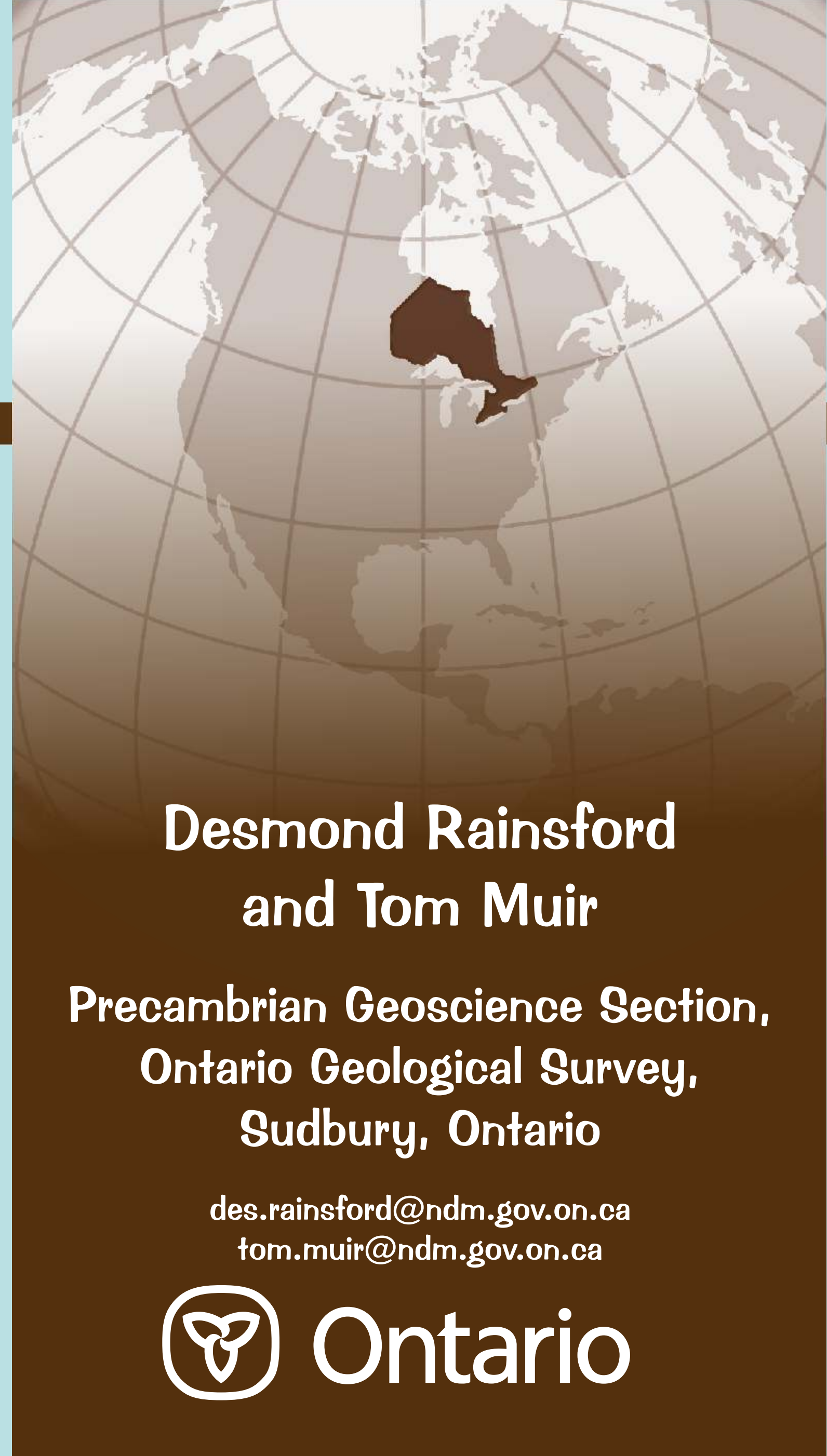


# ONTARIO GEOPHYSICS OVERVIEW



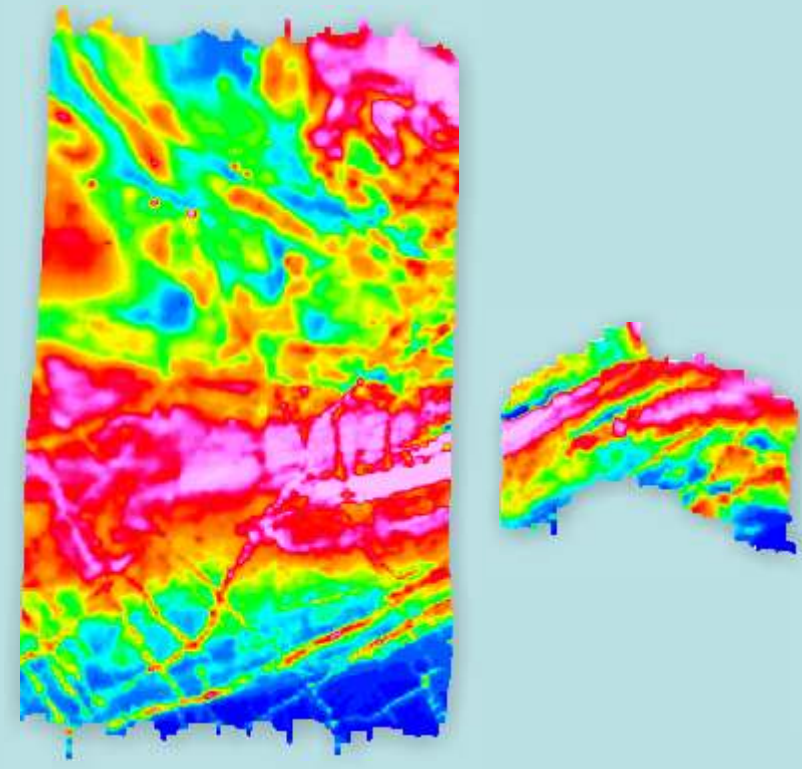
**Desmond Rainsford  
and Tom Muir**

Precambrian Geoscience Section,  
