., 1980; Davidson, 1986; 1990). In its central portion between Lake Temiscaming

and Lake Mistassini (Fig. 1), the GF is composed of NNE- and NE-trending faults of the Mistassini Fault System and lithologic contacts (Ciesielski, 1988; 1990). The width of the GF varies between 10-1000m and locally, can be defined by brittle faults, mylonite zones or lower strain contacts between similar or different rock units of similar or different ages; inside the Pontiac Group, the GF is defined by high strain zones or change in the structural attitudes.

Geological Synthesis

Autochthon

Immediately west of the GF, the E-W Kenoran fabrics of the volcanic and sedimentary sequences are reoriented to the NE north of the Cadillac Fault (CF on Fig. 2, called Cadillac-Larder Lake Fault in its western extension, CLL on Fig. 1) and to the SW, south of it, accompanied by NNE and NE faulting. A middle amphibolite grade metamorphism is superimposed on the supracrustal reoriented Kenoran trends (shaded area on the map) with NE-trending foliations and NE-plunging lineations (Rocheleau et al. 1990). Similar metamorphism west of the GF, yielded a Ar/Ar and K/Ar amphibole ages of 995 and 1036 Ma east of Chibougamau (Baker 1980; Ciesielski, unpublished data, 1991). Near its east end, the Cadillac Fault zone widens and affects the Trivio Formation (TR) to various degrees; on the map (Fig. 2), the CF is represented by a line for simplicity. The latter does not show a significant Grenvillian overprint and the eastern extremity of the fault is crosscut by pegmatites affected by NNE-trending shear zones (Rocheleau et al. 1990). SW of the Fréville Pluton, there is no evidence of Grenvillian metamorphism in the Pontiac Group; the Kenoran metamorphism increases southward through the sillimanite zone into the migmatite zone.

Grenville Front

The GF was localized using NE-trending lineaments and density contrasts on a filtered LANDSAT TM image, contrasting magnetic anomalies and geological data (Fig. 2) (Avramtchev et al. 1980; Ciesielski et al., 1990). All of the NNE- and NE-trending faults are part of the Mistassini Fault System and record cataclasis and/or mylonitization. The Matchi-Manitou Fault (MMF on Fig. 2) is a major NE-trending lineament that defines the GF for one third of its length in the map area; it can be traced through into both the autochthon and the parautochthon. SE of the Pershing Pluton, the GF is located 5 km east of the position proposed by Marquis and Goulet (1987). The NE portion of the GF on Fig. 2, is a high-strain tectonic contact between a massive tonalite body of the autochthon and tonalitic orthogneiss and amphibolite of the parautochthon. SW of the Fréville Pluton, part of the Grand Lac Victoria is the site

of a 100m wide NNE-trending mylonite zone (GLVF on Fig. 2) that marks an abrupt change from steeply-dipping EW foliation to shallow, east-dipping NNE foliation on the east in the Pontiac Group paragneisses. East of the Fréville pluton, pegmatites and amphibolitized volcanic rocks occur in the GF zone (Voguel 1978). To the SW of the map area, tonalitic orthogneisses and granulite-grade paragneisses are in contact with granitoid rocks and Pontiac Group diatexites and paragneisses at the GF and it is marked by a contrasting magnetic anomaly.

Parautochthon

SE of the GF, the parautochthonous metasedimentary rocks show compositionnal heterogeneity, various stages of migmatization, amphibolite, pegmatite, interleaving of tonalitic orthogneiss and ultramafic layers; they are the granulite-grade equivalents of the Pontiac Group paragneiss NW of the GF. SE of the GF, sillimanite-biotite-garnet paragneisses yielded mineral $^{206}\text{Pb}/^{204}\text{Pb}$ late-Archean minimum ages (Gariépy et al., 1990) and of which a high-P low-T superimposed Grenvillian metamorphism was inferred by Indares and Martignole (1989). Large bodies of tonalitic orthogneiss associated with paragneiss are present in the SW part of the map (Fig. 2) (Rive 1977). The orthopyroxene isograd, parallel to a NS, west-verging thrust proposed by Indares and Martignole (1989) and located on the SE side of the GF, west of highway 117 (dash line labelled I & M (89) on Fig. 2) is not compatible with (1) orthopyroxene-bearing paragneisses found in the Grand Lac Victoria Fault area and west of highway 117 (Opx on Fig. 2), (2) presence of NE- and NNE-trending foliations cutting across the inferred " thrust " and (3) the absence of major structures oriented 350° - 000° . SE of the GF, Kenoran local EW-trending foliations are preserved and the Grenvillian deformation appears as NS-, NE- and NNE-trending faults, mylonite zones and reoriented Kenoran foliations all accompanied by penetrative ESE-plunging lineations. Further to the SE, the contact zone between the parautochthonous paragneiss and orthogneiss is characterized by interleaving of both rock types and shows a more intense deformation.

