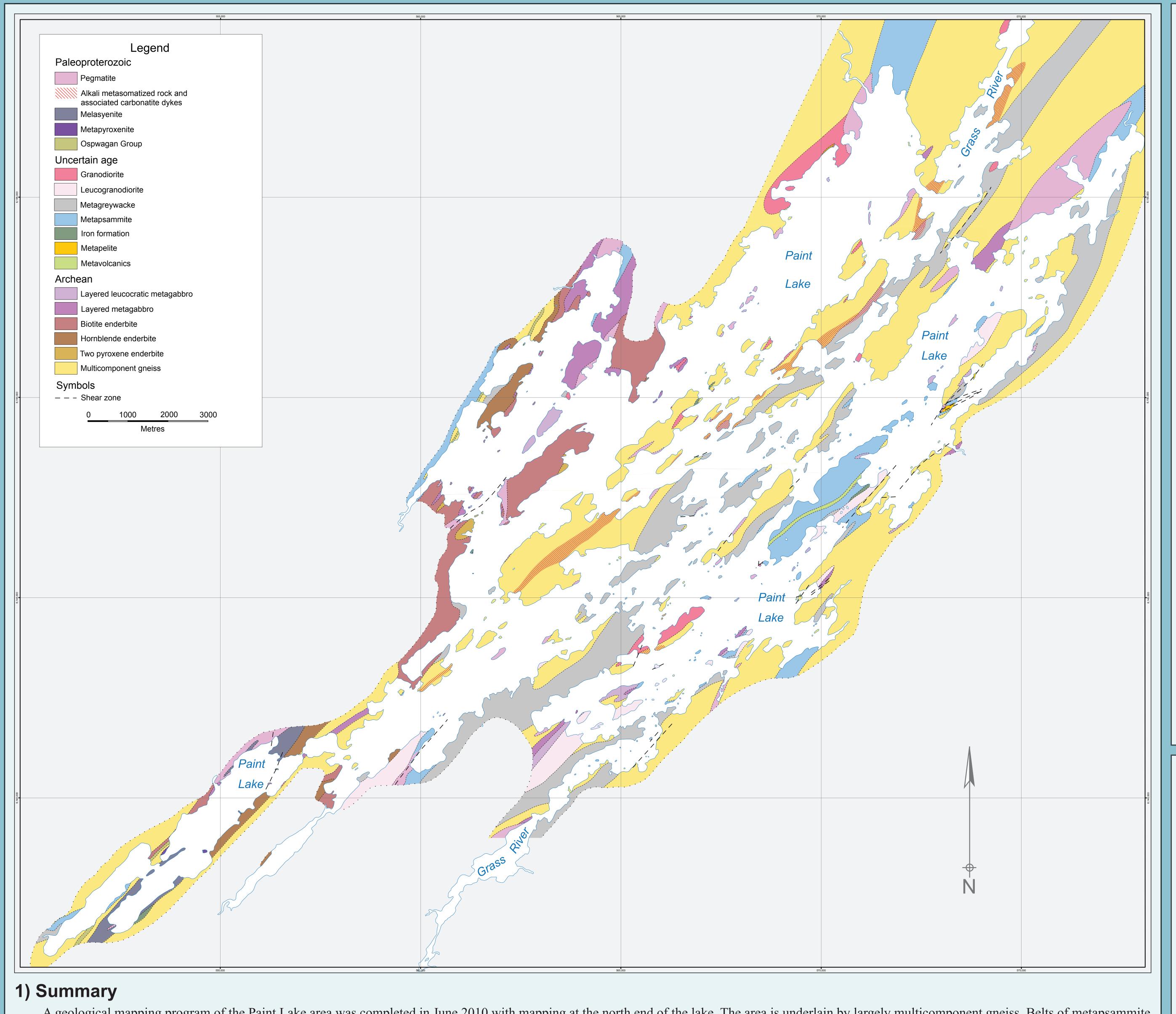


Mapping, Metamorphism, and Magnesiocarbonatites of the Paint Lake Area, Manitoba.