Ontario Geological Survey,  
Sudbury, Ontario

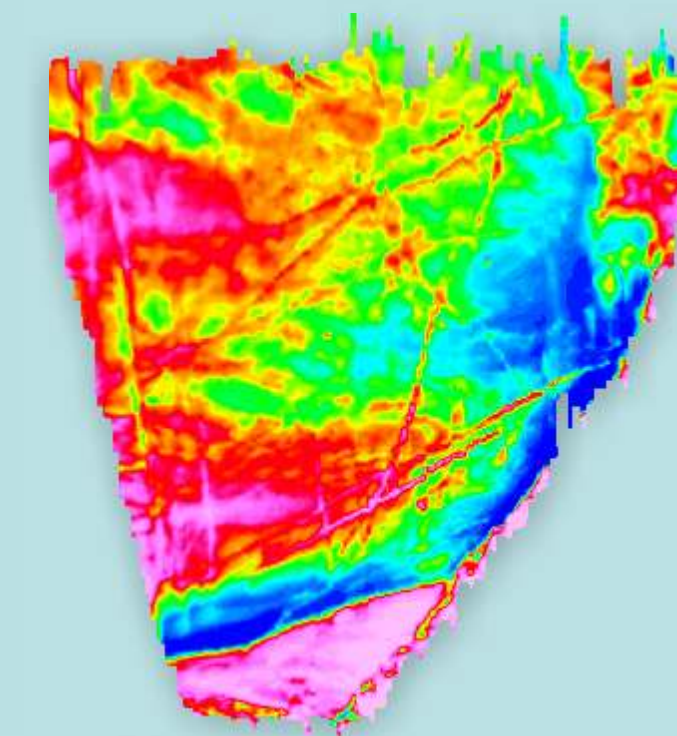
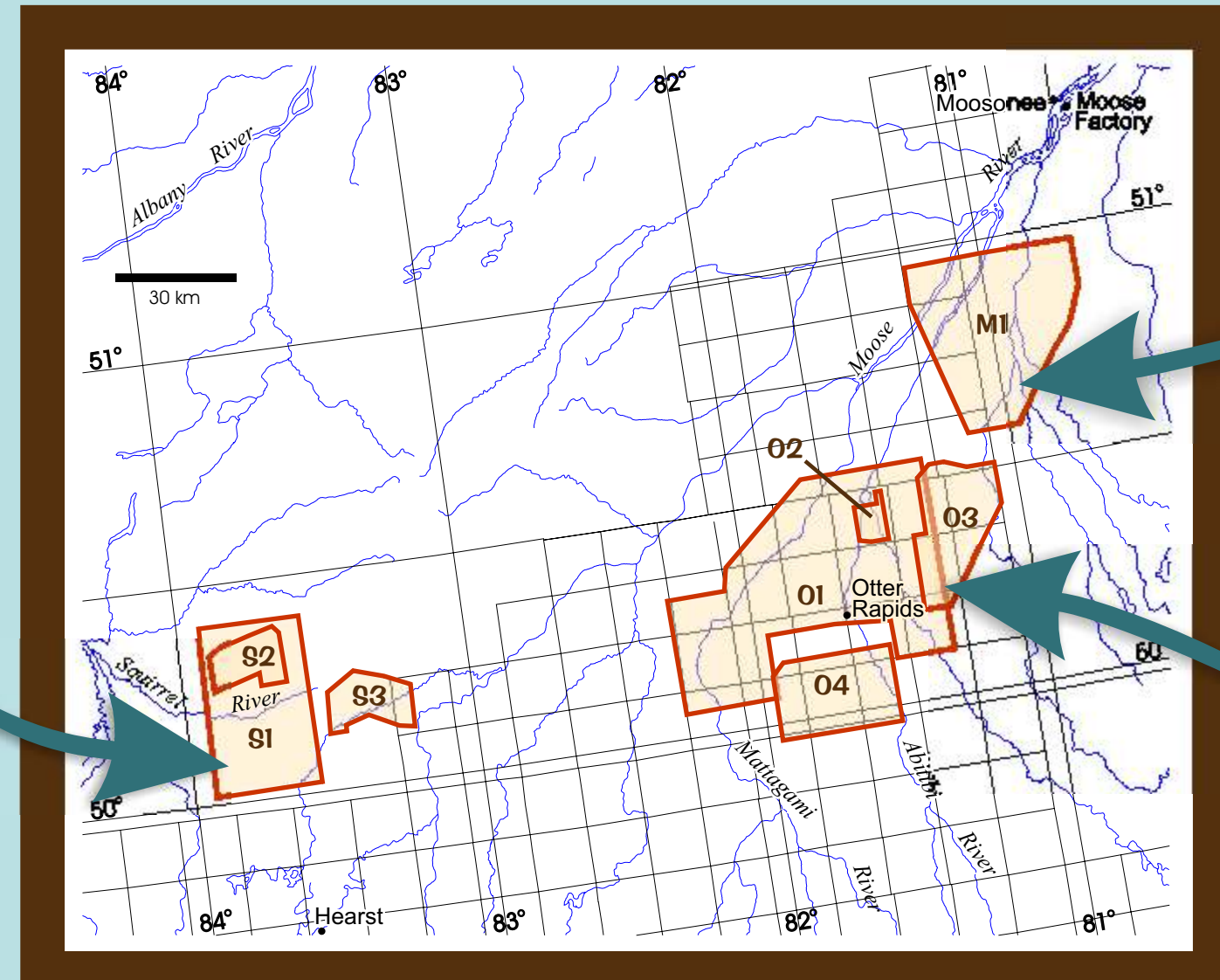
des.rainsford@ndm.gov.on.ca  
tom.muir@ndm.gov.on.ca



