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GEOLOGICAL SURVEY OF CANADA



COMMISSION GÉOLOGIQUE DU CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES
MINISTÈRE DE L'ÉNERGIE DES MINES ET DES RESSOURCES

Airborne Geophysical Survey
Levé géophysique Aéroporté
St. Peters – Framboise
Nova Scotia

NTS/SNRC 11 F/10, 11 F/9 and 11 F/5 (part of)

Contents include gamma ray spectrometric and magnetic
colour maps, flight path map, VLF profilemaps and
accompanying stacked profiles
Contient des cartes en couleur de rayons gamma spectrométrique
et magnétique, une carte de lignes de vol, VLF sous forme des
cartes de profils et profils multi-paramétriques

COOPERATION

COOPERATION
AGREEMENT ON
MINERAL DEVELOPMENT

ENTENTE DE
COOPÉRATION SUR
L'EXPLOITATION MINÉRALE

Contribution to Canada-Nova Scotia Cooperation Agreement on
Mineral Development (1990-1992) a subsidiary agreement under the
Economic and Regional Development Agreement.

Contribution à l'Entente de coopération Canada-Nouvelle-Écosse
sur l'exploitation minière (1990-1992), entente auxiliaire négociée
en vertu de l'Entente Canada/Nouvelle-Écosse de développement
économique et régional.

Canada

Nova Scotia
Province of
Nova Scotia



Energy, Mines and
Resources Canada

Energie, Mines et
Ressources Canada

Canada

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Colour – Geophysical Series
Couleur – Séries géophysiques

35611(10)G

GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA
OTTAWA

Airborne Geophysical Survey

In 1990, a multi-parameter airborne geophysical survey of southeastern Cape Breton Island, Nova Scotia was flown by the Geological Survey of Canada (GSC). This survey was flown as a contribution to the Canada-Nova Scotia Cooperation Agreement on Mineral Development (1990-1992), a subsidiary agreement under the Canada-Nova Scotia Economic and Regional Development Agreement. The area was surveyed using the GSC Skyvan aircraft. Gamma-ray spectrometric, VLF electromagnetic and total field magnetic data were recorded digitally and sampled at one second intervals. The aircraft was flown at a mean terrain clearance of 125 meters and at an average ground speed of 190 km/h. The flight lines were flown in an east-west direction with a line spacing of 1000 meters.

For this survey the data are released as eight (8) G-Series booklets. This booklet for the **St. Peters-Framboise area, G-Series 35611(10)G** includes a set of colour maps with the flight path of the aircraft superimposed, two black and white profile maps and stacked profiles for each flight line, all at 1:150,000 scale. The following maps are enclosed:

- 1) An exposure rate map,
- 2) 3 maps of the ground concentration of Potassium (K), Uranium (eU) and Thorium (eTh),
- 3) 3 ratio maps - eU/eTh, eU/K and eTh/K,
- 4) A three component or Ternary Radioelement map combining the potassium, uranium and thorium data,
- 5) A Magnetic Total Field map,
- 6) Two VLF profile maps, one with Total Field VLF profile data and the other with Quadrature VLF profile data,
- 7) A matte positive of the corresponding 1:50,000 NTS map sheet reduced to 1:150,000 scale.

The stacked profiles in the booklet have a five point weighted average filter applied to each parameter. Each profile shows the aircraft radar altimeter, the three radioelement ratios, the ground concentrations of potassium, uranium and thorium, the exposure rate, the magnetic total field and the VLF total field and quadrature components. The picked fiducials along the horizontal axis of each profile relates the data to the flight lines shown on the colour maps.

Gamma-ray Spectrometric Data

The airborne gamma-ray measurements were made using a 256 channel gamma-ray spectrometer with fourteen 102 x 102 x 406 mm NaI(Tl) crystals. The main detector array consisted of twelve crystals (total volume 50 litres). Two crystals, shielded by the main array, were used to detect variations in background radiation. The system constantly monitored the natural potassium peak and adjusted the gain for the system.

Potassium is measured directly from the 1460 keV gamma-ray photons emitted by ^{40}K , whereas uranium and thorium are measured indirectly from gamma-ray photons emitted by daughter products (^{214}Bi for uranium and ^{208}Tl 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:

Potassium (^{40}K)	1360 - 1560 keV
Uranium (^{214}Bi)	1660 - 1860 keV
Thorium (^{208}Tl)	2410 - 2810 keV

During processing, the spectra were energy calibrated, and counts were accumulated into the windows described above. The window counts were corrected for deadtime and for background activity due to cosmic radiation, the radioactivity of the aircraft and atmospheric radon decay products. The window data were then corrected for spectral scattering in the ground, air and detectors. Corrections for deviations, of altitude from the planned terrain clearance, and of temperature and pressure were made prior to conversion to ground concentrations of potassium, uranium and thorium, using factors determined from flights over a calibration range near Ottawa. In areas of extreme topographic variations accurate terrain corrections are difficult. Thus, estimates of radioelement concentrations may be inaccurate in these areas. The stacked profiles should be inspected in areas of extreme topographic relief.

Potassium	91.0 cps/%
Uranium	9.1 cps/ppm
Thorium	7.0 cps/ppm

Corrected data were interpolated to yield 100 m grids using an inverse distance weighted average technique. The results of an airborne gamma-ray spectrometer survey represent average surface concentrations which 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 concentration.

