

**Geological Interpretation of the 2004 Marctown Aeromagnetic Survey, Southeastern New Brunswick**  
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**Introduction**

In March 2004 an airborne magnetic survey, named the Marctown survey after the rural community located near the centre of the survey area, was completed in the southeastern part of New Brunswick (Kiss, 2004). The survey was conducted along flight-lines oriented northwest-southeast crossing the prevailing geological strike approximately at right angles. A pre-survey flight-surface (draped) was calculated to minimize height differences at intersections of traverse and control lines, and hence differences in the values of the magnetic field. The boundaries of the area are indicated on the diagram below. It is bounded to the north by latitude 46° 15', and to the south by latitude 45° 15' or the north coast of the Bay of Fundy. To the east it is bounded by longitude 65° 10', and to the west by longitudes 66° and 65° 45' north and south, respectively, of latitude 45° 48'. Flight-line spacing was 300 m and the aircraft flew at a targeted mean terrain clearance (MTC) of 150 m. Older non-draped aeromagnetic data collected in 1990 at 300 m flight-line spacing and a targeted MTC of 150 m between latitudes 45° 15' and 45° 48', and longitudes 66° and 65° 45' have been recompiled, regrided and merged with the data from the new survey. The composite area measures approximately 111 km in a north-south direction, and has a maximum east-west width of about 65 km.

A preliminary geological interpretation of the combined data set was presented by Thomas and Kiss (2004). This open file provides documentation of that interpretation. The relationship between the magnetic field and the geology of the area is discussed principally in the context of three different representations of the magnetic field: (1) the residual total magnetic field (informally referred to as the total magnetic field), (2) the 1st vertical derivative of the magnetic field (commonly referred to as the vertical gradient), and (3) the 2nd vertical derivative of the magnetic field. These representations are presented here in the form of maps (Sheets 1, 2 and 3) at a scale of 1:125,000. This map is Sheet 3, the 2nd vertical derivative map. Geological boundaries from four different maps (sources are listed in the geological legend) have been superposed on each map to provide a geological framework for the discussions presented on Sheets 4 and 5.

This open file is available from the Geophysical Data Centre, Geological Survey of Canada, 615 Booth Street, Ottawa, Ontario, K1A 0E9, from the New Brunswick Department of Natural Resources, Minerals, Policy and Planning Division, P.O. Box 6000, Fredericton, New Brunswick, E3B 5H1, or from the NEDNR regional office, P.O. Box 5040, 207 Piccadilly Road, Sussex, New Brunswick, E4E 5L2.

Gridded data from the survey are available at no cost, in digital format, from the Natural Resources Canada, Geological Survey of Canada, Geoscience Data Repository web site: <http://gdr.nrcan.gc.ca>. Grids (50 m spacing) for the residual total magnetic field and the 1st and 2nd vertical derivatives may be downloaded. Digital data may also be obtained for a fee from the Geophysical Data Centre, Geological Survey of Canada, 615 Booth Street, Ottawa, Ontario, K1A 0E9.

NATIONAL TOPOGRAPHICAL SYSTEM REFERENCE AND GEOLOGICAL MAP NO. 3  
SYSTÈME NATIONAL DE RÉFÉRENCE CARTOGRAPHIQUE ET NO. DES CARTES GÉOLOGIQUES