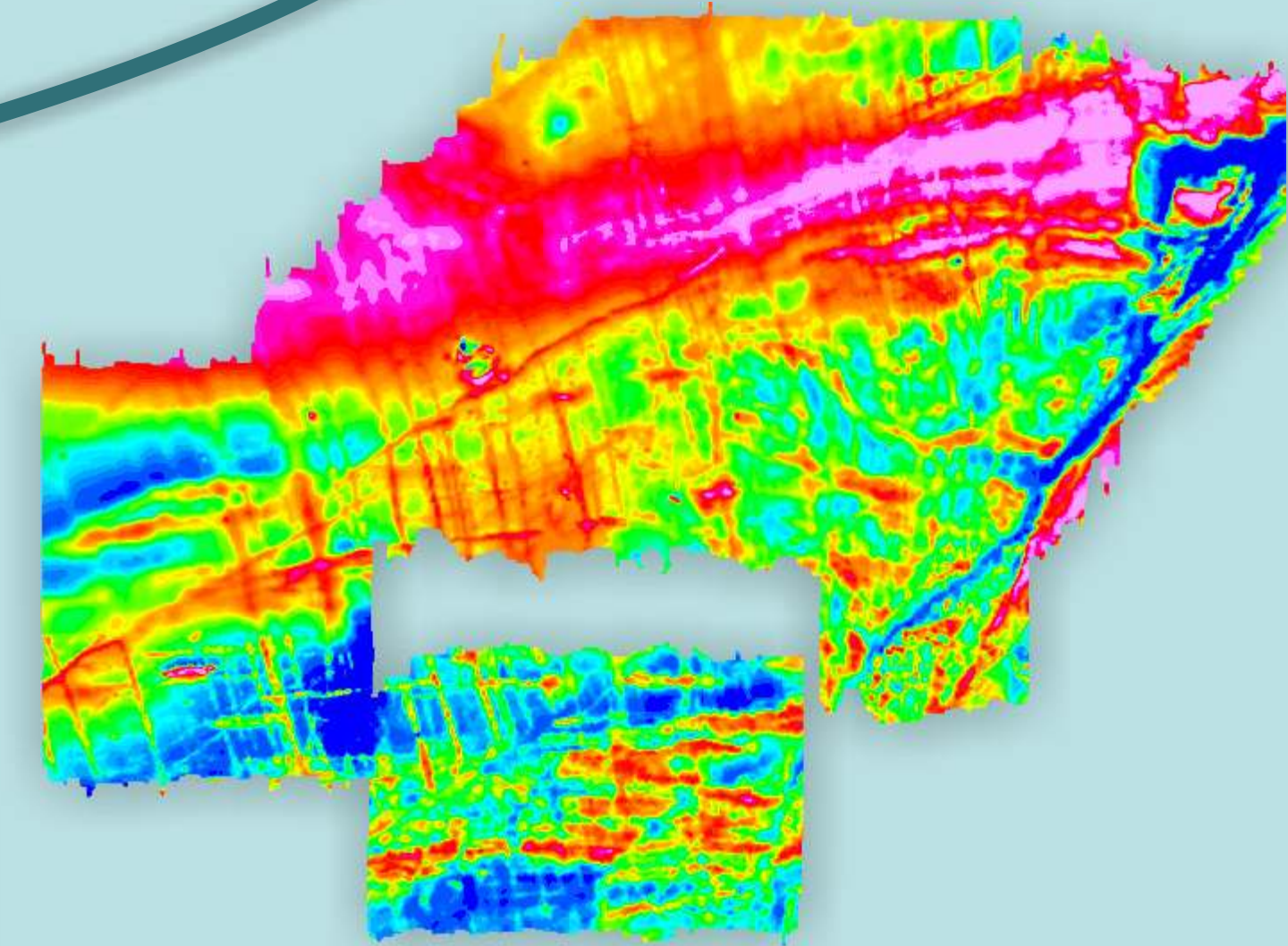
## New Release: Geophysical Data Set GDS 1228 Squirrel River - Otter Rapids - Moose River Areas (James Bay Lowlands)