The exposure rate in micro Roentgens per hour was computed from the measured ground concentration of potassium, uranium and thorium. To compare this exposure rate with older total count maps contoured in Ur (units of radioelement concentration) the conversion factor is $1\mu\text{R/h} = 1.67 \text{ Ur}$.

VLF Data

The VLF electromagnetic data were recorded using a Hertz Totem 1A system. The system was tuned to a primary electromagnetic field generated by one of several VLF communication stations. For this survey, the receiving coils were tuned to station NSS in Annapolis, Maryland which transmits at a frequency of 21.4 kHz.

Anomalies reflect distortions in the primary field cause by a secondary electromagnetic field generated by eddy currents flowing in geological and man-made conductors. Anomalies produce positive peaks on the total field trace and are of the cross-over type (negative to positive) on the quadrature trace. Both parameters are plotted with positive deflections toward north. The profiles presented are the total field value (vector sum of the horizontal and vertical components) and the quadrature value (out-of-phase component). For the stacked profiles, the mean value or line average of the total field and quadrature component were removed along each flight line. The quadrature, which depends on the flight line direction, was inverted for lines flown from east to west. All the VLF data are plotted with a two second lag.

Magnetic Data

The aeromagnetic data were acquired using a Geometrics model G-803 proton precession magnetometer with a sensitivity of one nanotesla (1 nT). The magnetic data were corrected to remove spikes, heading effects and diurnal variations.

Information regarding these G-Series Maps may be obtained from: Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario, K1A 0E8; Telephone (613) 995-4342 or 992-4279.

Base map material supplied by Surveys and Mapping Branch.

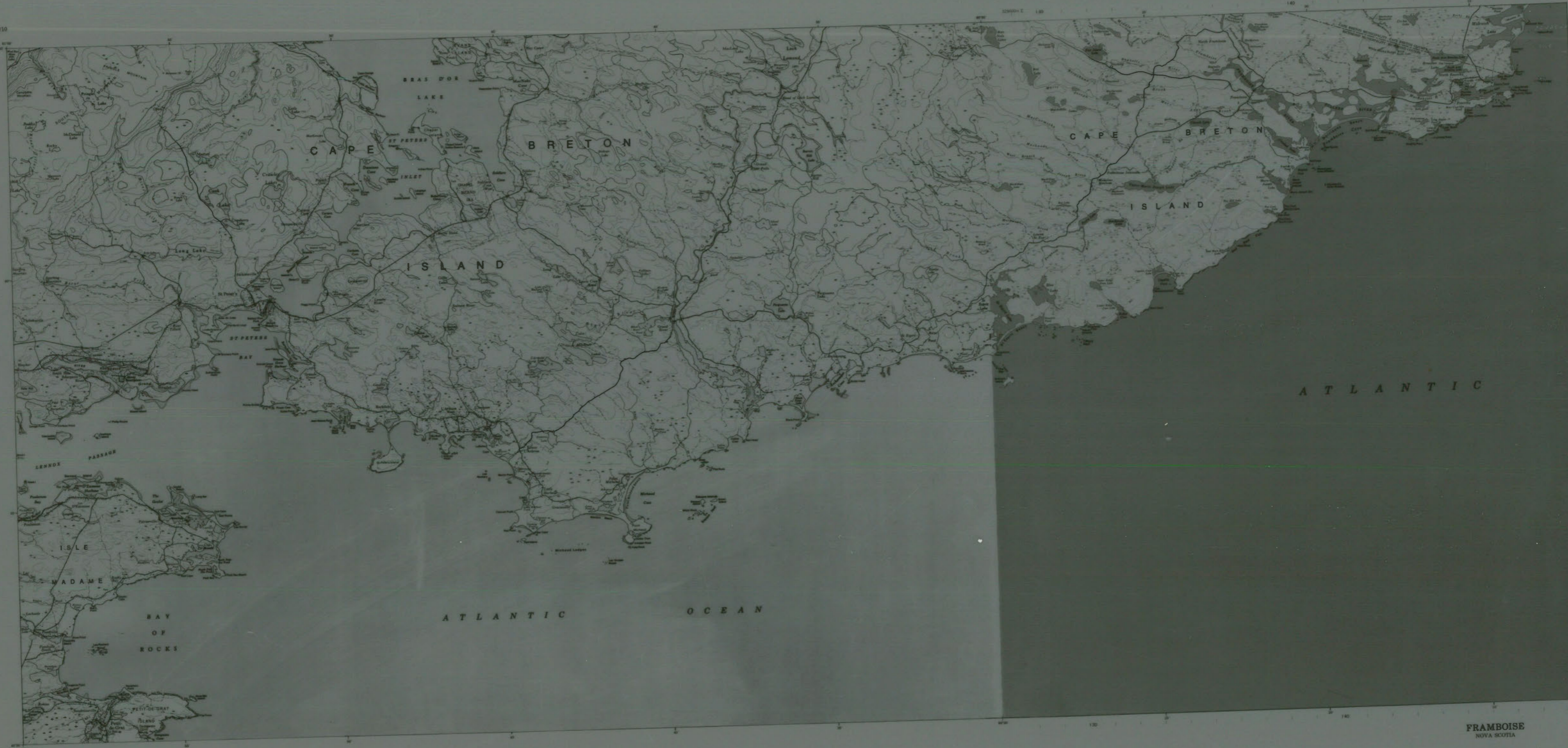
Airborne gamma-ray spectrometer, VLF and magnetic survey carried out by the Mineral Resources Division of the Geological Survey of Canada as a contribution to the Canada-Nova Scotia Cooperation Agreement of Mineral Development (1990-1992), a subsidiary agreement under the Canada-Nova Scotia Economic and Regional Development Agreement.

