
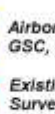


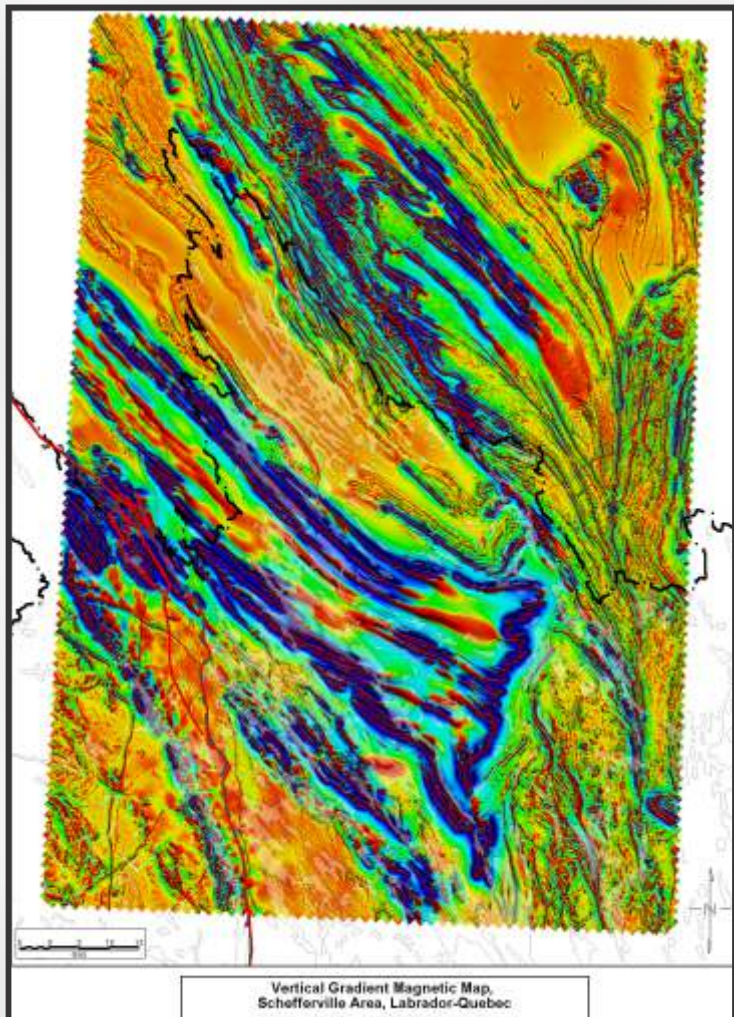
# GEOPHYSICAL RESOURCES

Colour, Shaded Relief Regional Aeromagnetic Map, Newfoundland and Labrador

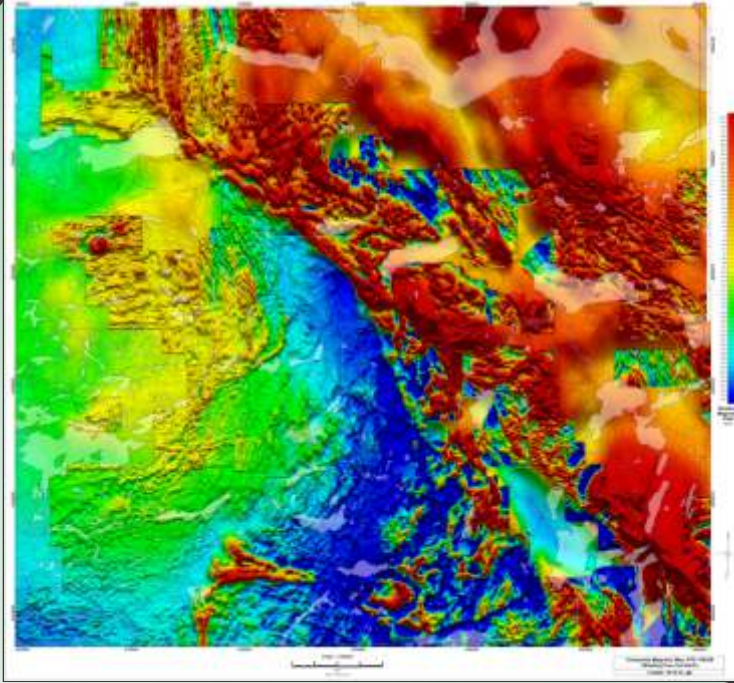
**Legend**

-  Airborne Surveys, GSC, GSNL & MRNG
-  Existing Airborne Surveys, Digital Data Available