C.G. Couëslan, T. Martins†, & A.R. Chakhmouradian†

†The University of Manitoba, R3T 2N2

UNIVERSITY of Manitoba



A geological mapping program of the Paint Lake area was completed in June 2010 with mapping at the north end of the lake. The area is underlain by largely multicomponent gneiss. Belts of metapsammite and metagreywacke with minor iron formation are continuous with metasediments mapped the previous year. Trace element and Sm-Nd isotope geochemistry suggests these metasediments are not correlative with the Proterozoic Ospwagan Group (Couëslan & Martins 2010). The Paint Lake metasediments appear to be sourced from an older, more mafic source than the Ospwagan Group. Although the Paint Lake metasediments do not appear to be correlative with the Ospwagan Group, they could act as a potential source of sulphur for intruding ultramafic bodies. Peak metamorphic assemblages from the Paint Lake area suggest conditions of 800–840 °C and 5–6.5 kbar. Relict andalusite in metapelitic gneiss suggest a low pressure prograde metamorphic path.

A zone of previously recognized carbonatite magmatism and metasomatism was traced northward into the Grass River area. The total documented strike length of this system is now 23 kilometres; however, the intensity of magmatism and metasomatism appears to be waning towards the north. Two types of carbonatites are identified in the Paint Lake area: calcite carbonatites, and calcite-dolomite carbonatites (Chakhmouradian et al. 2009, Couëslan 2009). Carbon and oxygen isotopic compositions support an igneous origin for the carbonatites, and the trace-element geochemistry is typical of postorogenic carbonatites. Detail mapping of two carbonatite outcrops suggests the carbonatites are intruding late in the tectonomagmatic history of the Paint Lake area. The dykes cross cut all phases but the latest pegmatite intrusions. Given the extraordinary strike length of the carbonatite magmatism and metasomatism, the potential for rare element mineralization is significant.

Acknowledgements: Thanks to D. Vessey for his assistance in the field and A. Camacho for his visit and our discussions in the field. T.M. received financial support from Fundação para a Ciência e Tecnologia, Portugal. Special Manitoba thanks to the staff and students working at Midland for all of their logistical support.

2) Metamorphism Temperature (°C) Temperature (°C)

conditions. Both metapelite samples contain relict andalusite suggesting a low pressure prograde path. observed assemblage indicated in brown. D) An overlay of the three observed assemblages with the

A) The largest calcite carbonatite dyke from detail map 4A),

dolomite carbonatite dyke in central Paint Lake enclosed in

compositions of the Paint Lake carbonatites (primitive mantle

metasomatized pegmatite. C) Normalized trace-element

cuts the regional gneissocity at a low angle. B) Calcite-

of McDonough & Sun 1995) compared to the average

composition of calcite carbonatite from different tectonic

settings (Chakhmouradian, unpubl. data). The Paint Lake

samples show depletion in Ti, Zr, Hf, Nb, and Ta, typical of

postorogenic carbonatites. **D)** C-O isotopic compositions of

igneous compositions in contrast to Ospwagan Group metasediments from the Thompson Nickel Belt.

sillimanite isograd (Cesare 1994). I) Clinopyroxene and orthopyroxene partially replaced by

Ms = muscovite, Opx = orthopyroxene, PI = plagioclase, Qz = quartz, Rt = rutile,

Cal = calcite, Ccb = calcite carbonatite, Dcb = calcite-dolomite carbonatite, Di = diopside,

Dol = dolomite, Gn = multicomponent gneiss, Mgt = magnetite, Ol = olivine, Peg = pegmatite,

olivine crystals in a calcite-dolomite matrix;

F) Back scatter electron image of calcite-

dolomite carbonatite with phlogopite and

olivine in a carbonate matrix of Mg-calcite,

with exsolved and interstitial dolomite. G)

