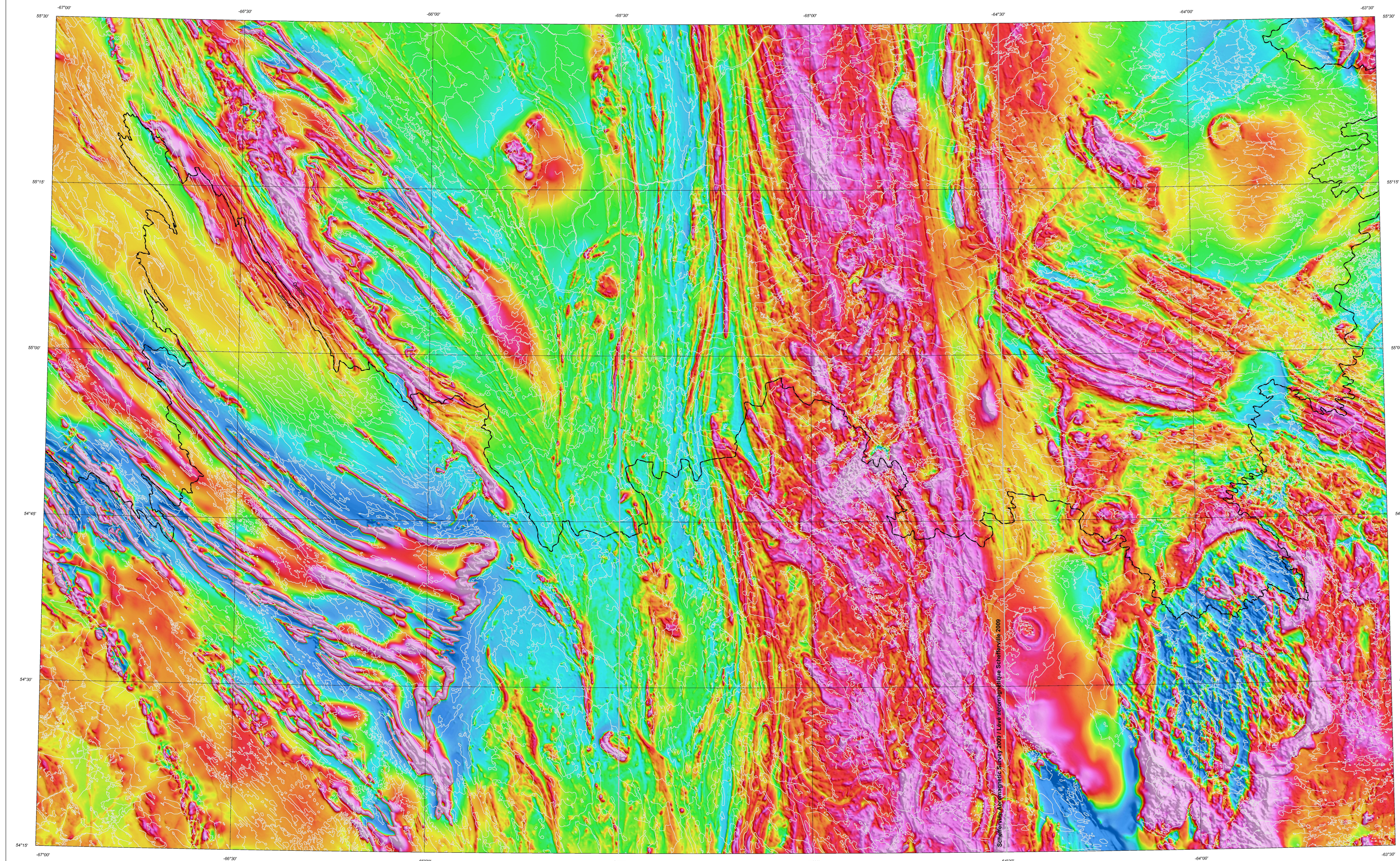


SÉRIE DES CARTES GÉOPHYSIQUES / COMPOSANTE RÉSIDUELLE DU CHAMP MAGNÉTIQUE TOTAL

GEOPHYSICAL SERIES / RESIDUAL TOTAL MAGNETIC FIELD



Deux levés géophysiques aéroportés combinant l'acquisition de données quantitatives de spectrométrie gamma et de données magnétiques ont été réalisés, par la société Fugro Airborne Surveys, dans les régions de Schefferville, Québec et Terre-Neuve et Labrador. Les levés ont été effectués du 24 mai au 30 août 2009, à bord de deux avions Cessna 208B Caravan immatriculés C-GNAV et C-FYAU ainsi qu'un avion Cessna 441T immatriculé C-FYAU. L'épave nominal des lignes de vol était de 200 m et celui des lignes de contrôle de 1 200 m, alors que l'altitude nominale de levé était de 80 m au-dessus du sol et que la vitesse était de 200 à 270 km/h. La trajectoire de vol a été restituée par l'application après le vol de corrections différentielles aux données brutes enregistrées avec un récepteur GPS.

Le champ magnétique a été échantillonné 10 fois par seconde à l'aide d'un magnétomètre à vapeur de césium à faisceau partagé (sensibilité = 0,005 nT) rigoureusement à l'échelle. Les différences de valeur du champ magnétique aux intersections des lignes de contrôle et des lignes de levé ont été analysées par ordinateur afin d'obtenir un jeu de données sur le champ magnétique multibeam nivelées sur les lignes de vol. Ces valeurs nivelées ont ensuite été interpolées suivant une grille à maille de 50 m. Le champ géomagnétique international de référence (International Geomagnetic Reference Field, IGRF) de l'année 2010 a été soustrait à l'altitude moyenne de 617 m au-dessus de la mer pour les données GPS pour l'année 2009 à être soustrait. La soustraction de l'IGRF, qui représente le champ magnétique du noyau terrestre, fournit une composante résiduelle essentiellement reliée à la magnétisation de roches terrestres.

La dérivée première verticale du champ magnétique représente la rate de change de la magnétique field in the vertical direction. Computation of the first vertical derivative removes long-wavelength features of the magnetic field and significantly improves the resolution of closely spaced and superposed anomalies. A property of first derivative maps is the coincidence of the zero-value contour with vertical contacts at high magnetic latitudes (Hood, 1960).