Squirrel River  
Surveys



Moose River  
Survey

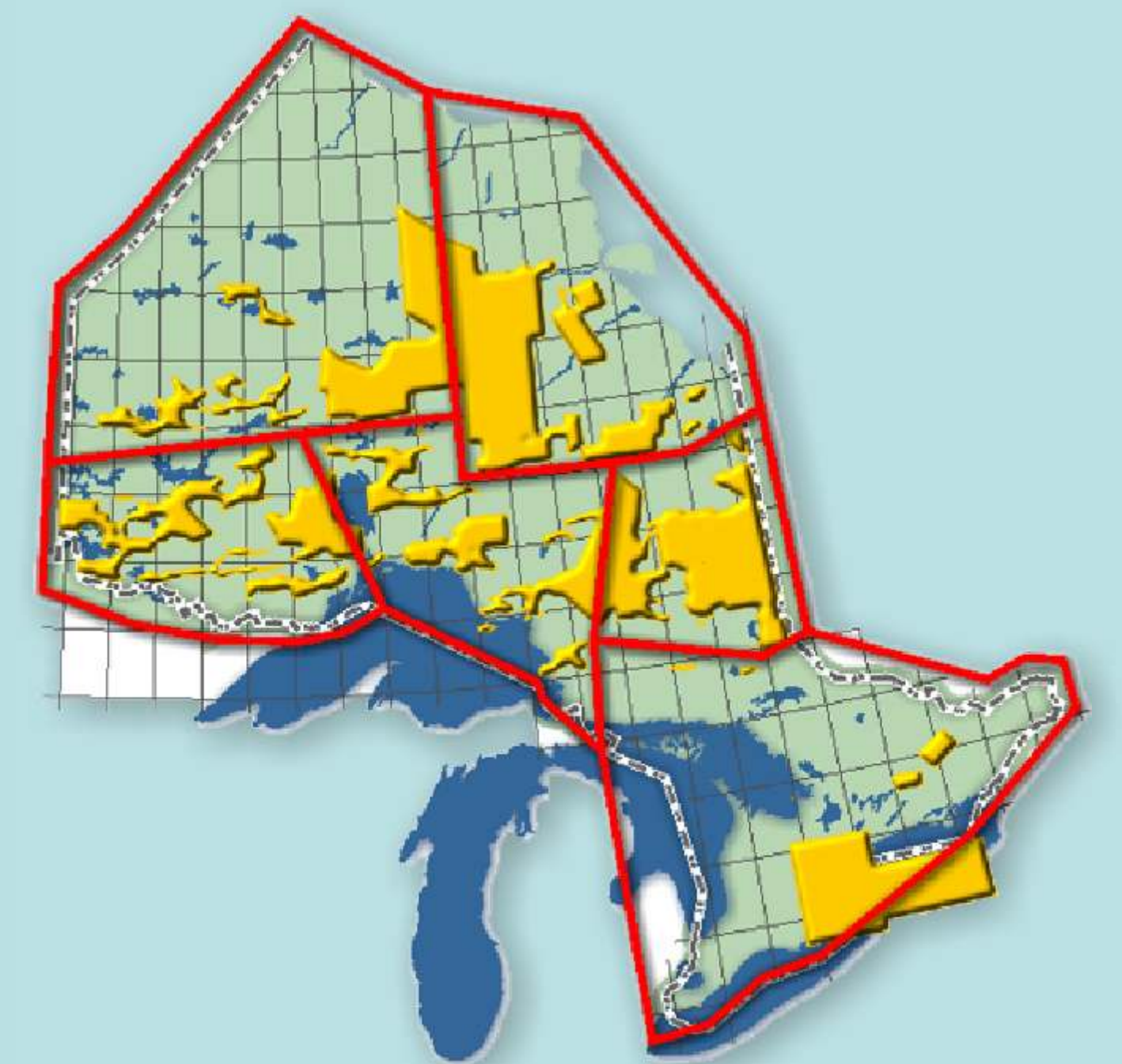


Otter  
Rapids  
Surveys

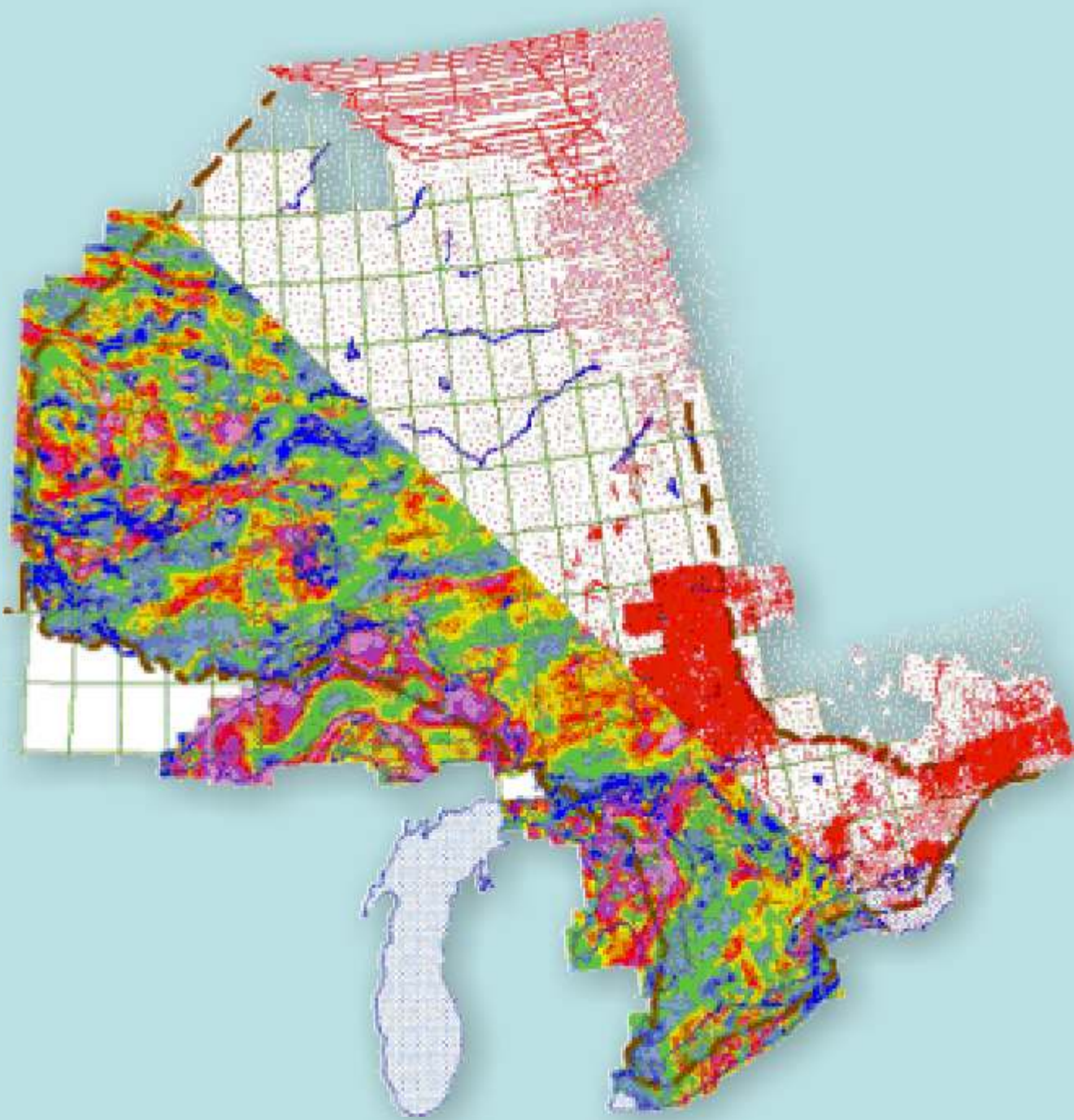
## ONTARIO GEOLOGICAL SURVEY GEOPHYSICAL ATLAS WEBSITE:

Repository of available  
geophysical data or data sources  
for Ontario:

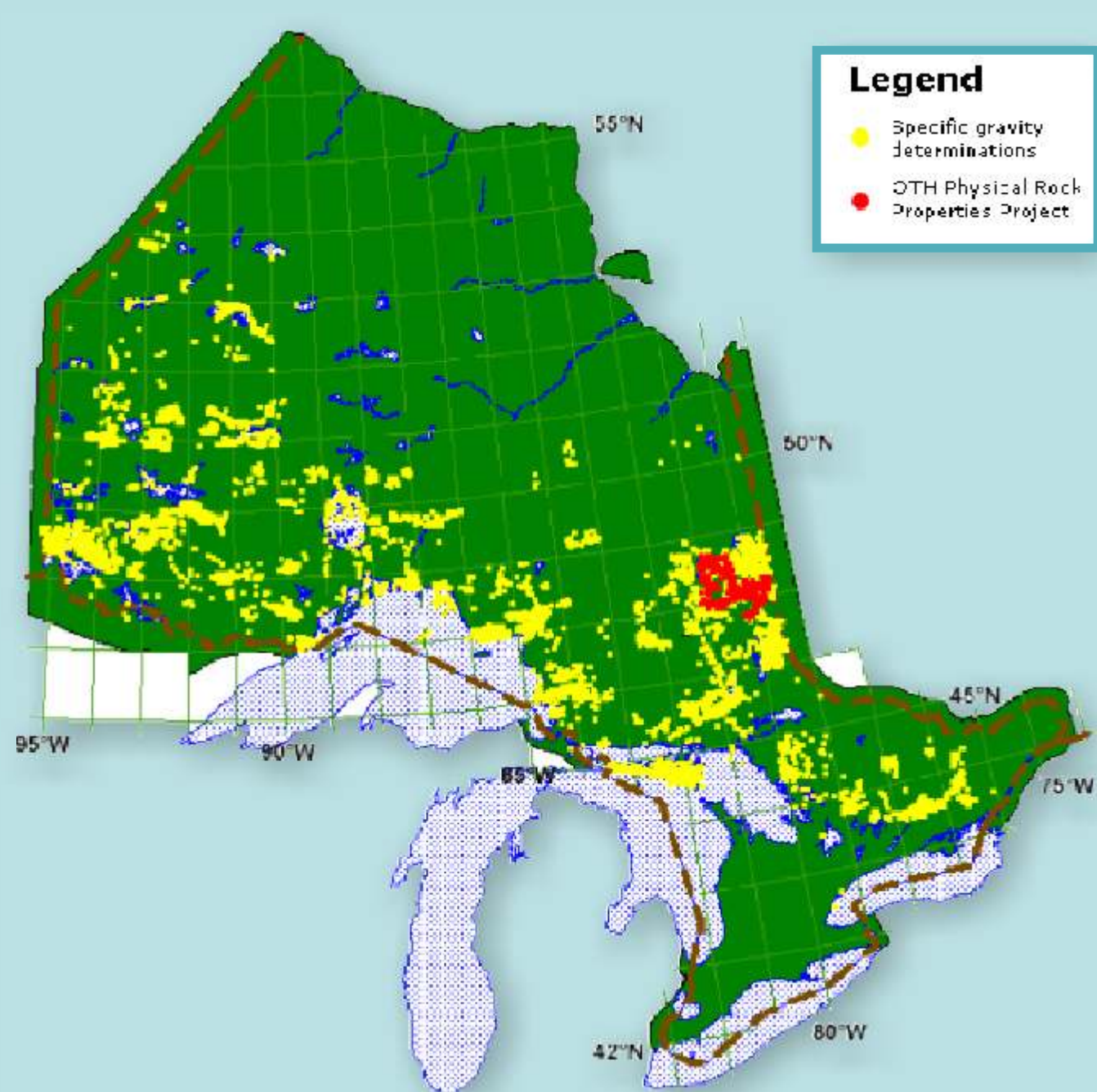
[http://www.mndm.gov.on.ca/mndm/mines/ogs/gpxatlas/default\\_e.asp](http://www.mndm.gov.on.ca/mndm/mines/ogs/gpxatlas/default_e.asp)