First vertical derivative of magnetic field results from an airborne magnetic and radiometric survey flown during the summer of 2009 in the Schefferville area, Labrador-Québec. Survey was by fixed-wing aircraft, and was flown at 80 m nominal terrain clearance along NE-SW oriented flight traverses spaced at 200 m and perpendicular control lines at 1200 m intervals. The results from this second phase of airborne survey, flown as part of an ongoing 5-year GEM cooperative agreement (GSC/GSNL/MRNFQ), have been released as series of PDF maps during the last few months.



Composite magnetic map for NTS 14E/SE, northern Labrador, shaded from the north. These composite maps are constructed by first piecing together the magnetic results from detailed airborne surveys to form a patchwork assembly. The results are then merged into, and referenced to the lower resolution, regional magnetic data available for the area. The result portrays the best available magnetic data for all parts of the map. Note that subtle offsets are visible, as a result of small post-leveling discrepancies remaining along the data boundaries between adjacent airborne survey blocks.



**Introduction**

Geophysical data are now routinely collected as part of most mineral exploration programs, varying in scope from property-wide reconnaissance airborne surveys to very detailed surface or 3-D borehole surveys focused on specific mineral deposits. Since 1995, the results of these surveys have been submitted in digital as required by assessment reporting. These digital geophysical results are being archived to form an ever-expanding and valuable resource for future exploration phases and for geoscience studies in general.

**Airborne Surveys**

By far, the largest proportion of digital geophysical data held by the Geological Survey originates from airborne surveys. Various types of airborne survey are flown to target specific mineral commodities: time-domain or frequency-domain electromagnetic (EM), radiometric, high-resolution magnetic gradient, or gravimetric surveys (or combinations of these). Magnetic data are recorded during most airborne surveys, as the magnetic instrumentation is compact and lightweight, and the magnetic results can provide valuable bedrock geological information to assist the interpretation of the targeting geophysical method.

**Digital Data Access**

The base map shown here consists of the regional magnetic field for the Province as a shaded relief image, overlain with the outlines (in red) of airborne surveys for which digital data are currently available. The recorded data and various products from these surveys can be accessed online through the Geoscience Resource Atlas: <http://gis.geosurv.gov.nl.ca>