Two quantitative gamma-ray spectrometric and aeromagnetic airborne geophysical surveys were completed by Fugro Airborne Surveys in the region of Schefferville, in Québec and Newfoundland and Labrador. The surveys were flown from May 24th to Aug 30th, 2009 using two Cessna 208B Caravan aircraft (C-GNAV and C-FYAU) and one Cessna 441T aircraft (C-FYAU). The nominal traverse and control line spacing were, respectively, 200 m and 1200 m, and the aircraft flew at a nominal terrain clearance of 80 m at a speed between 200 and 270 km/h. The flight path was recovered following post-flight differential corrections to raw data recorded by a Global Positioning System.

The airborne gamma-ray measurements were made with an Explanorium GR820 gamma-ray spectrometer using ten (C-GNAV and C-FYAU) or fourteen (C-GNAV) 102 x 102 x 400 mm (4") crystal. The main detector array consisted of eight (C-GNAV and C-FYAU) or twelve (C-GNAV) crystal (total volume 33.6 litres and 50.4 litres, respectively). Two crystals on all aircraft (total volume 8.4 litres), shielded by the main array, were used to detect variations in background radiation caused by atmospheric radon. The system constantly monitored the natural thorium peak for each crystal, and using a Gaussian least squares algorithm, adjusted the gain for each crystal.

Potassium is measured directly from the 1460 keV gamma-ray photons emitted by ⁴⁰K, whereas uranium and thorium are measured indirectly from the gamma-ray photons emitted by daughter products (²¹⁴Pb for uranium and ²¹⁴Pb for thorium). Although these daughters are far down their respective decay chains, they are assumed to be in equilibrium with their parents. Thus gamma-ray spectrometric measurements of uranium and thorium are referred to as equivalent uranium and equivalent thorium, i.e. eU and eTh. The energy windows used to measure potassium, uranium and thorium are, respectively, 1370 - 1570 keV, 1660 - 1860 keV, and 2410 - 2810 keV.