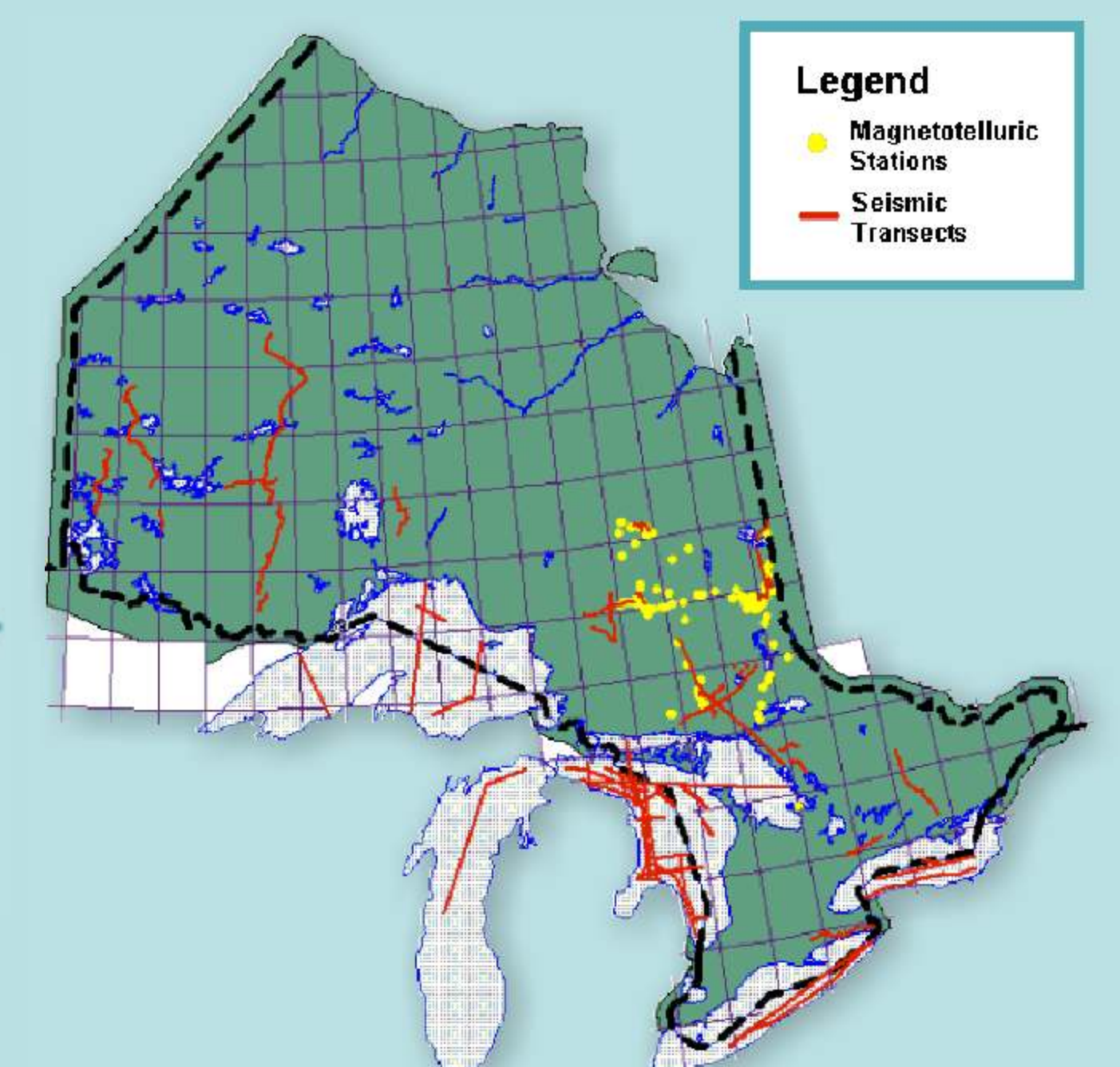
Site for narrowing the scope of selecting surveys  
in Ontario by choosing the region,  
then the specific survey



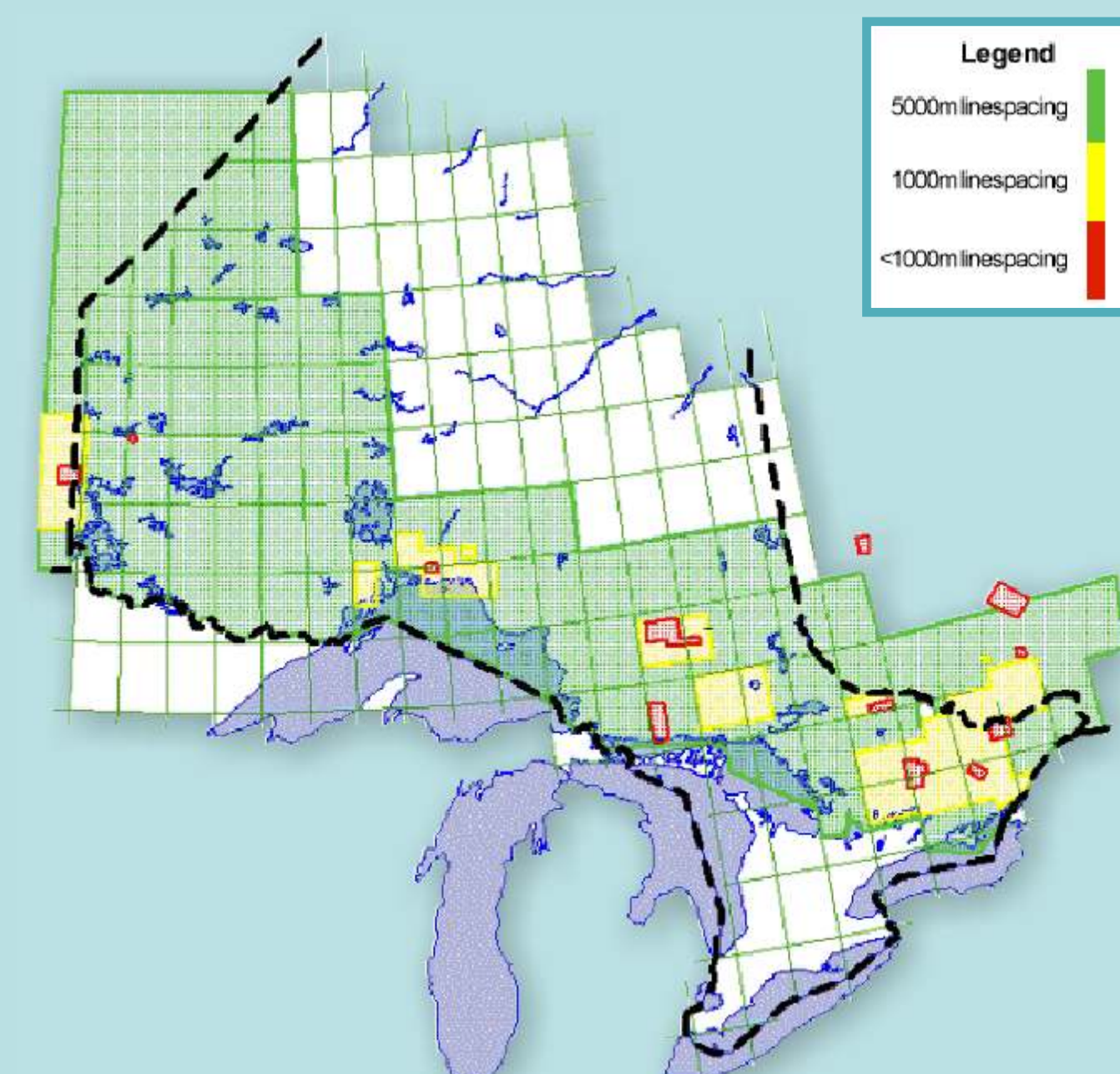
Site indicating provincial-scale magnetic  
and gravity data available from OGS