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MAP LIBRARY / CARTOTHEQUE

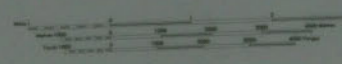
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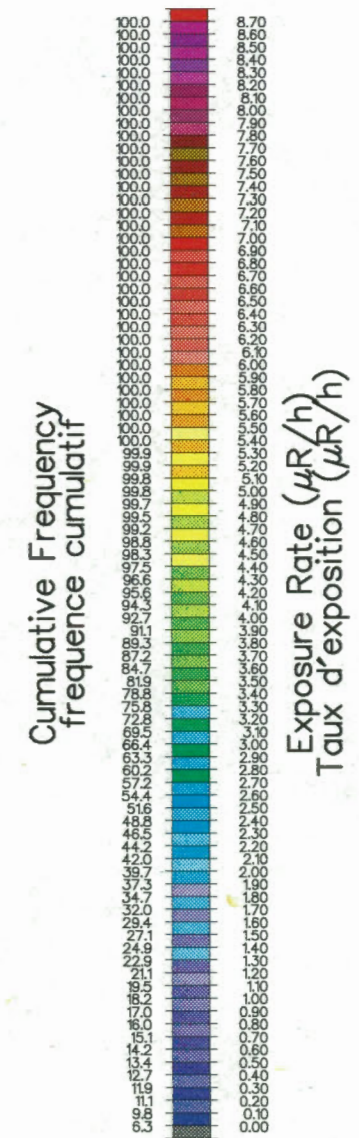
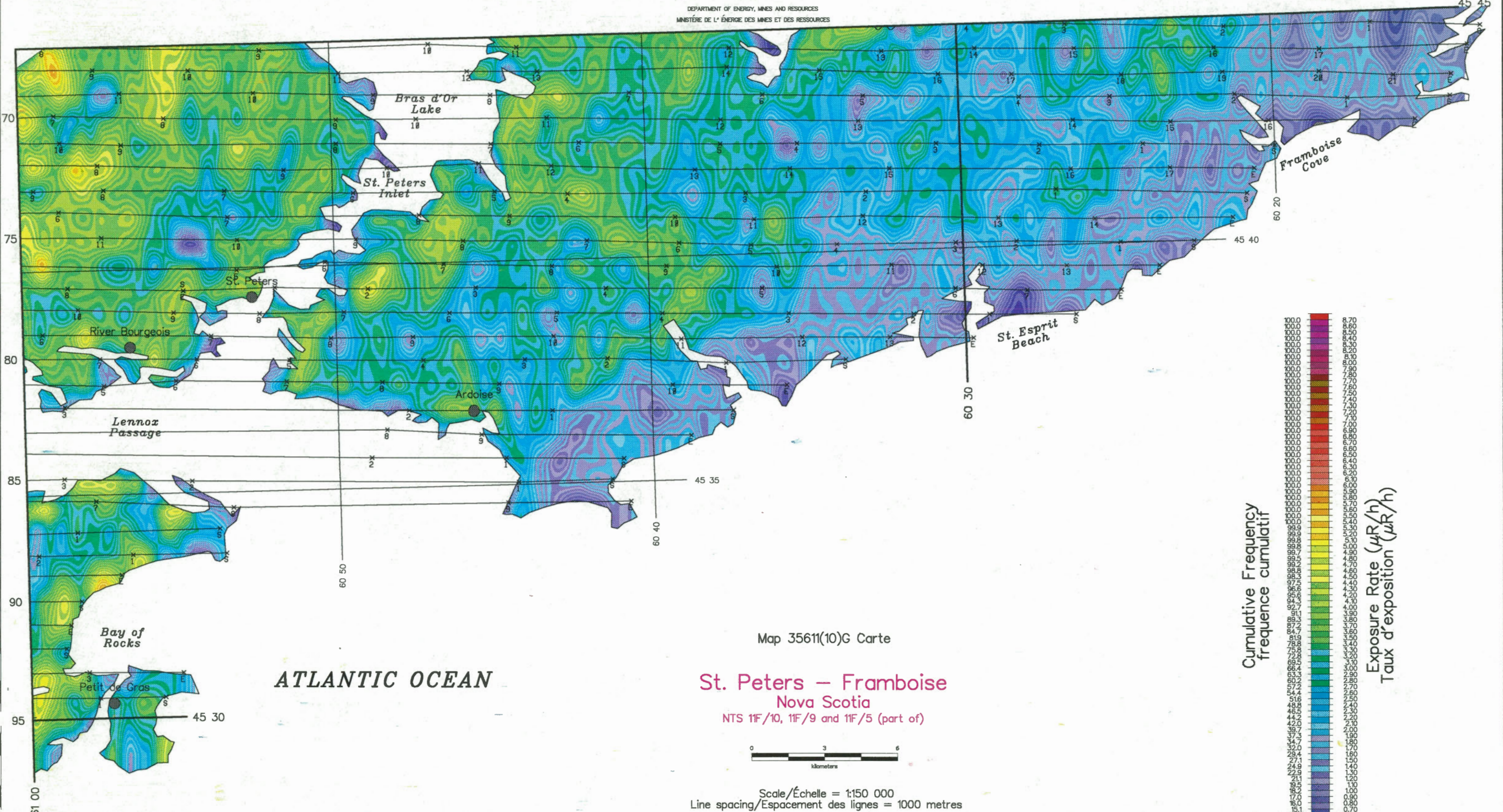
ST. PETER'S
 MUNICIPALITY - BEAUFORT COUNTY
 NOVA SCOTIA