Gamma-ray spectra were recorded at one-second intervals. During processing the spectra were energy calibrated, and the counts were accumulated into the windows described above. Counts from the radon detectors were recorded in a 1660 - 1860 keV window and radon at energies greater than 2000 keV was recorded in the thorium window. Thorium activity from cosmic radiation, radioactivity of the aircraft and detectors, atmospheric radon decay products, the window data were then corrected for spectral scattering in the ground, air and detectors. Corrections for deviations from the planned terrain clearance and for variation of temperature and pressure were made prior to conversion to ground concentrations of potassium, uranium and thorium, using factors determined from flights over the Breckenridge, Québec calibration range. The factors for potassium, uranium, and thorium were, respectively, 137.63 cps/m³, 16.60 cps/m³, and 7.57 cps/m³ for C-GNAV; 79.66 cps/m³, 7.32 cps/m³, and 4.18 cps/m³ for C-FYAU; and 91.10 cps/m³, 10.18 cps/m³, and 4.92 cps/m³ for C-FYAU.

Connected data were filtered and interpolated to a 50 m grid interval. The results of an airborne gamma-ray spectrometer survey represent the average surface concentrations that are influenced by varying amounts of outcrop, overburden, vegetation cover, soil moisture and surface water. As a result the measured concentrations are usually lower than the actual bedrock concentrations. The total air absorbed dose rate in nanograms per hour was produced from measured counts between 450 and 2810 keV.

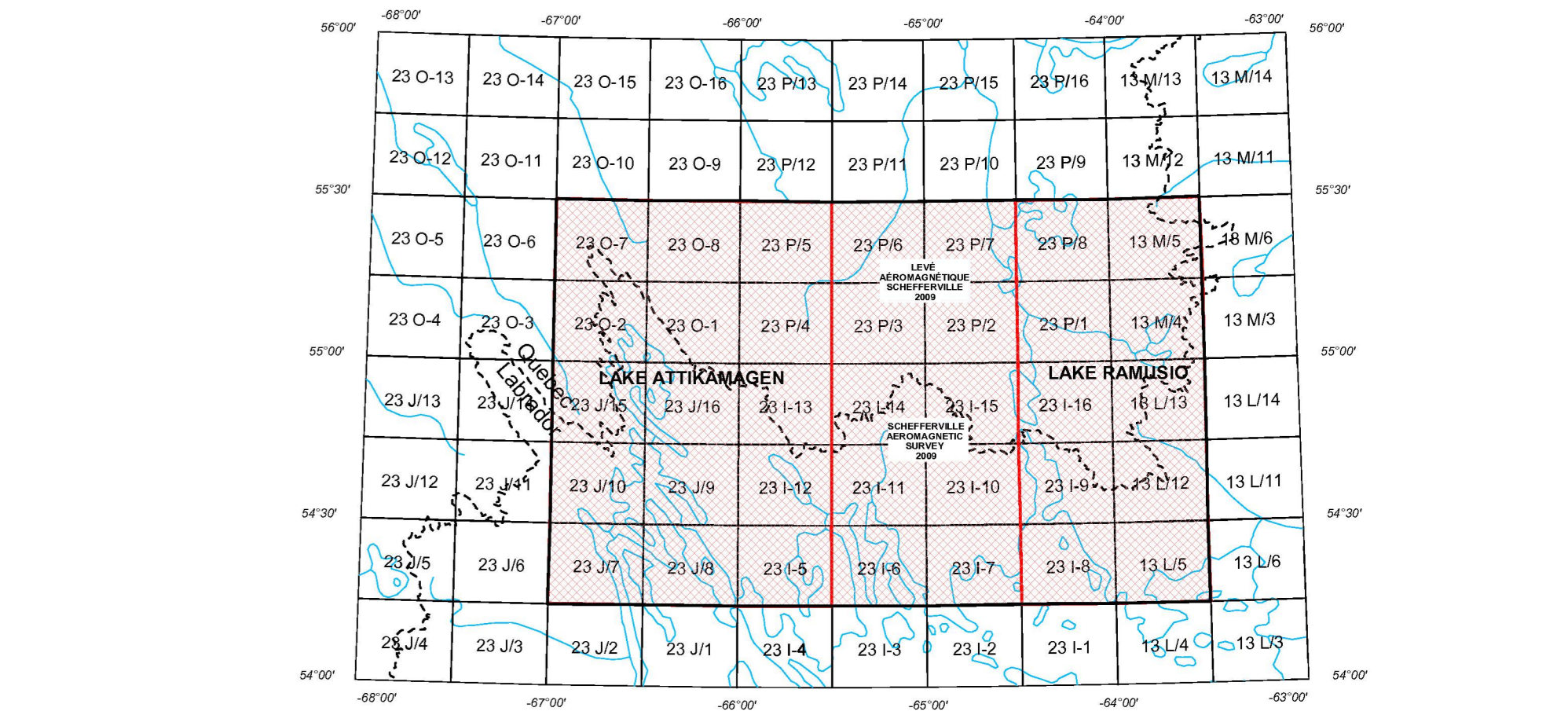
The magnetic field was sampled 10 times per second using a split-beam cesium vapour magnetometer (sensitivity = 0.005 nT) rigidly mounted to the aircraft. Differences in magnetic values at the intersections of control and traverse lines were computer-analysed to obtain a mutually levelled set of flightline magnetic data. The levelled values were then interpolated to a 50 m grid. The International Geomagnetic Reference Field (IGRF) defined at the average GPS altitude of 617 m above sea level for the year 2009.5 was then removed. Removal of the IGRF, representing the magnetic field of the Earth's core, produces a residual component related essentially to magnetization within the Earth's crust.

