



New Gravity Data for the Bathurst Mining Camp, Northeastern New Brunswick: A Colour-Shaded Map of the 1st Vertical Derivative of the Bouguer Gravity Anomaly with Geological Contacts and Faults, and Locations of Selected Volcanogenic Massive Sulphide Deposits

Morris¹, R., Jobin¹, D.M., Thomas², M.D., Rogers³, N. and McCutcheon⁴, S.R.

- 1: Geodetic Survey Division, Natural Resources Canada, 615 Booth St., Ottawa, Ontario, K1A 0E9
- 2: Geological Survey of Canada, Natural Resources Canada, 615 Booth St., Ottawa, Ontario, K1A 0E9
- 3: Geological Survey of Canada, Natural Resources Canada, 601 Booth St., Ottawa, Ontario, K1A 0E8
- 4: New Brunswick Department of Natural Resources, Minerals Office - Bathurst, 495 Riverside Drive, Bathurst, New Brunswick, E2A 2M4

Introduction

In June, July and August 2006 a regional ground gravity survey was carried out in the Bathurst Mining Camp, northeastern New Brunswick, with the objective of obtaining measurements at a nominal interval of 1 km, wherever road or track access permitted. Gravity measurements were made at 3539 locations, most of which adhere to the required 1 km interval. Sporadic lack of access resulted in observations at larger intervals in some areas, and time constraints limited coverage in the southeastern corner of the mining camp. The survey was carried out as part of Natural Resources Canada's Targeted Geoscience Initiative III (TGI3).

Gravity Survey Procedures

Gravity observations were made using Lacoste and Romberg gravity meters, and were tied to the National Gravity Network. Gravity data were reduced to a sea level datum assuming a mean crustal density of 2.67 g/cm³ to produce Bouguer anomalies. Terrain corrections were determined and applied to the Bouguer anomalies. The gravity map in this open file is based therefore on terrain corrected Bouguer anomalies, the accuracy of which is estimated to be ± 0.17 mGal. Horizontal and vertical positions of gravity stations were determined by a differential global positioning system (GPS) using Ashtech Z-Xtreme receivers and Ashtech antennae, integrated with the Canadian Spatial Reference System. Horizontal and vertical accuracies in position of a gravity station are estimated to be ± 1.0 m and ± 0.5 m, respectively.

The survey was completed by a team of 8 students under the supervision of Robert Morris, Geomatics Canada. The students are Jennie-Lee Groom (University of Ottawa), Vishal Gupta (Carleton University), Shelley Julie (University of Calgary), Crystal Maher (University of New Brunswick), Evan Orovan (Carleton University), Steve Pratte (University of Montreal), Megan Reardon (Saint Mary's University) and Benjamin St-Onge (Carleton University), who are duly acknowledged for their contribution to TGI3.

Computation of Terrain Corrections

Gravitational terrain corrections were estimated using Triter software, which considers a digital terrain model in terms of a series of sloping top triangular prisms (Rupert, 1991). The digital terrain model for the Bathurst Mining Camp was constructed from: (1) topographic data obtained from 1:10,000 scale digital maps from Service New Brunswick; (2) bathymetric data from the Canadian Hydrographic Service, Dartmouth, Nova Scotia, and (3) the shoreline as depicted on 1:50,000 scale maps published by the Centre for Topographic Information in Sherbrooke, Quebec.

The digital terrain model was gridded at both 50 m and 200 m to produce an inner and an outer radius file. The inner file was used to compute the terrain correction in the area within 4 km of the station, and the outer file was used for the area lying between 4 km and 30 km from the station. The terrain was assumed to have a rock density of 2.67 g/cm³. The minimum terrain correction in the survey region was 0.02 mGal, and the maximum 3.04 mGal; the mean value was 0.32 ± 0.37 mGal.

Presentation of Gravity Data

The data from the new survey are presented in a series of three open files (Geological Survey of Canada open file numbers 5542, 5543, 5544; New Brunswick Department of Natural Resources map plate numbers 2007-13A, 2007-13B, 2007-13C), each of which comprises a map at 1:150 000 scale. Two maps are based on Bouguer gravity anomaly values interpolated to a grid having an interval of 250 m in both mutually orthogonal directions. One map is based on the 1st vertical derivative (= vertical gradient) values at the same grid points.

Open File 5542 is a shaded coloured Bouguer gravity anomaly map (linear colour interval) showing gravity station locations and corresponding Bouguer anomaly values. The linear colour interval is 1.5 mGal. The shading is effected by a simulated light source directed downward at an angle of 48° to the horizontal along azimuth N244°E. Gravity station locations and corresponding Bouguer anomaly values are posted on the map.

Open File 5543 is a shaded coloured Bouguer gravity anomaly map (histogram equalized intervals) on which are superposed contour lines at 0.5 mGal interval, and gravity station locations. The shading is effected by a simulated light source directed downward at an angle of 48° to the horizontal along azimuth N244°E.