FRAMBOISE
 NOVA SCOTIA



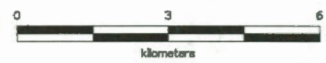


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ATLANTIC OCEAN

Map 35611(10)G Carte
St. Peter's - Framboise
 Nova Scotia
 NTS 11F/10, 11F/9 and 11F/5 (part of)

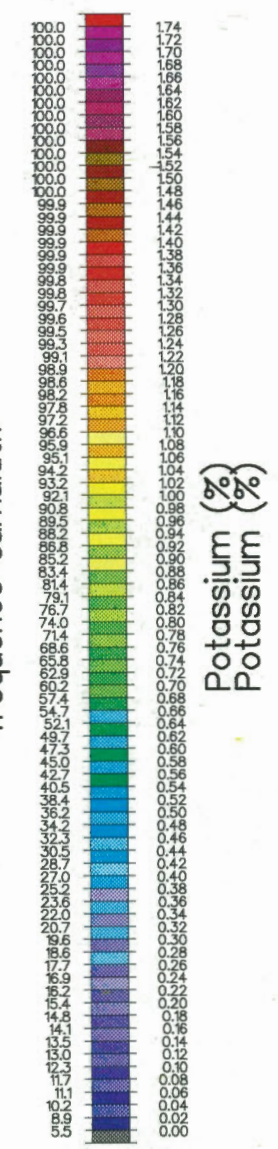
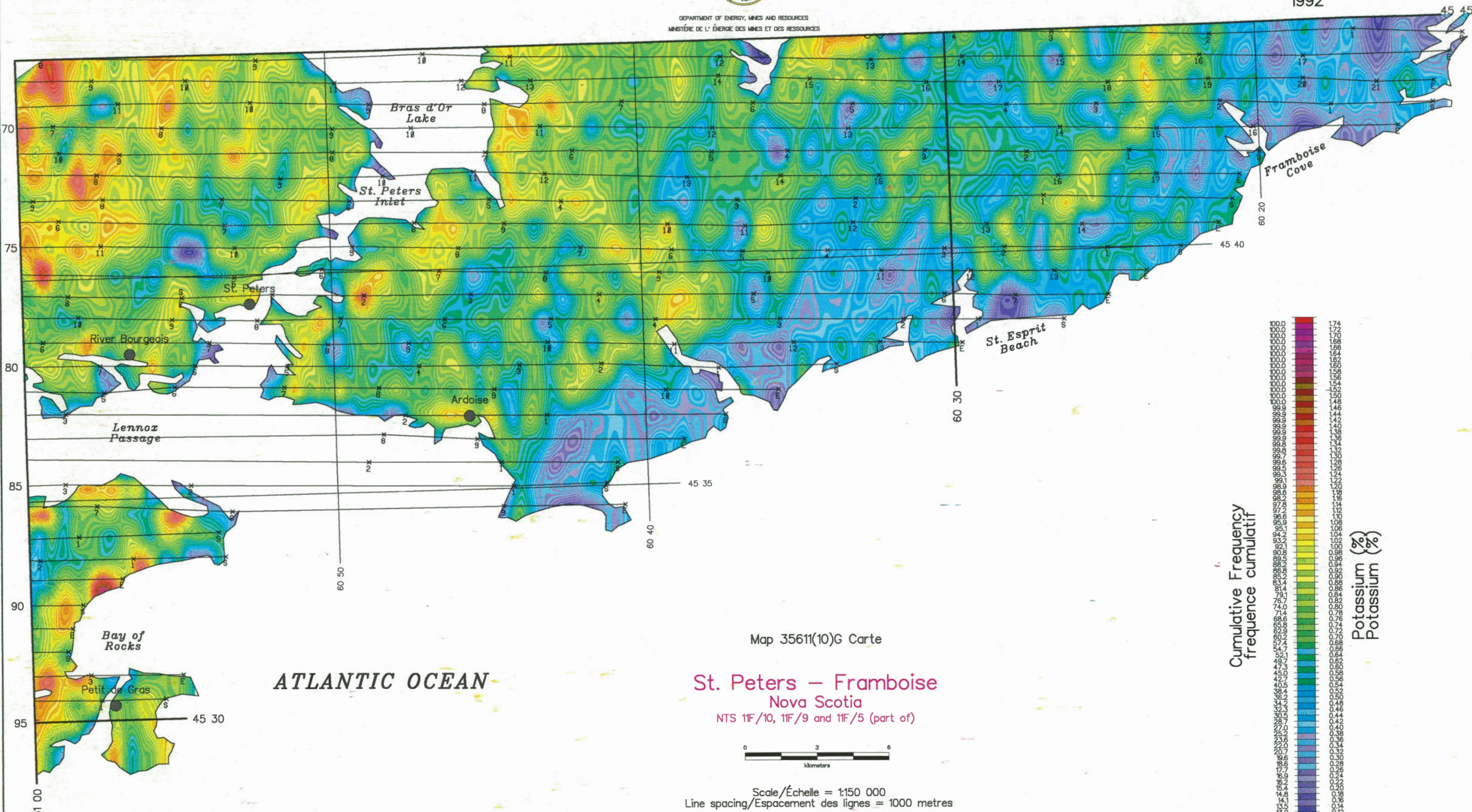