dolomite carbonatite. Olivine is replaced by

amphibole +/- magnetite exsolution lamellae

Back scatter electron image of calcite-

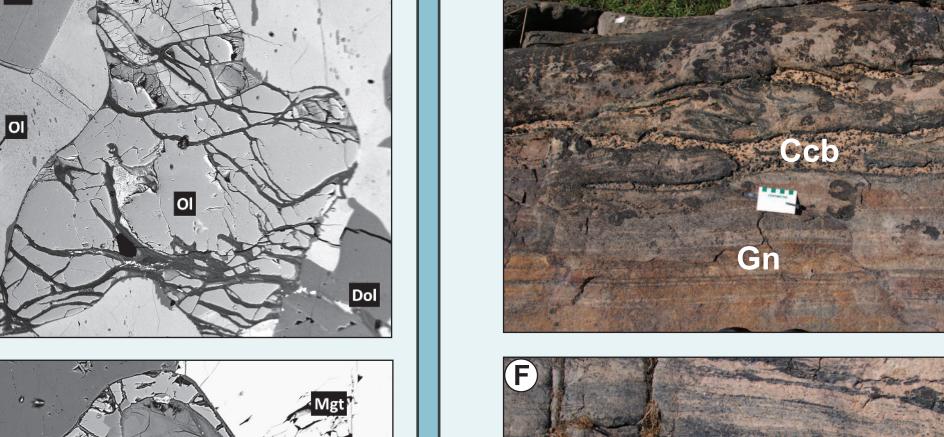
and diopside: their relative order of

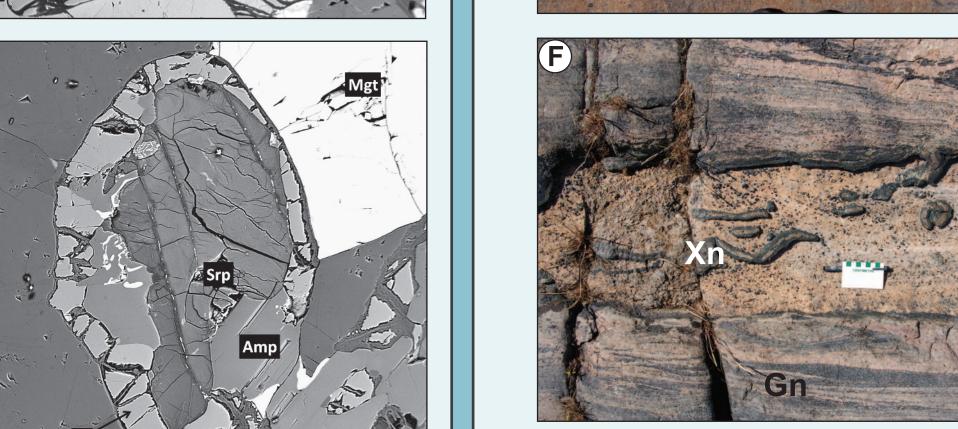
Abbreviations: Amp = amphibole,

Phl = phlogopite, Srp = serpentine

crystallization remains to be determined.

some olivine is pseudomorphed by serpentine.

