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and

Preliminary Map P.3818, *Precambrian Geology of the Perth Area, Grenville Province, Southeastern Ontario*.[1]

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Miscellaneous Release—Data 351

Geological, Geochemical, Geophysical and Petrographic Data from the Perth Area, Grenville Province, Southeastern Ontario

by R.M. Easton

This publication can be downloaded from
http://www.geologyontario.mndm.gov.on.ca/mndmaccess/mndm_dir.asp?type=pub&id=MRD351

This digital data release consists of geological information (field notes, outcrop photographs), whole-rock geochemical data, magnetic susceptibility data, scintillometer data, and photomicrographs and petrographic data obtained between June 2015 and November 2016, as part of a 1:50 000 scale bedrock geological mapping project (Project Unit 15-014) in the Perth area of southeastern Ontario. This release comprises 482 photographs and 8 thin section images (as *.jpg* files), 172 backscattered scanning electron microscope images (as *.tif* files), 6 Microsoft® Excel® 365 (*.xlsx*) files and 9 documents in portable document format (*.pdf*).

Data are organized into 5 folders, 2 of which have subfolders:

1. Field Data
   - Field Photographs (with 4 subfolders)
2. Geochemistry
3. Geophysics
4. Petrography
   - MRD351_BSE images (with 19 subfolders)
   - MRD351_Thin Section images
5. Presentations and Publications

[1] *Open File Report 6330 was published in 2017; Preliminary Map P.3818 is in preparation, with publication planned for 2019.*

1. Field Data. This folder contains 1 Microsoft® Excel® 365 (*.xlsx*) file, and 1 subfolder with 482 photographs (as *.jpg* files) and 1 portable document format *(.pdf*) file with photo captions. Photos in the "Field Photographs" subfolder were taken during the summers of 2015 and 2016 as part of the mapping project.

The workbook files in this folder contain raw data collected while working in the field during the summers of 2015 and 2016 using a customized ESRI® ArcPad® application on a portable computer (Trimble® Juno™ SB handheld global positioning system (GPS) device). The original files have been edited (to remove abbreviations and spelling errors) and abridged, in particular, blank columns have been removed from the original files. Some columns, such as Object Identifier and Lithology Identifier, have been retained in the workbooks to facilitate the import of these files into either ESRI® ArcGIS® or database software.

MRD351_Perth_Field Data.xlsx consists of 8 worksheets.

Seven (7) worksheets consist of edited and abridged field notes collected by R.M. Easton during the summers of 2015, 2016 and 2017 as part of bedrock geological mapping, at a scale of 1:50 000, in the Perth area. Also included are data for 52 stations visited by RM. Easton in 1988 and /or1994 during prior studies in the area; geographical location information for these historical stations is less precise than for the 2015–2017 stations. All locations are provided as Universal Transverse Mercator (UTM) co-ordinates using North American Datum 1983 (NAD83), Zone 18.

The last worksheet presents a summary of all geochronological information from the map area.

"Station" worksheet provides a brief description of each station visited, including descriptions of the observed outcrops, as well as the date and time of each visit and the geographic co-ordinates for each station (in both UTM co-ordinates and latitude and longitude using NAD83 in Zone 18).

"Intrusive" worksheet contains a description of each outcrop that was classified as an intrusive rock, regardless of whether it was metamorphosed or not. All of these outcrops are Precambrian.

"Metamorphic" worksheet contains a description of each outcrop that was classified as a metamorphic rock. All of these outcrops are Precambrian.

"Sedimentary" worksheet contains a description of each outcrop that was classified as a sedimentary rock. All of these outcrops are Paleozoic.

"Structure" worksheet contains any planar, linear and curvilinear (folded) structural features, including the classification, orientation and a brief description for each feature. Abbreviations in this worksheet correspond to those listed in Jackson, Muir and Romkey (1995, 2010).

"Sample" worksheet provides a brief description of each rock sample collected in the field, along with the purpose for collecting each sample.

"Photo" worksheet provides a brief description of each photographic site in the field.

"Geochronology" worksheet contains a listing of all geochronological information available for the study area.

"**MRD351_Field Photographs**" subfolder contains 472 photos (as *.jpg* images) taken during field work by R.M. Easton in 2015 and/or 2016. It also contains 10 photos (as *.jpg* images) taken by R.M. Easton in 1988 during previous reconnaissance studies in the Perth area. These photographs are a subset of all of the photographs collected during the project and have been selected for quality and for being representative of the major rock units observed in the Perth area. Photographs are grouped into 4 subfolders: 1) Paleozoic Rocks, 2) Precambrian Rocks, 3) Pits, Abandoned Mines and Occurrences and 4) 1988 Photos. The photo files are labelled according to station number and photograph number (e.g., 15RME-01xx-2 is photograph 2 from station 15RME-01xx). Descriptions of each photograph are provided in the *MRD351_Perth_Field Photo Captions* document.