Site indicating rock property  
data available from OGS



Site indicating Ontario-based seismic transects  
and magnetotelluric data available elsewhere



Site indicating Ontario-based  
radiometric data available elsewhere

## METADATA DOWNLOADS

### Public Airborne Survey Information

[Survey details in an Excel spreadsheet \(48 KB\)](#)

[Surveys in ArcView format \(zipped; 1360 KB\)](#)

### Seismic Transects

[Transects in ArcView format \(zipped; 89 KB\)](#)

Site providing a source of digital data for published geophysical surveys  
(airborne magnetic, electromagnetic, gravity, radiometric)  
and seismic transects

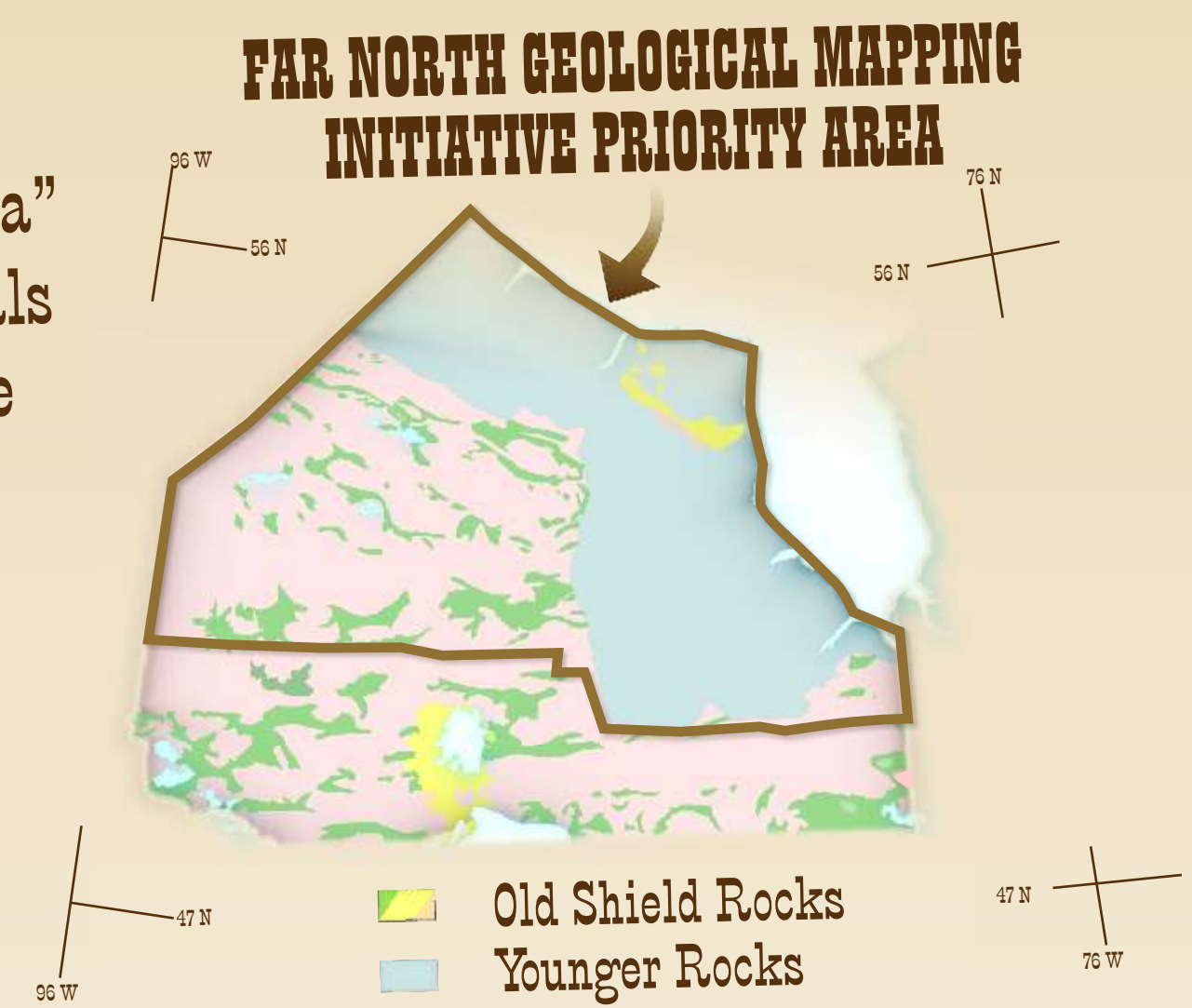
Parts of this poster may be quoted if credit is given. It is recommended that reference be made in the following format:  
Rainsford, D. And Muir, T. Ontario Geophysics Overview; Ontario Geological Survey poster, Ontario Exploration and Geoscience Symposium, Toronto, Ontario, December 13-14.