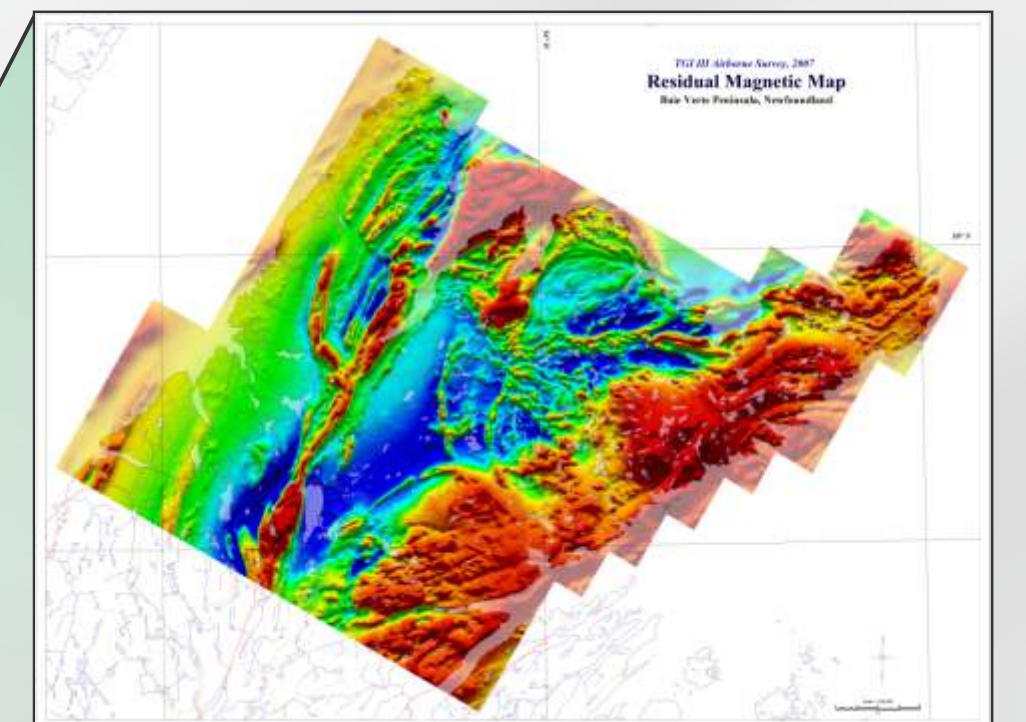
**New Airborne Surveys**

Also shown are the outlines (in blue) of two phases of airborne survey flown during in the offshore western Newfoundland, funded by the Offshore Geophysical Data Program (OGDC) of the Energy Branch of DNR and Nalcor Energy. The data acquisition and processing was coordinated by the Geological Survey of Canada. The larger area was flown in the summer months of 2012 with horizontal gradient magnetic survey at 200 m and 400 m line spacing. The smaller area in St. George's Bay is the footprint of a full gradient gravity survey flown at 400 m line spacing by Bell Geospace Inc. during Dec. 2012. The data and compiled map products were released earlier this year, and have been made available through the airborne survey index within the Geoscience Resource Atlas.

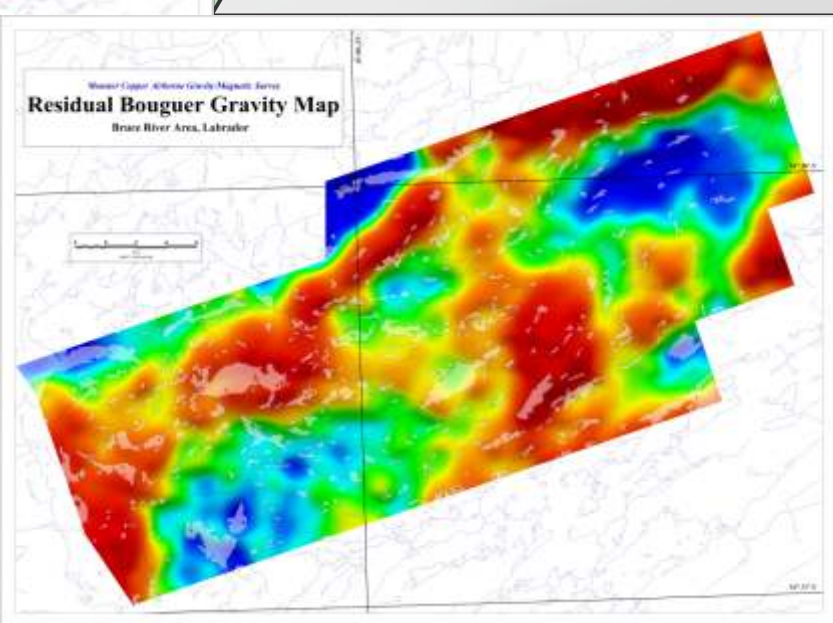
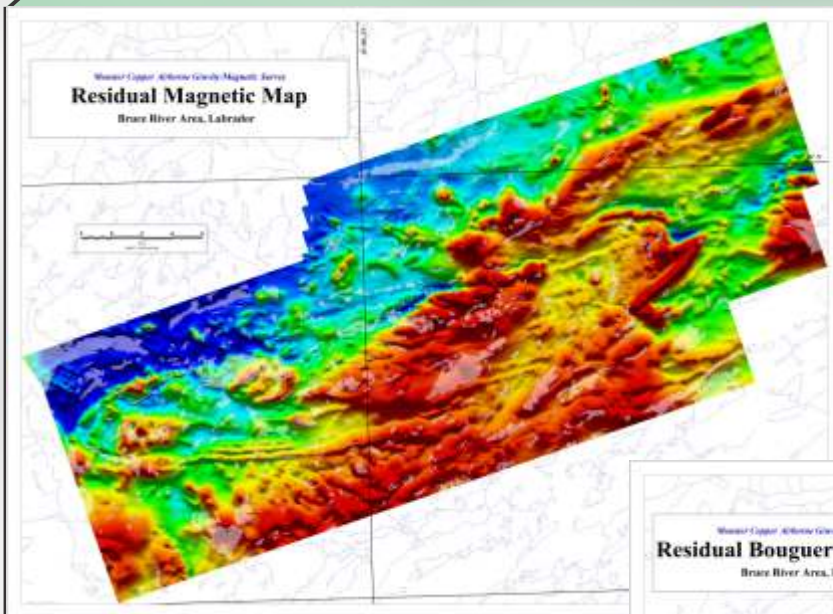
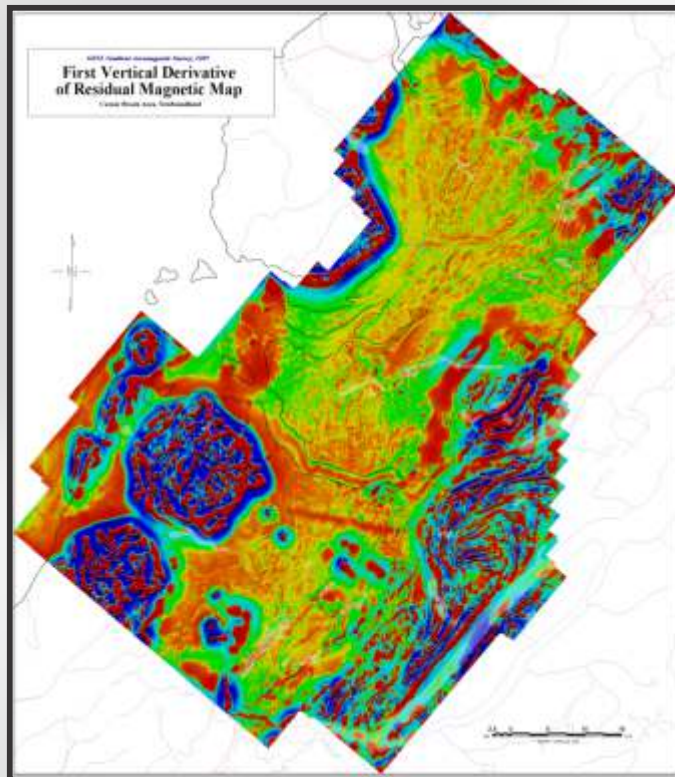
**Examples**

