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Duguet, M. 2018. Geological, geochemical, geophysical and petrographic data related to the Cochrane and Borden townships area, Kapuskasing Structural Zone, Wawa–Abitibi terrane; Ontario Geological Survey, Miscellaneous Release—Data 365.

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These data accompany:

Preliminary Map P.3821, *Precambrian Geology of Cochrane and Borden Townships, Kapuskasing Structural Zone, Wawa–Abitibi Terrane*.

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Miscellaneous Release—Data 365

Geological, Geochemical, Geophysical and Petrographic Data Related to the Cochrane and Borden Townships Area, Kapuskasing Structural Zone, Wawa–Abitibi Terrane

by M. Duguet

This publication can be downloaded from

http://www.geologyontario.mndm.gov.on.ca/mndmaccess/mndm_dir.asp?type=pub&id=MRD365

This digital data release contains field photographs and petrographic images, and whole-rock geochemical, petrographic, magnetic susceptibility and scintillometer data collected as part of 1:20 000 scale bedrock geology mapping of Cochrane and Borden townships (Project NE-16-002) (Borden Lake area) during the summer of 2016. Also included are presentations and a previously published article related to the project. This release comprises 141 field photographs (as *.jpg* files), 13 thin section scans (as *.jpg* files), 98 scanning electron microscope (SEM) (*.bmp*) images and 43 associated thermobarometric (*.txt*) program files, 3 Microsoft® Excel® 2013 (*.xlsx*) workbook files and 8 documents in portable document format (*.pdf*). These data augment Preliminary Map P.3821, *Precambrian Geology of Cochrane and Borden Townships, Kapuskasing Structural Zone, Wawa–Abitibi Terrane*; the geological legend for the map is also provided.

Data are organized into 5 folders:

1. Geochemistry
2. Geology and Publication
3. Geophysics
4. Petrography
5. Photographs

1. Geochemistry. This folder contains 1 Microsoft® Excel® 2013 (.xlsx) file.

MRD365_Borden Lake_Geochemistry.xlsx consists of 1 worksheet.

This worksheet also contains location data (“Easting”, “Northing” and “Township”), “Rock Type”, and stratigraphic information, if known, for each sample collected; UTM co-ordinates are provided in North American Datum 1983 (NAD83), Zone 17.

“Whole rock data” worksheet contains 166 whole-rock geochemical analyses (including 9 analyses of sample splits) acquired from samples collected during the summer of 2016 as part of this study. The geochemical analyses were performed at the Geoscience Laboratories (Geo Labs), Ontario Geological Survey, Sudbury. Sample descriptions and thin section descriptions (when available) are also provided; note: mineral abbreviations used in the worksheet are provided in this readme file. The methods used, lower detection limit for each method, and reported units for each method are included for each element (and oxide) listed. A few samples were collected in the townships adjacent to Cochrane and Borden townships as reconnaissance work during the mapping of this area during the summer of 2016.

2. Geology and Publication. This folder contains 5 portable document format (.pdf) files, one of which is a publication associated with this project.

MRD365_SoFW2016-04_Duguet et al.pdf: An article (Duguet and Szumylo 2016), published in the Ontario Geological Survey *Summary of Field Work and Other Activities, 2016* volume, outlining the activities and results of field work for this project (Project NE-16-002) during the summer of 2016.

P3821_Legend.pdf is the general legend used as the base for Ontario Geological Survey Preliminary Map P.3821, *Precambrian Geology of Cochrane and Borden Townships, Kapuskasing Structural Zone, Wawa-Abitibi Terrane*; (Duguet and Szumylo 2018). Material in the geochemistry file and the photograph captions file are cross-referenced to map codes in the legend.

MRD365_OPES-NEOMMS 2017 talk.pdf is the 20-minute oral presentation (Duguet 2017a) presented at both the Ontario Prospectors Association Exploration Showcase (OPES) at Thunder Bay in early April 2017 and at the Northeastern Ontario Mines and Minerals Symposium (NEOMMS) in mid-April 2017 in Timmins. This presentation summarizes the preliminary results of the geological mapping project in Borden and Cochrane townships in the Kapuskasing structural zone.