The first vertical derivative of the magnetic field is the rate of change of the magnetic field in the vertical direction. Computation of the first vertical derivative removes long-wavelength features of the magnetic field and significantly improves the resolution of closely spaced and superposed anomalies. A property of first derivative maps is the coincidence of the zero-value contour with vertical contacts at high magnetic latitudes (Hood, 1960).

References: Hood, P.J., 1960. Gradient measurements in aeromagnetic surveying; Geophysics, v. 30, p. 891-902.

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SYMBOLS PLANIMÉTRIQUES / PLANIMETRIC SYMBOLS. Table listing symbols for drainage, etc.



LEVÉS GÉOPHYSIQUES LAC RAMUSIO ET LAC ATTIKAMAGEN RÉGION DE SCHEFFERVILLE / LAKE RAMUSIO AND LAKE ATTIKAMAGEN GEOPHYSICAL SURVEYS SCHEFFERVILLE REGION

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L'acquisition, la compilation des données ainsi que la production des cartes furent effectuées par Fugro Airborne Surveys, Ottawa, Ontario. La gestion et la supervision du projet furent effectuées par la Commission géologique du Québec, Ottawa, Ontario.

Data acquisition, compilation and map production by Fugro Airborne Surveys, Ottawa, Ontario. Contract and project management by the Geological Survey of Newfoundland and Labrador.

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SÉRIE DES CARTES GÉOPHYSIQUES / GEOPHYSICAL SERIES. Parties des SNRC 13 L, 13 M, 23-I, 23 J, 23-O, 23 P / Parts of NTS 13 L, 13 M, 23-I, 23 J, 23-O, 23 P

LEVÉS GÉOPHYSIQUES LAC RAMUSIO ET LAC ATTIKAMAGEN RÉGION DE SCHEFFERVILLE / LAKE RAMUSIO AND LAKE ATTIKAMAGEN GEOPHYSICAL SURVEYS SCHEFFERVILLE REGION

COMPOSANTE RÉSIDUELLE DU CHAMP MAGNÉTIQUE TOTAL / RESIDUAL TOTAL MAGNETIC FIELD

Echelle 1/250 000 - Scale 1:250 000

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Summary of map sheet information including title, scale, and contact details for the Geological Survey of Newfoundland and Labrador.

Notation bibliographique / Bibliographic notation. Lists references and provides contact information for the Geological Survey of Newfoundland and Labrador.