Scale/Échelle = 1:150 000
 Line spacing/Espacement des lignes = 1000 metres

Exposure Rate ($\mu\text{R}/\text{h}$)
Taux d'exposition ($\mu\text{R}/\text{h}$)



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Cumulative Frequency
 fréquence cumulée

Potassium (%)
 Potassium (%)

Map 35611(10)G Carte

St. Peter's - Framboise
 Nova Scotia
 NTS 11F/10, 11F/9 and 11F/5 (part of)

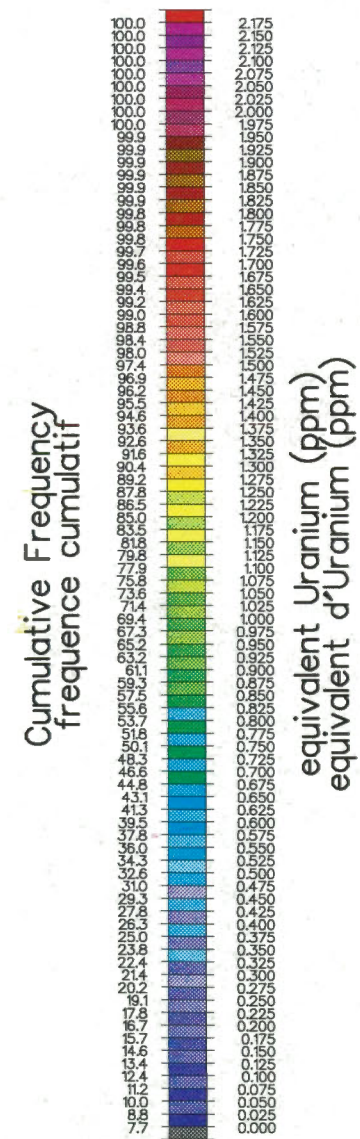
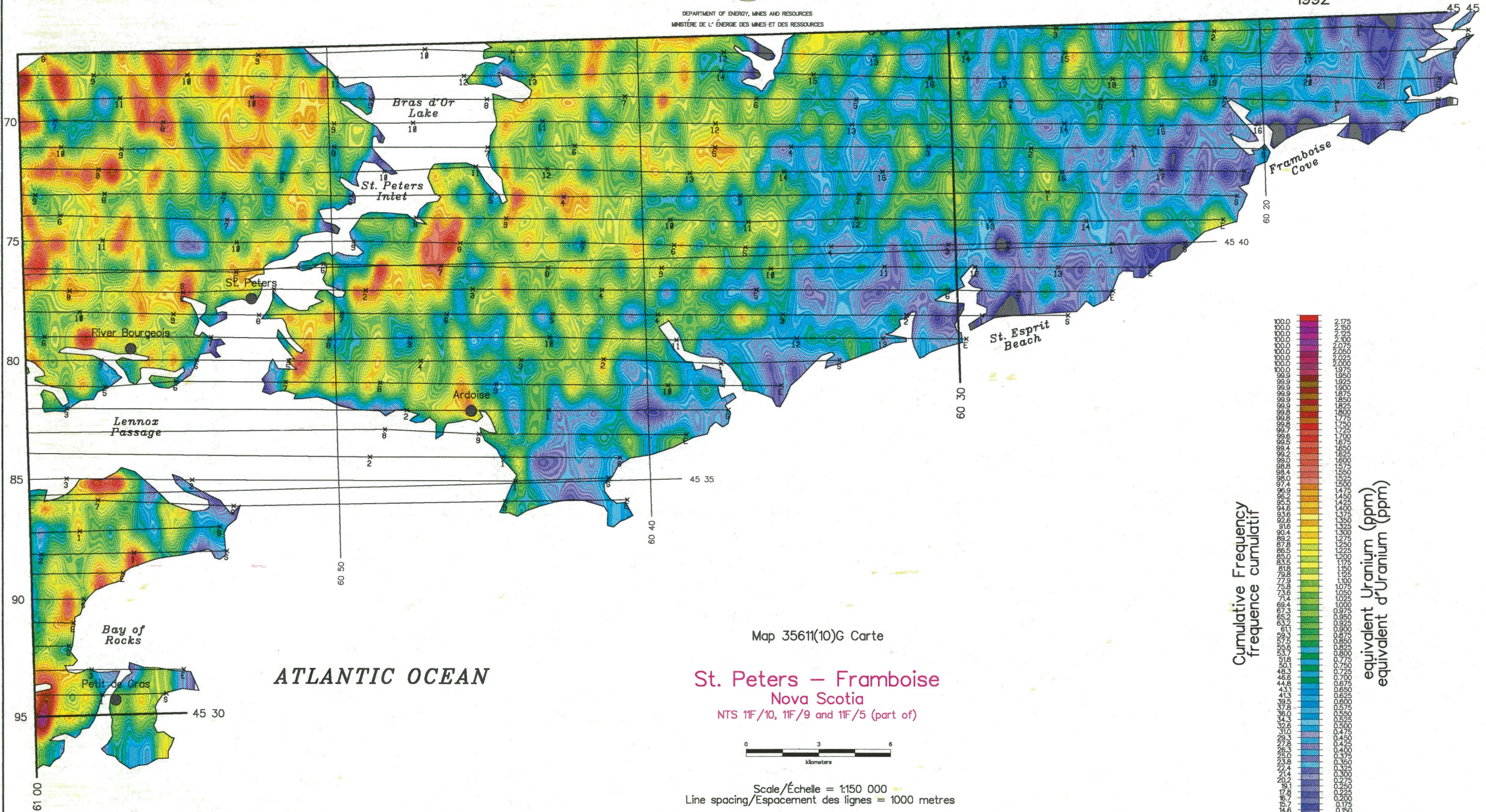