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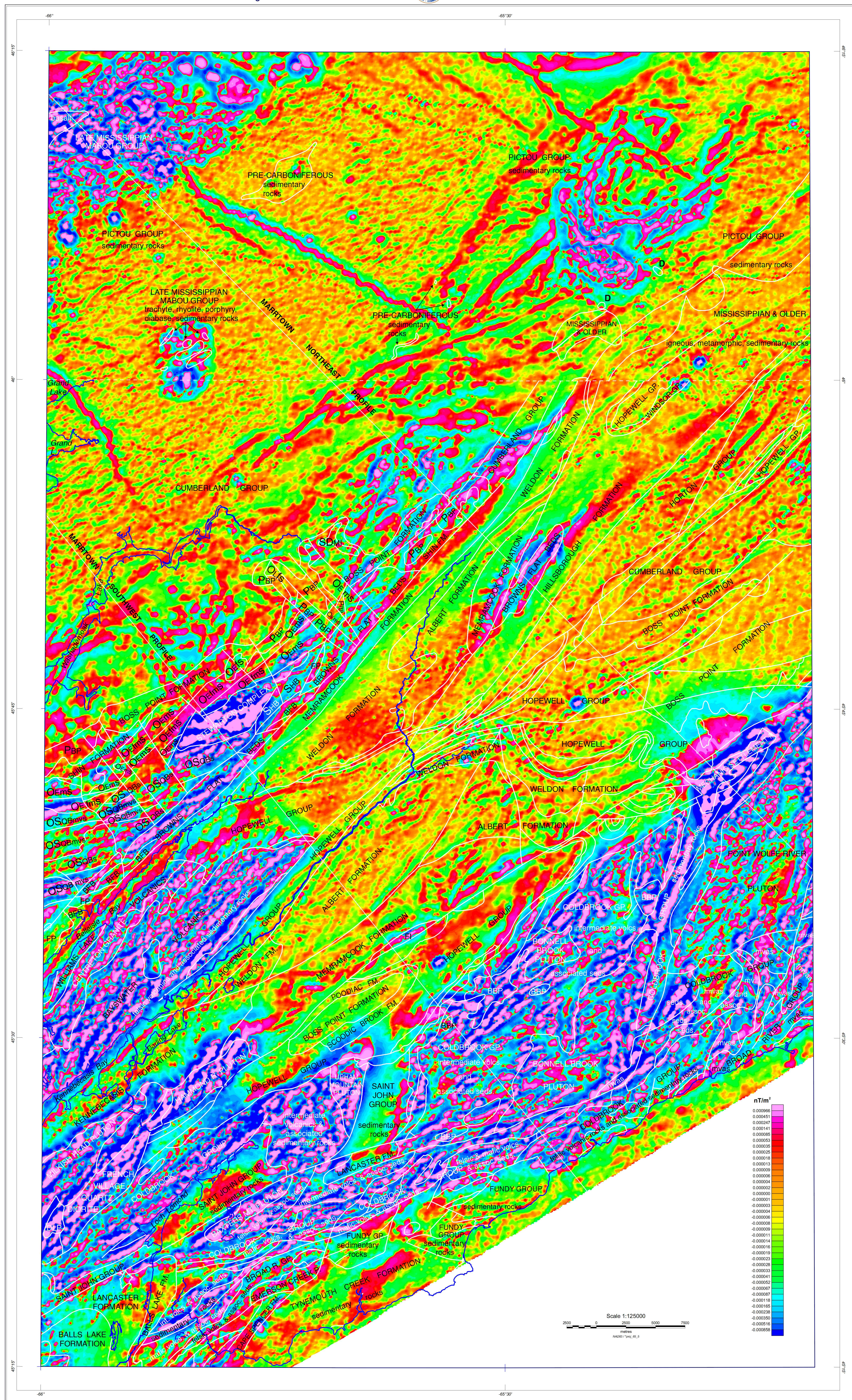
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**Geological Legend (North of Latitude 46°)**

Information from St. Peter (1997) west of longitude 65° 30', and from Ball (1980) and Potter et al. (1979) east of longitude 65° 30'.

**UPPER CARBONIFEROUS**

- PICTOU GROUP (Pennsylvanian)
  - sandstone, conglomerate, siltstone,
  - MABOU GROUP (Mississippian)
    - conglomerate, sandstone, siltstone, mudstone, shale, minor coal
    - olivine basalt
    - trachyte, feldspar porphyry, rhyolite; minor agglomerate, volcanic breccia, lapilli tuff, sandstone, intrusive diabase

**PRE-CARBONIFEROUS**

- slate, phyllite, sandstone

**MISSISSIPPIAN AND OLDER**

**MISSISSIPPIAN, DEVONIAN TO CAMBRIAN, PRECAMBRIAN**

- igneous, metamorphic and sedimentary rocks
- DEVONIAN MAINLY [D]
  - granite, quartz monzonite, granodiorite and related rocks

**Geological Legend (South of Latitude 46°)**

Information from McLeod et al. (1994).

**TRIASSIC**

- FUNDY GROUP
  - sedimentary rocks

**CARBONIFEROUS**

- CUMBERLAND GROUP (Upper Part)
  - TYNEMOUTH CREEK FORMATION
  - LANCASTER FORMATION
  - BOSS POINT FORMATION [Pbp]
  - SHIN FORMATION
  - BALLS LAKE FORMATION
  - HOPEWELL GROUP (Undivided)
    - SCOODIC BROOK FORMATION
    - POODIAC FORMATION
    - WINDSOR GROUP (Undivided)
      - KENNEBECASIS FORMATION
      - HILLSBOROUGH FORMATION
      - HORTON GROUP (Undivided)
        - WELDON FORMATION
        - ALBERT FORMATION

**CARBONIFEROUS-DEVONIAN**

- MEMRAMCOOK FORMATION

**SILURIAN**

- HENDERSON BROOK BEDS [Shb]
  - sedimentary rocks
- WILLIAMS LAKE VOLCANICS
  - felsic volcanic and associated sedimentary rocks