The figures, detailing individual survey results, have been selected to show a few examples of the types of geophysical data that are currently available, and to illustrate that compilation of the results from different surveys can add a significant "value-added" aspect to the geophysical products. Refer to the figure captions for explanations of their contents.

Residual magnetic field results for the Targeted Geoscience Initiative (2007 - GSC/GSNL) survey of the Baie Verte Peninsula, Newfoundland. Survey was by fixed-wing aircraft equipped with wingtip magnetometers, flown at 100 m terrain clearance along NW-SE oriented flight traverses spaced at 250 m and perpendicular control lines at 1000 m intervals.



First vertical derivative of the magnetic field results from a gradient aeromagnetic survey of the Corner Brook area, Newfoundland, flown in 2008/2009. The fixed-wing survey aircraft was equipped with two wing-tip magnetometers and a third magnetometer mounted in a tail boom. The survey was flown on a pre-determined drap surface (90 m nominal terrain clearance) along NW-SE oriented flight traverses spaced at 200 m and perpendicular control lines at 2000 m intervals. Note how this gradient image enhances subtle magnetic differences, yielding patterns and features which can be related to the underlying bedrock geology.



Results of an airborne gravity and magnetic survey flown in 2003 within the Bruce River area of central Labrador by Monster Copper Resources Inc.: a) residual magnetic field after removal of the Geomagnetic Reference Field, and b) residual Bouguer gravity field after removal of a 2<sup>nd</sup> order regional trend from the data. A drap surface having minimum 150 m terrain clearance was flown during the survey, with traverse lines spaced at 100 m and oriented ENE-WSW (along the long dimension of the survey block), while perpendicular control lines were spaced at 500 m. Airborne gravity requires a relatively large and dense network of flights in order to yield effective results.

Map of Bouguer gravity field for the northern part of the Bay St. George Carboniferous subbasin, western Newfoundland. The compilation is comprised of data from over 2500 onshore surface and offshore (underwater) gravity measurements, compiled from 15 different surveys of regional to property scale in scope, and collected from the 1960s to the early 2000s. Red coloured areas on the map indicate relatively high Bouguer gravity values; underlain largely by high specific gravity carbonates (Port au Port Peninsula) and pre-Carboniferous crystalline rocks (area to the SE), whereas the blue areas identify significant accumulations of rocks having low specific gravity - mostly Carboniferous sediments and evaporate sequences within the subbasin. Orange lines are the existing access roads in the area.