MRD351_Perth_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., 15RME-01xx-2 is photograph number 2, from station RME-01xx in 2015. Station location information is provided in UTM co-ordinates, NAD83, Zone 18.

2. Geochemistry. This folder contains 1 Microsoft® Excel® 365 (*.xlsx*) file and 2 portable document format (*.pdf*) files.

MRD351_Perth_Geochemistry.xlsx consists of 6 worksheets.

"Whole-rock_this study" worksheet contains the results of whole-rock geochemical analyses acquired from samples collected as part of this study during the summers of 2015 and 2016. The geochemical analyses were performed at the Ontario Geological Survey Geoscience Laboratories (Geo Labs) in Sudbury. The methods used, lower detection limit for each method, and reported units for each method are included for each element (and oxide) listed. The methods are described in more detail in the accompanying files "*2015 Geo Labs Brochure.pdf*" and "*2016 Geo Labs Brochure.pdf*". 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 NAD83, Zone 18.

"Assay this study" worksheet contains the results of geochemical analyses for assay purposes on samples collected as part of this study from the Perth area. Work was performed at the Ontario Geological Survey Geoscience Laboratories (Sudbury).

"Whole-rock 1994" worksheet contains the results of geochemical analyses performed at the Ontario Geological Survey Geoscience Laboratories (Sudbury) on samples collected by R.M. Easton in 1994 during reconnaissance work in the Perth area.

"MRD251 marbles" worksheet contains the results of geochemical analyses performed at the Ontario Geological Survey Geoscience Laboratories (Toronto) on marbles in the Perth area that were sampled in the 1980s. These data were originally reported by van Haaften and Meyn (1990, 2010).

"Paleozoic" worksheet contains the results of geochemical analyses performed at the Ontario Geological Survey Geoscience Laboratories (Sudbury) on Paleozoic samples in the Perth area. The same data are also included in worksheet "whole-rock_this study".

"Paleozoic literature" worksheet contains the results of geochemical analyses of Paleozoic rocks from the Perth area compiled from the literature. These are mostly partial analyses for major and trace elements. Data sources are listed in the worksheet.

2015 Geo Labs Brochure.pdf and *2016 Geo Labs Brochure.pdf* describe the analytical methods used at the Ontario Geological Survey Geoscience Laboratories for samples submitted in 2015 and 2016, respectively.

3. Geophysics. This folder contains 2 Microsoft® Excel® 365 (*.xlsx*) files.

MRD351_Perth_Magnetic Susceptibility Data.xlsx contains 3 worksheets.

"Perth-2016_Mag-Susc" worksheet provides the magnetic susceptibility data from the Perth area collected in 2016.

Measurements were collected using an Exploranium™ KT-9 or a KT-10 magnetic susceptibility meter. 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 in NAD83, Zone 18.

"Perth-2015_Mag-Susc" worksheet provides the magnetic susceptibility data from the Perth area collected in 2015.

Measurements were collected using an Exploranium™ KT-10 magnetic susceptibility meter. Sample location information is given in UTM co-ordinates, NAD83, Zone 18.

"Pick Lists, Notes" worksheet provides additional information about the pick-lists for fields ("Geological Province", "Meter Number", "UTM Zone", "Rock Type Pick List", "Rock Types Corresponding to Pick List", "Dike Swarm Name", "Metamorphic Grade") used in the workbook.

MRD351_Perth_Scintillometer Data.xlsx contains 2 worksheets.

"Perth 2015-2016 Scintillometer" worksheet provides ground gamma-ray scintillometer data from the study area collected during the summers of 2015 and 2016, with additional data collected by R.M. Easton in 1994 during reconnaissance work in the Perth area.

Unless otherwise indicated, measurements were collected using an Exploranium™ GR-130 MiniSpec gamma-ray spectrometer, serial number 4885, calibrated on November 18, 2014, for measurements collected in 2015 and calibrated on November 6, 2015, for measurements collected in 2016. The spectrometer uses 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 18. Easton (2009) provides precision and reproducibility data for the instrument.

"Pick Lists, Notes" worksheet provides additional information about the pick-lists for fields ("Geological Province", "Meter Number", "UTM Zone", "Rock Type Pick List", "Rock Types Corresponding to Pick List", "Dike Swarm Name", "Metamorphic Grade") used in the workbook.