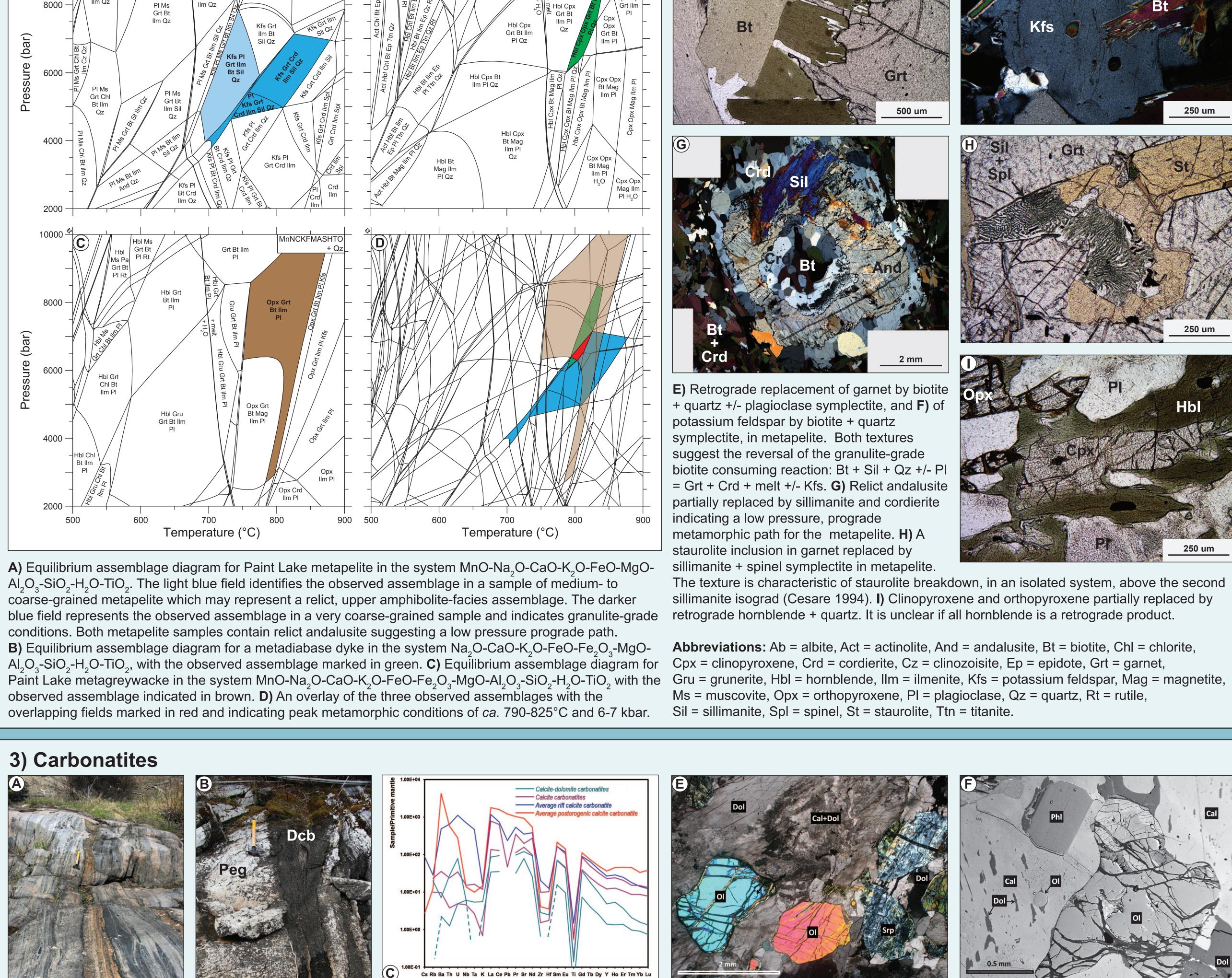




with a thick, clinopyroxene-rich selvedge.

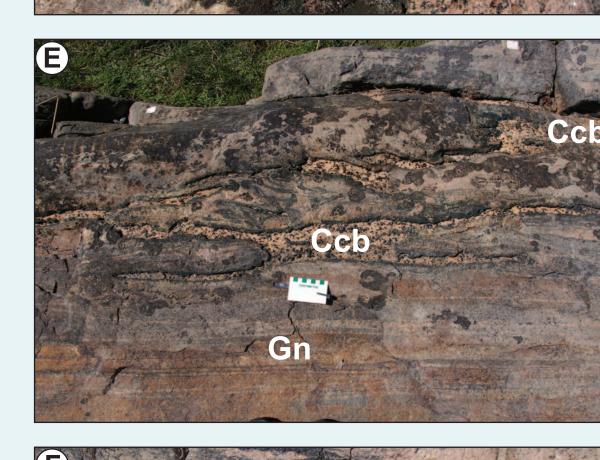
A) & B) Detailed lithological maps of outcrops from Photographs C) to F) are located on map A), photographs G) to I) are located on map B). C) & D) Late pegmatite dyke cross cutting the regional gneissocity and carbonatite dykes. E) Anastomozin carbonatite dyke. F) Carbonatite dyke with entrained xenoliths of country rock. G) Bulbous intrusion of a late pegmatite dyke into carbonatite. H) Late pegmatite cross cutting the regional gneissocity and carbonatite dykes. I) Terminus of a carbontite dyke

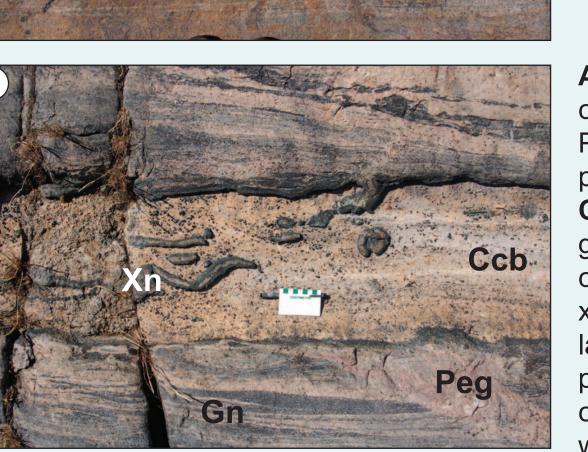
Abbreviations: Ccb = calcite carbonatite, Gn = multicomponent gneiss, Peg = pegmatite, Xn = xenolith.

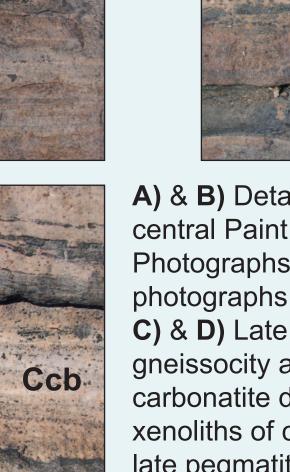


■ Calcite-dolomite carbonatites

4) Detail Mapping







Pegmatite

Massive quartz