MRD365_SGA 2017_extended abstract.pdf is the abstract submitted for the poster (Duguet 2017b) presented at the Society of Geology Applied to Mineral Deposit (SGA) 14th Biennial SGA conference in Québec City in August 2017.

MRD365_SGA 2017_poster.pdf is the poster (Duguet 2017b) presented at the Society of Geology Applied to Mineral Deposit (SGA) 14th Biennial meeting in Québec City (August 20–23, 2017).

3. Geophysics. This folder contains 1 Microsoft® Excel® 2013 (.xlsx) file.

MRD365_Borden Lake_Geophysical Data.xlsx contains 2 worksheets.

“Magnetic Susceptibility” worksheet provides magnetic susceptibility data from the study area collected during the summer of 2016.

Measurements were collected using Exploranium® KT-10 magnetic susceptibility meters. Magnetic susceptibility is defined as the degree to which a substance can be magnetized and, in this case, is expressed as the ratio of the intensity of magnetization (k) to the ratio of the Earth’s magnetic field to magnetic field induced by the susceptibility meter. The readings (k) are expressed as 10^{-3} times the SI unit for susceptibility and are dimensionless. The minimum value that can be recorded by the meter is 0.001×10^{-3} SI units; the largest value is 999×10^{-3} SI units. Sample location information is given in UTM co-ordinates, NAD83, Zone 17.

“Scintillometer” worksheet provides ground gamma-ray scintillometer data from the study area collected during the summer of 2016.

Measurements were collected using an Exploranium™ GR-130 MiniSpec gamma-ray spectrometer, serial number 4884, calibrated on November 6, 2015, using a NaI crystal and software version 501GEO. The instrument was stabilized daily, and data were recorded using the assay mode with a 5-minute

count time. Quoted accuracy is 0.1% K, 0.4 ppm U, and 0.7 ppm Th for a sample with 2% K, 2 ppm U and 8 ppm Th. Sample location information is provided in UTM co-ordinates, NAD83, Zone 17. Easton (2009) provides precision and reproducibility data for the instrument.

4. Petrography. This folder contains several subfolders with a total of 1 Microsoft® Excel® 2013 (.xlsx) file, 2 portable document format (.pdf) files, 13 thin section photo (.jpg) files, 98 SEM image (.bmp) files and 43 thermobarometric data (.txt) files.

“**Microprobe**” subfolder includes 2 subfolders.

“**SX-100_March-2017**” sub-subfolder contains mineral analyses performed with a CAMECA SX-100 microprobe on several garnet-bearing samples. Analysis conditions, calibrations, and analyses are presented in a Microsoft® Excel® 2013 (.xlsx) workbook file.

MRD365_16-0435-EMP-100.xlsx workbook file contains 4 worksheets: “Garnet”, “Feldspar”, “Amphibolite” and “Ilmenite”, each representing a different mineral species for which specific analytic protocols have been established by the Geo Labs.

This workbook file is accompanied with 98 back-scattered scanning electron microscopy images taken between microprobe analysis runs and showing the locations of the analysis points (green, numbered circles). Image names are linked to station labels (e.g., 16MD036A is from station 16MD036). Images are duplicated with one image showing the analysis locations (“pt” or “pts” in file name) and the other image without them. The label numbers of analysis points on the back-scattered scanning electron microscopy pictures match those in the column “Point” of each worksheet in the *MRD365_16-0435-EMP-100.xlsx* workbook file.

“**Thermobarometry**” sub-subfolder contains thermobarometric calculations performed using mineral chemistry acquired with the microprobe. The “Thermobarometry” sub-subfolder is subdivided into an additional 2 subfolders.

“**AX_files**” subfolder contains 29 text files of structural formulae and activity calculations for different mineral phases. These calculations constitute a prerequisite step before running thermobarometric calculations and were performed with the AX software (Holland 2009).