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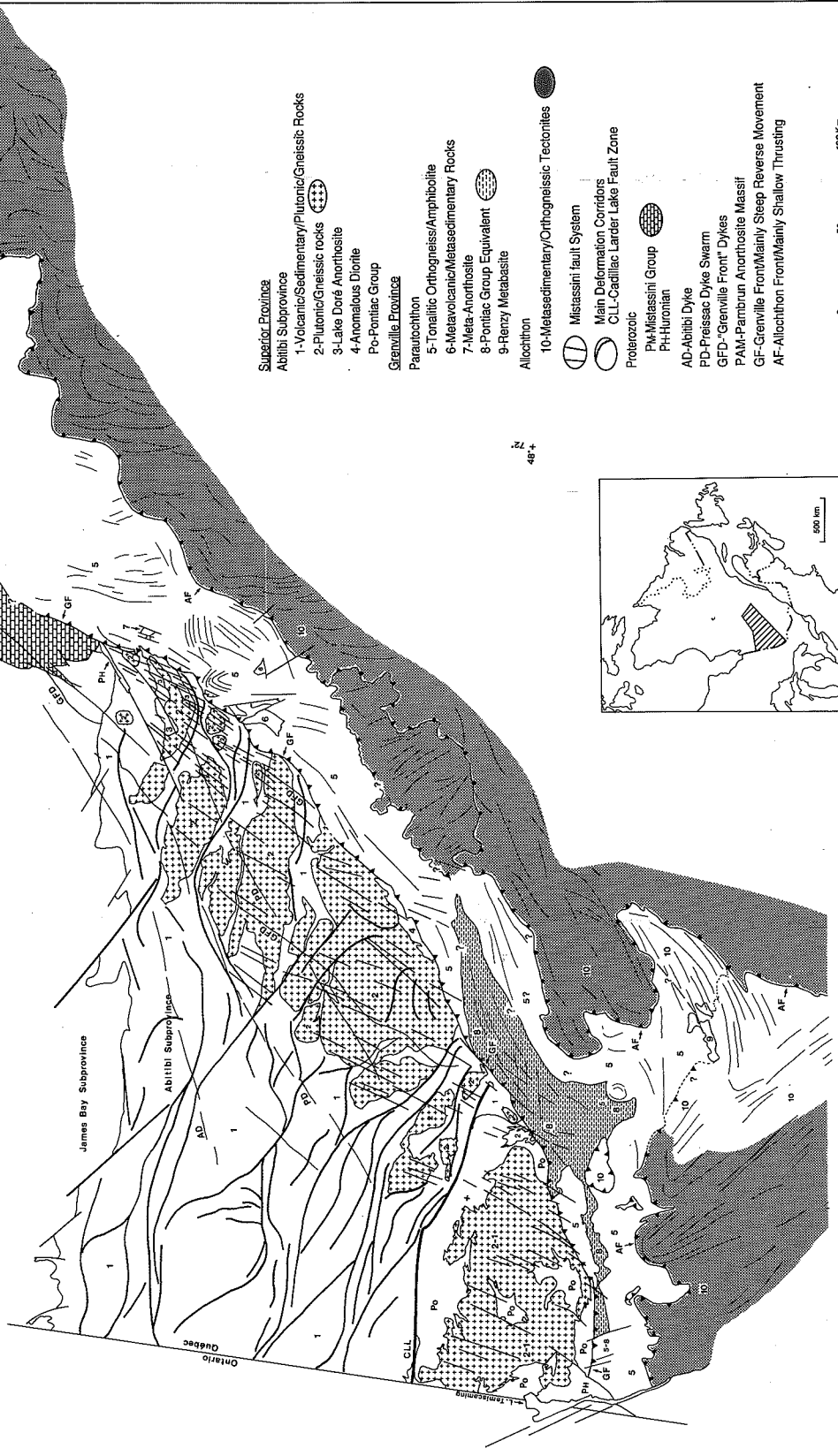
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78° 52'