**SILURIAN-ORDOVICIAN**

- BAYSWATER VOLCANICS [Shb]
  - mafic volcanic and associated sedimentary rocks

**ORDOVICIAN**

- QUEEN BROOK FORMATION [OSob]
  - shale, wacke and siltstone [OSobas]
    - mafic volcanic and associated sedimentary rocks [OSobmvs]
  - EAST SCOTCH SETTLEMENT FORMATION
    - mafic volcanic and associated sedimentary rocks [Oemv]
    - felsic volcanic and associated sedimentary rocks [Oelm]
    - felsic and mafic volcanic and associated sedimentary rocks [Oelmv]
    - LAWSON BROOK FORMATION
      - felsic volcanic and associated sedimentary rocks [OLv]

**ORDOVICIAN-CAMBRIAN**

  - SAINT JOHN GROUP (Undivided)
    - sedimentary rocks

**CAMBRIAN**

  - BROWNS FLAT BEDS [BFB]: see Note 2
    - sub-units within this unit comprise felsic and mafic volcanic and associated sedimentary rocks, or mafic volcanic and associated sedimentary rocks, or sedimentary rocks
  - CAPE SPENCER FORMATION
    - sedimentary rocks

**PRECAMBRIAN (Hadyrian = Late Neoproterozoic)**

  - COLBROOK GROUP
    - intermediate volcanic and associated sedimentary rocks
      - felsic volcanic and associated sedimentary rocks
      - mafic volcanic (mv) and associated sedimentary rocks (mvvas)
      - felsic and mafic volcanic and associated sedimentary rocks
        - sedimentary rocks
    - BROAD RIVER GROUP
      - mafic volcanic and associated sedimentary rocks (mvvas)
        - felsic and mafic volcanic and associated sedimentary rocks (mvvas)

**PLUTONIC INTRUSIONS**

  - SILURIAN-DEVONIAN
  - UNNAMED MAFIC INTRUSION [SDm]
    - gabbro, diorite, ultramafic rocks; locally abundant granitoids
  - STEWART COMPLEX
    - gabbro, diorite, ultramafic rocks; locally abundant granitoids
  - SILURIAN
  - CENTRETON GRANITE (438 Ma)
    - granite, felsic porphyry

**CAMBRIAN**

  - UNNAMED FELSIC PORPHYRY [FP]
    - granite, felsic porphyry
  - HAMMOND RIVER PLUTON
    - composite intrusion; granodiorite, granite, diorite; minor gabbro, rhyolite
  - MILKISH HEAD PLUTON (520 Ma)
    - granodiorite, quartz diorite, diorite; syenitic and alkalic granitoids
  - FRENCH VILLAGE QUARTZ DIORITE (539-537 Ma)
    - granodiorite, quartz diorite, diorite; syenitic and alkalic granitoids

**PRECAMBRIAN (Hadyrian = Neoproterozoic)**

  - UNNAMED FELSIC INTRUSION [F]
    - granite, felsic porphyry
  - BAXTERS MOUNTAIN PLUTON
    - gabbro, diorite, ultramafic rocks; locally abundant granitoids
  - EMERSON CREEK PLUTON
    - composite intrusion; granodiorite, granite, diorite; minor gabbro, rhyolite
  - DUCK LAKE PLUTON [DLF]
    - gabbro, diorite, ultramafic rocks; locally abundant granitoids
  - BONNELL BROOK PLUTON [BBP] (650 Ma)
    - granite, felsic porphyry
  - UPHAM MOUNTAIN PLUTON (554 Ma)
    - granite, felsic porphyry
  - MECHANIC SETTLEMENT PLUTON (557 Ma)
    - gabbro, diorite, ultramafic rocks; locally abundant granitoids
  - POINT WOLFE RIVER PLUTON (616-625 Ma)
    - composite intrusion; granodiorite, granite, diorite; minor gabbro, rhyolite

Abbreviations used on the map for geological units and their constituent rock types are indicated above by bold font enclosed within [square] and (round) brackets, respectively.

Other abbreviations: assoc. - associated FM - Formation  
int. - intermediate GP - Group  
seeds. - sedimentary rocks MT - Mountain  
volcs. - volcanic rocks

**Note 1**

In the above legends a general stratigraphic or chronologic order has been attempted, but it is cautioned that some units are correlative or partially correlative with other units, and therefore the vertical position is not necessarily always indicative of relative age. Furthermore, radiometric age dates are not available for all of the plutonic intrusions. For further details, the cited geological map sources should be consulted.

**Note 2**

The source of geological boundaries south of latitude 46° is the single map compiled by McLeod et al. (1994), the legend for which indicates the age of the Browns Flat Beds to be Cambrian. However, more recent information (Venugopal and Brown, 1997), and mapping by geologists of the New Brunswick Department of Natural Resources, Minerals, Planning and Policy Division's Geological Surveys Branch indicate that this unit includes significant proportions of Ordovician and Silurian rocks.

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**PLATE 2005-21C PLANCHE**  
NEW BRUNSWICK/NOUVEAU-BRUNSWICK

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