4. Petrography. This folder contains 2 Microsoft® Excel® 365 (*.xlsx*) files and 2 subfolders with 8 photographs (as *.jpg* files) and 172 backscattered scanning electron microscope images (as *.tif* files).

MRD351_Perth_Petrography.xlsx consists of 1 worksheet.

"Petrography_SEM samples" worksheet provides descriptions for 53 samples examined using scanning electron microscopy (SEM) by R.M. Easton. Full-size thin section images of 8 of these samples are presented in the subfolder | MRD351_Thin Section images; semi-quantitative and quantitative mineral chemistry data collected from these samples are provided in *MRD351_Perth_SEM analyses.xlsx*. Backscattered scanning electron microscope images related to these samples are provided in the subfolder | MRD351_BSE images.

MRD351_Perth_SEM analyses.xlsx contains 6 worksheets providing quantitative major and trace element mineral chemistry data collected for 6 samples obtained from the Geoscience Laboratories using scanning electron microscopy (SEM). Data are provided as separate worksheets for each sample.

"**MRD351_BSE images**" subfolder provides backscattered scanning electron microscope images from polished thin sections from a variety of rock units from the Perth area, including the geochronology samples. Descriptions of these images are presented in *MRD351_Perth_Petrography.xlsx*. This subfolder consists of 5 backscattered scanning electron microscope images (as *.tif* files) and 19 subfolders, with 167 backscattered scanning electron microscope images (as *.tif* files), all labelled according to the station number for the outcrop from which the sample was collected.

"**MRD351_Thin Section images**" subfolder contains 8 images (as *.jpg* files) of whole polished thin sections. Each image is labelled according to the station number for the outcrop from which the sample was collected. The field of view of each image is approximately 3.9 mm by 2.2 mm, i.e., the size of a standard thin section. Details on the samples can be found in *MRD351_Perth_Field Data.xlsx* in the "Sample" worksheet.

5. Presentations and Publications. This folder contains 6 portable document format (*.pdf*) files for presentations and preliminary reports from 2015 to 2018 related to the Perth area bedrock geology mapping project. In addition to these files, a field trip guidebook for part of the Perth map area was published in 2017 as Ontario Geological Survey Open File Report 6330 (Easton 2017).

MRD351_SoFW2015-18_Easton.pdf is an article (Easton 2015), published in the Ontario Geological Survey *Summary of Field Work and Other Activities, 2015* volume, which, written immediately following field work in the Perth area during the summer of 2015, outlined the activities and results of that field work.

MRD351_SoFW2016-17_Easton.pdf is an article (Easton 2016a), published in the Ontario Geological Survey *Summary of Field Work and Other Activities, 2016* volume, which, written immediately following field work in the Perth area during the summer of 2016, outlined the activities and results of that field work.

MRD351_SoFW2016-18_Easton.pdf is an article (Easton 2016b), published in the Ontario Geological Survey *Summary of Field Work and Other Activities, 2016* volume, which, written immediately following field work in the Perth area during the summer of 2016, focussed on the mineral potential of syenite intrusions and calcite-diopside-mica metasomatic rocks present in eastern Ontario.

MRD351_GAC-MAC-2017_presentation_mica_Easton.pdf is an oral presentation, entitled "Metasomatism, syenite magmatism and rare earth element and related metallic mineralization in Bancroft and Frontenac terranes, Grenville Province, Ontario: A preliminary deposit model", presented at the Geological Association of Canada—Mineralogical Association of Canada Annual Meeting in Kingston, Ontario, on May 17, 2017. The presentation highlighted the recent work on mica-apatite deposits in the Perth area, in part summarized in Easton (2016b).

MRD351_GAC-MAC-2017_presentation_Perth_Easton.pdf is an oral presentation, entitled "Metamorphic and tectonic history of Frontenac terrane revisited: Evidence for a high-pressure regime preserved in the hanging-wall of the Maberly shear zone", presented at the Geological Association of Canada—Mineralogical Association of Canada Annual Meeting in Kingston, Ontario, on May 17, 2017. The presentation highlighted the metamorphic geology in the Perth area following recent bedrock geology mapping, in part summarized in Easton (2016a).

MRD351_unsubmitted_abstract_Easton.pdf is an extended abstract prepared for, and reviewed, but not submitted to, the Society of Geology Applied to Mineral Deposit (SGA) 14th Biennial SGA conference in Québec City in August 2017. The abstract, entitled "Iron oxide (P-rich) mineralization in Frontenac Suite intrusions, Central Metasedimentary Belt, Grenville Province, Ontario: Is there a relationship to iron oxide-apatite (IOA) deposits?", is based on field work in the Perth area in 2016.

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