# WANTED

## Airborne Geophysical Data

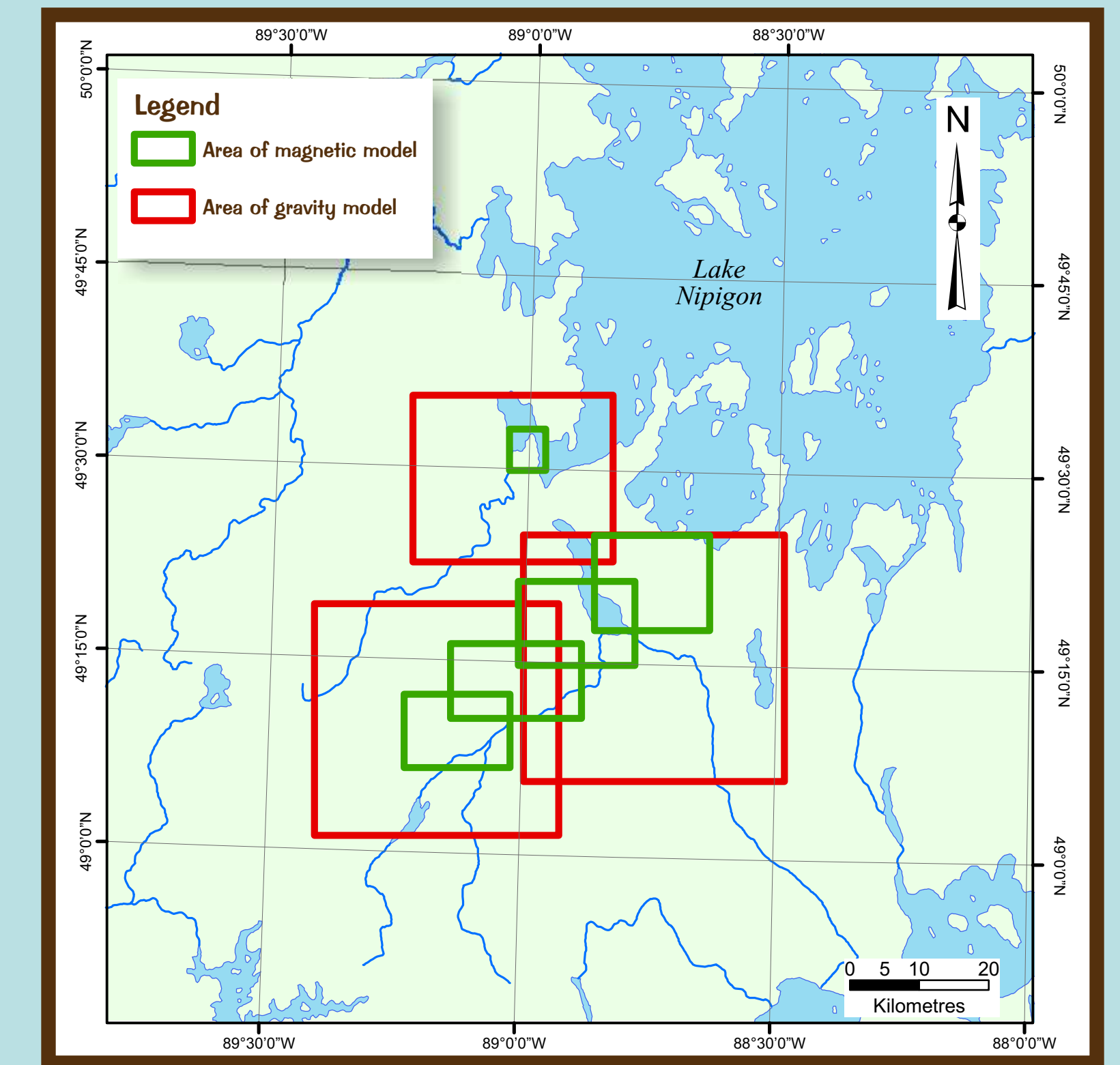
As part of the geophysical component of the Far North Geological Mapping Initiative, the Ontario Geological Survey (OGS) is looking to buy airborne geophysical data in the Far North region. The data will be reprocessed to conform to OGS formats and standards prior to publication. It is hoped that these data sets will provide a valuable resource for companies exploring in Northern Ontario.

Look out for "Requests For Data" which will be issued at intervals over the next two years. These will be advertised in trade publications and via mining related associations.



# INVERSION MODELLING - NIPIGON AREA

As part of the Lake Nipigon Region Geoscience Initiative a program of geophysics was carried out along the western and southern margins of Lake Nipigon. The program included an aeromagnetic and a ground gravity survey. To assist in the interpretation of the geophysical data and gain a better understanding of geological structures, 3-D inversion modelling was performed in selected areas. The modelling was carried out using smooth model inversion software developed at the University of British Columbia. Visualisation of the model results utilized WinDisp software from Scientific Computing & Applications.



Index map showing the location of the magnetic and gravity models illustrated on this poster. Note that, owing to the greater resolution of the magnetic data, the magnetic models are smaller and more detailed than the corresponding gravity models.

One of the challenges to the understanding of the geological structure of the Lake Nipigon basin is the masking of the Archean basement by areally extensive Proterozoic diabase sills. In spite of the sills having both elevated densities and magnetic susceptibilities, it was possible to delineate bodies within the basement using the newly acquired magnetic and gravity data. The inversion modelling was able to define bodies within the basement and, in two cases, drill core measurements from existing holes were used to verify the results of the modelling. The model results were also able to provide context to isolated inliers of Archean rocks exposed through windows in the sills.

The two examples shown here illustrate the use of modelling to investigate:

- an isolated magnetic anomaly (see detailed model below left)
- a semi-regional feature (see model below)

## Detailed Modelling

The model blocks are centred on an area with a pronounced magnetic anomaly and an associated positive gravity anomaly. The central part of the area is covered by Nipigon sill diabase with a small inlier of mafic volcanic rock. The model suggests that the gravity response is caused by a northeast-striking, steeply dipping body. The body has the same orientation as the exposed Archean metavolcanic rocks to the

southwest. The magnetic model indicates that the magnetic response is coming from the near the top of the body. Support for this model comes from magnetic susceptibility measurements obtained on drill core from a hole drilled into the feature (Geikie Lake GK-01-08), which show that a gabbro body, intersected below the sill, was 5 to 10 times more magnetic than the overlying sill.

## Semi-Regional Modelling

The modelling was carried out in order to investigate strong NE-SW trending gravity and magnetic anomalies. The orientation of these features is parallel with the strike of the Archean basement which is exposed in the eastern and western parts of the region. Most of the rest of the area is covered by Proterozoic diabase sills and Sibley sediments. Owing to the relatively large area to be modelled it was necessary to perform the modelling in segments. While the resulting magnetic models joined very closely, there is some mis-match

between gravity model blocks. The gravity models show a steeply dipping, high density body striking to the northeast. This feature appears to coincide with Archean mafic volcanic rocks exposed in the southwestern part of the area and is also consistent with the density measurement obtained from these rocks. The high magnetic susceptibility bodies are partially coincident with the high density body defined by the gravity model and correlates with iron formation mapped at the northeastern end of the area.