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 Line spacing/Espacement des lignes = 1000 metres

Potassium (%)
 Potassium (%)



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Map 35611(10)G Carte

St. Peter's - Framboise
 Nova Scotia
 NTS 11F/10, 11F/9 and 11F/5 (part of)

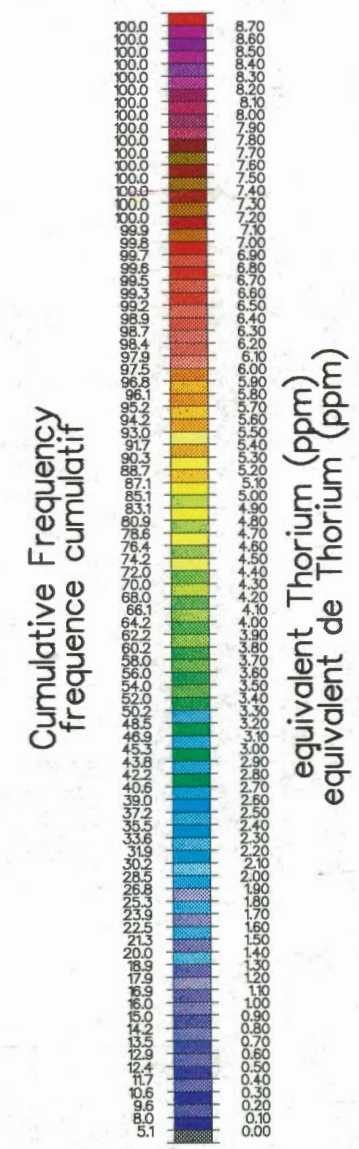
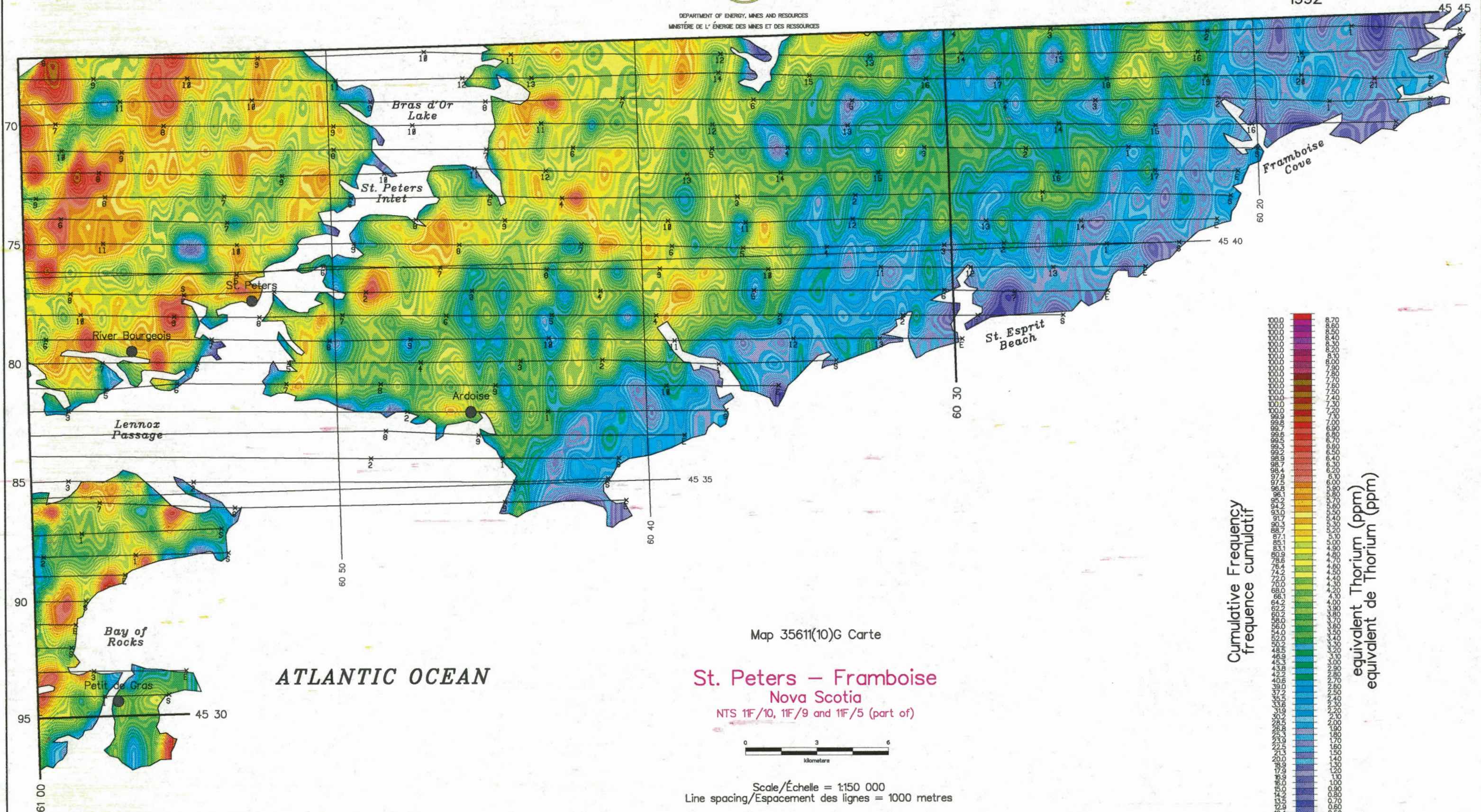