Open File 5544 (this map) is a shaded coloured map (histogram equalized intervals) of the 1st vertical derivative of the Bouguer gravity anomaly field. The shading is effected by a simulated light source directed downward at an angle of 45° to the horizontal along azimuth N225°E. The Bouguer gravity anomaly field was upward continued 375 m prior to computation of the vertical derivative. Line geology representing contacts and faults based on a 1:100 000 scale geological map of the Bathurst Mining Camp (van Staal et al., 2003), and locations of gravity stations and selected volcanogenic massive sulphide deposits are superposed. Descriptions of the massive sulphide deposits and their geophysical signatures are provided in Thomas et al. (2000). The sulphide deposits are: A, Armstrong B; B6, Brunswick No. 6; B12, Brunswick No. 12; CA, Caribou; CB, Camel Back; CH, Chester; CL, Canoe Landing Lake; CNE, Captain North Extension (CNE); D, Devils Elbow; F, Flat Landing Brook; HM, Half Mile Lake; HS, Heath Steele; K, Key Anacon; M, Murray Brook; N, Nepisiguit A; O, Orvan Brook; R, Restigouche; S, Stratmat; T, Taylor Brook; W, Wedge.

References

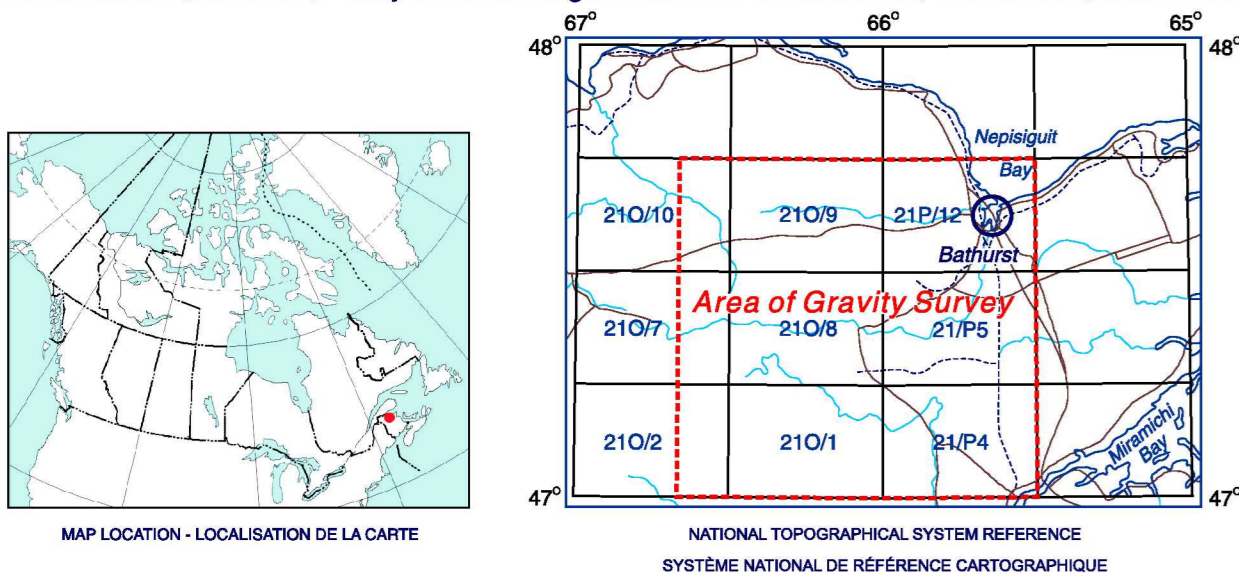
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Procurement of Maps and Gravity Data

The gravity data on which the map in this open file/map plate is based are available, for a fee, from the Geophysical Data Centre, Geological Survey of Canada, 615 Booth Street, Ottawa, Ontario, K1A 0E9 (Telephone: 613-995-5326; email: infogdc@agg.nrcan.gc.ca). The data may also be downloaded, at no charge, from Natural Resources Canada's Geoscience Data Repository at <http://gdr.nrcan.gc.ca>. Copies of the open file/map plate may be purchased from the Geological Survey of Canada bookstore, 601 Booth St., Ottawa, Ontario, K1A 0E8 (gscbookstore@nrcan.gc.ca), or from the New Brunswick Department of Natural Resources, Minerals, Policy and Planning Division at P.O. Box 6000, Fredericton, New Brunswick.



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PLATE 2007-13C PLANCHE
 NEW BRUNSWICK/NOUVEAU-BRUNSWICK

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Colour-Shaded 1st Vertical Derivative of the Bouguer Gravity Anomaly (Histogram Equalized Colour Contour Intervals)