Eastern Superior Province / Central Grenville Province: Morphology of the Grenville Front / Allochthon Front and Distribution of the Archean Tonalitic Orthogneisses in the northwest Grenville Province



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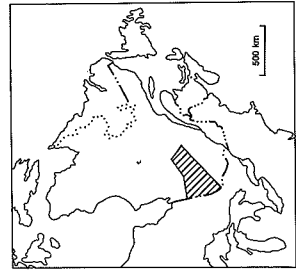


Fig.1

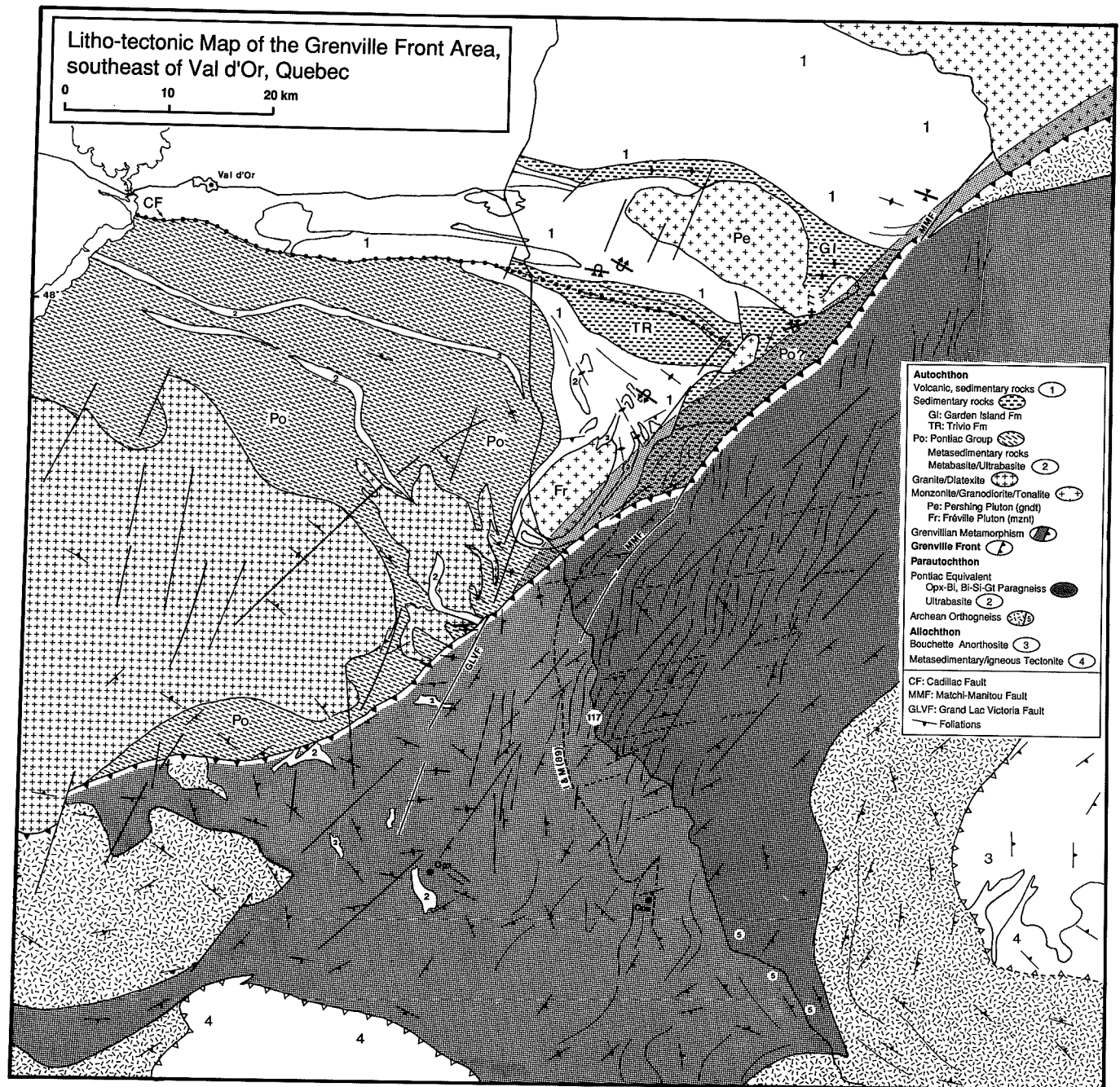


Fig.2