Scale/Échelle = 1:150 000
 Line spacing/Espacement des lignes = 1000 metres

equivalent Uranium (ppm)
 équivalent d'Uranium (ppm)



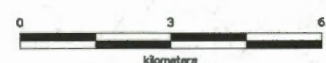
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ATLANTIC OCEAN

Map 35611(10)G Carte

St. Peter's - Framboise
 Nova Scotia
 NTS 1F/10, 1F/9 and 1F/5 (part of)

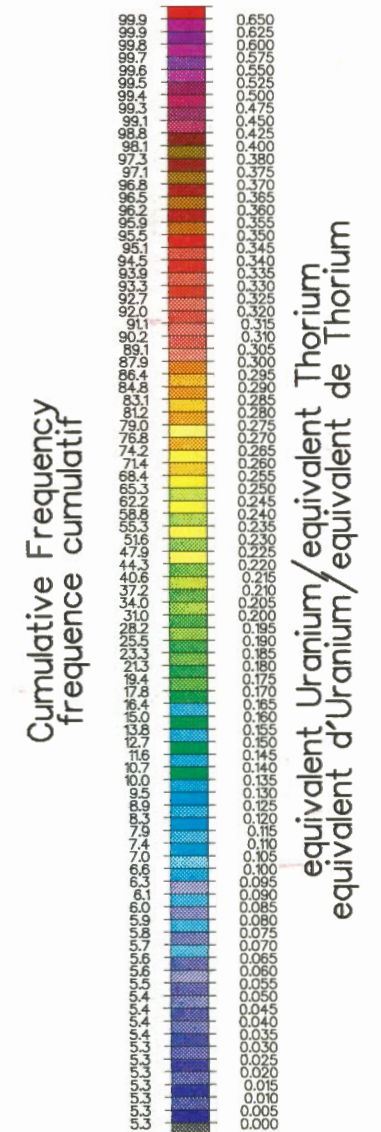
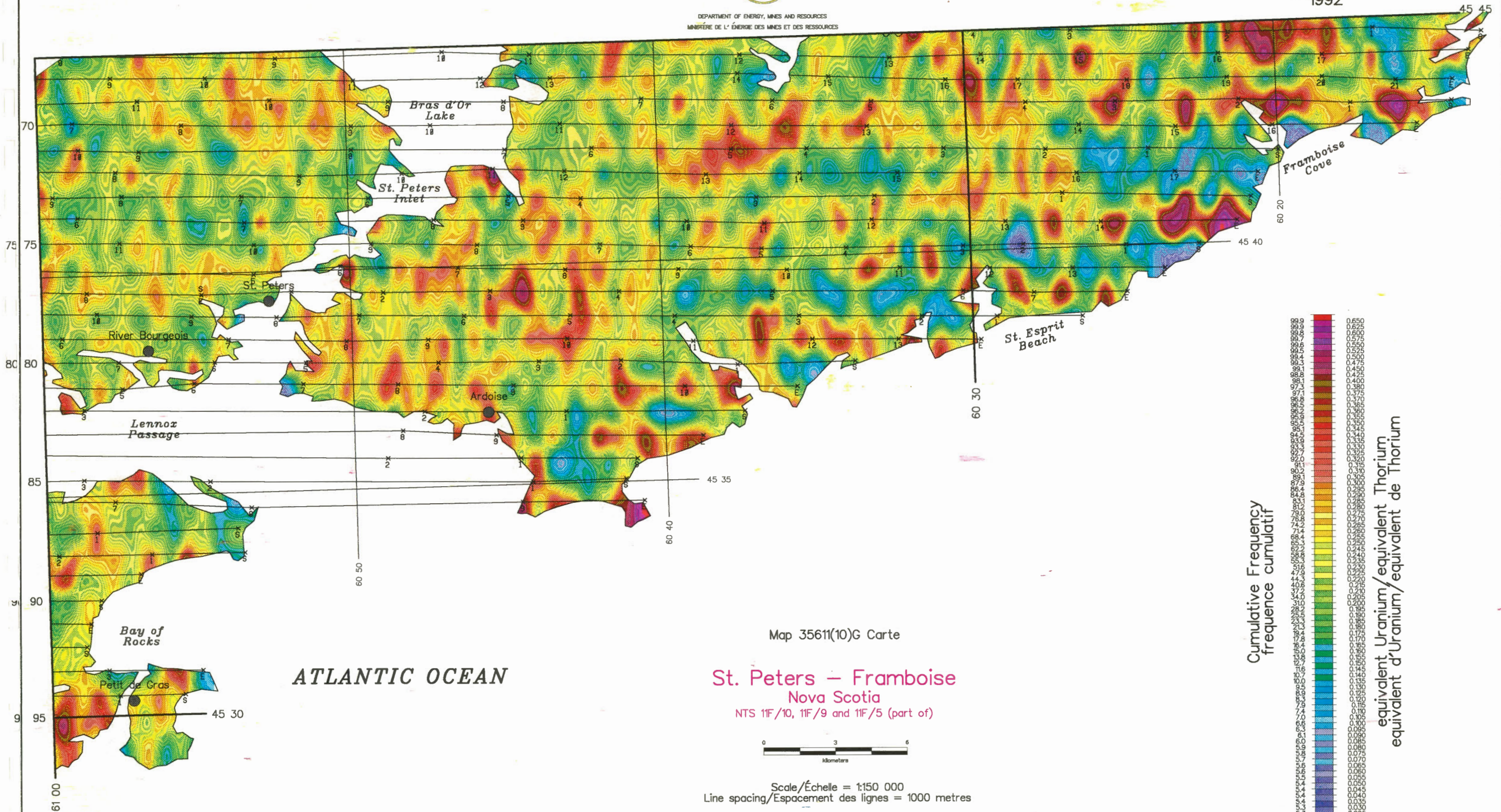