“**Thermocalc_runs**” subfolder contains 7 input text files (e.g., tc-16MD036A) generated by AX software and used to calculate pressures and temperatures with the Average-PT mode of THERMOCALC v3.4 (Holland and Powell 1998). THERMOCALC uses the internally consistent thermodynamic database tc-ds62 (Holland and Powell 2011). The 7 output text files (e.g., tc-16MD036A-o) present thermobarometric calculations performed for each sample for a full range of CO₂ activity. Full methodology, software and file downloads can be found at <http://www.metamorph.geo.uni-mainz.de/thermocalc/index.html> [accessed June 22, 2018].

“**Thin section scans**” subfolder includes 2 subfolders.

“**Alteration_Mineralization_thin sections**” sub-subfolder contains 8 high-resolution scans of thin sections illustrating various types of metamorphosed alteration in the Borden Lake area. The photo file names for the .jpg files are based on station location, which is provided in UTM co-ordinates, NAD83, Zone 17.

MRD365_Borden Lake_Metamorphosed Alteration Samples_Thin Section Photos_Captions.pdf provides the petrographic description for each sample.

“**Geochronology_thin sections**” sub-subfolder contains 5 high-resolution scans of thin sections of samples collected for U/Pb geochronology. Ages are reported on Preliminary Map P.3821. Photo file names for the .jpg files are based on station location, which is provided in UTM co-ordinates, NAD83, Zone 17.

MRD365_Borden Lake_Geochronology Samples_Thin Section Photos_Captions.pdf provides the petrographic description for each sample.

5. Photographs. This folder contains 141 field photographs (as .jpg files) and 1 portable document format (.pdf) file. The photographs were taken during the summer of 2016 as part of the mapping project.

MRD365_Borden Lake_Field Photo Captions.pdf provides the station location, a brief photo description and identifies the scale used in the photo. Photo file names for the .jpg files are based on station location, e.g., 16MD002_02-N is photograph number 2 (“_02”), from station MD002 in 2016, with the camera facing to the north. Station location information is provided in UTM co-ordinates, NAD83, Zone 17.

Mineral Abbreviations

These abbreviations are used *MRD365_Borden Lake_Geochemistry.xlsx*.

ab	albite	cz	clinozoisite	phl	phlogopite
act	actinolite	di	diopside	pl	plagioclase
al	allanite	ep	epidote	py	pyrite
an	anorthite	fsp	feldspar (undifferentiated)	qtz	quartz
ap	apatite	grt	garnet	rbk	riebeckite
aug	augite	gru	grünerite	scp	scapolite
bt	biotite	hbl	hornblende	ser	sericite
cal	calcite	ilm	ilmenite	sil.....	sillimanite
carb	carbonate	kfs	potassium feldspar	spn	spene (titanite)
chl	chlorite	mag	magnetite	sul	sulphide minerals
cp	chalcopyrite	ms	muscovite		(unspecified)
cpx	clinopyroxene	ol	olivine	tr	tremolite

These abbreviations are used the Petrography subfolder files for AX and THERMOCALC software.

Abbreviation	Endmember
ab	albite
alm	almandine
an	anorthite
ann	annite
cc	calcite
cumm	cummingtonite
cz	clinozoisite
east	eastonite
ep	epidote
fact	ferro-actinolite
gl	glaucophane
gr	grossular
gru	grünerite
parg	pargasite
phl	phlogopite
py	pyrope
q	quartz
spss	spessartite
tr	tremolite
ts	tschermakite

Abbreviation	Mineral
amph	amphibole
bi	biotite
ep	epidote
fsp	plagioclase
g	garnet
gru	grünerite
qtz	quartz

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- Duguet, M. 2017a. Archean and Proterozoic geology of the Borden Lake area, Kapuskasing Structural Zone, Abitibi–Wawa terrane; oral presentation, Ontario Prospectors Association Exploration Showcase, Thunder Bay, Ontario, April 4–6, 2017, and Ontario Prospectors Association, Northeastern Ontario Mines and Minerals Symposium, Timmins, Ontario, April 18–19, 2017.
- 2017b. Structural architecture and metamorphism of the Borden Lake greenstone belt, Kapuskasing Structural Zone, Abitibi–Wawa terrane; extended abstract *in* Society of Geology Applied to Mineral Deposit (SGA), 14th Biennial meeting, August 20–23, 2017, Quebec City, Quebec, Proceedings, v.1, p.131-134.
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