Scale/Échelle = 1:150 000
 Line spacing/Espacement des lignes = 1000 metres

equivalent Thorium (ppm)
 équivalent de Thorium (ppm)

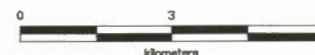


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Map 35611(10)G Carte

St. Peter's - Framboise
 Nova Scotia
 NTS 11F/10, 11F/9 and 11F/5 (part of)

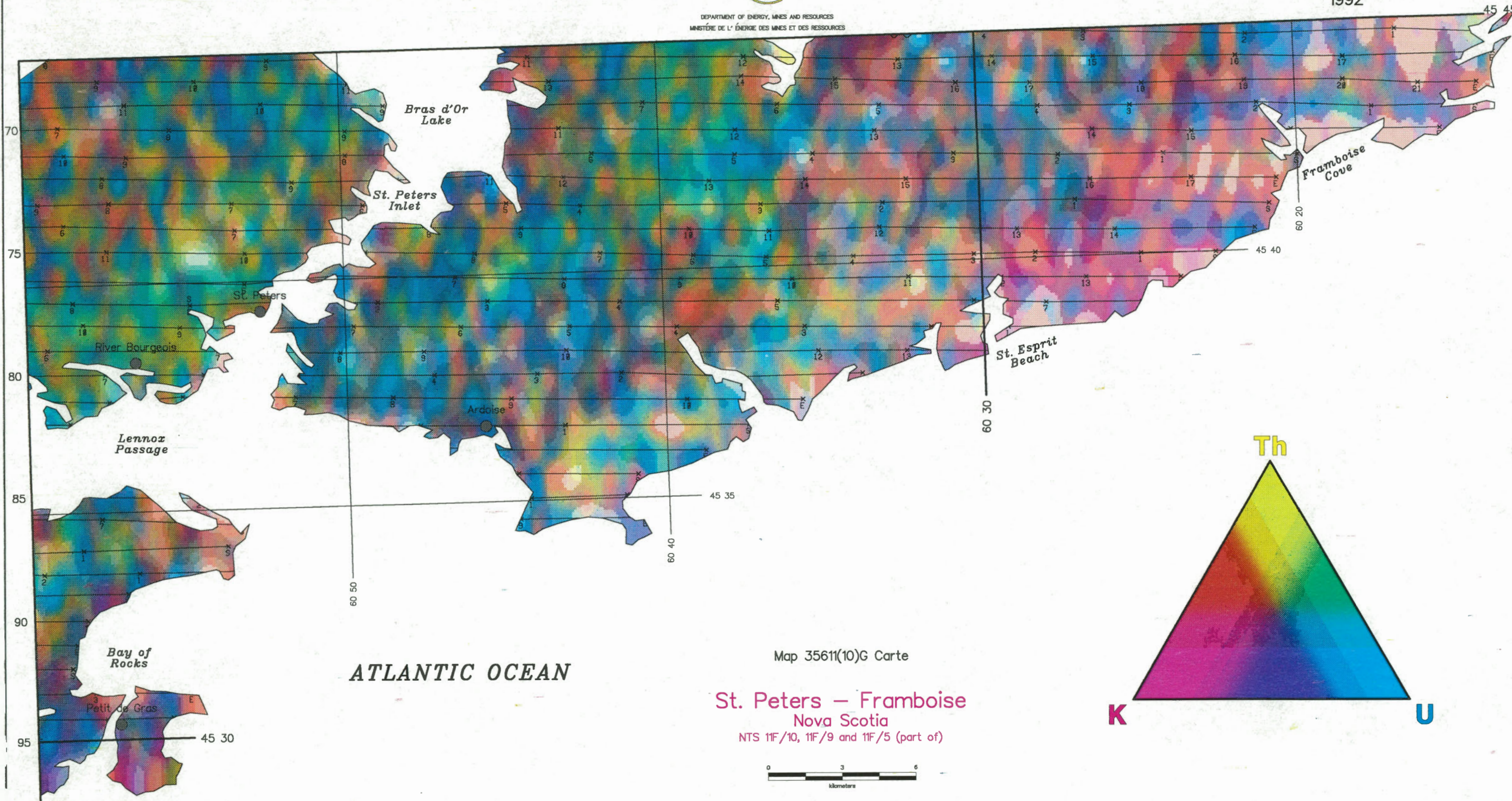


Scale/Échelle = 1:150 000
 Line spacing/Espacement des lignes = 1000 metres

equivalent Uranium/equivalent Thorium
 équivalent d'Uranium/équivalent de Thorium



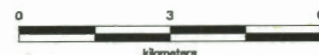
DEPARTMENT OF ENERGY, MINES AND RESOURCES
MINISTÈRE DE L'ÉNERGIE DES MINES ET DES RESSOURCES



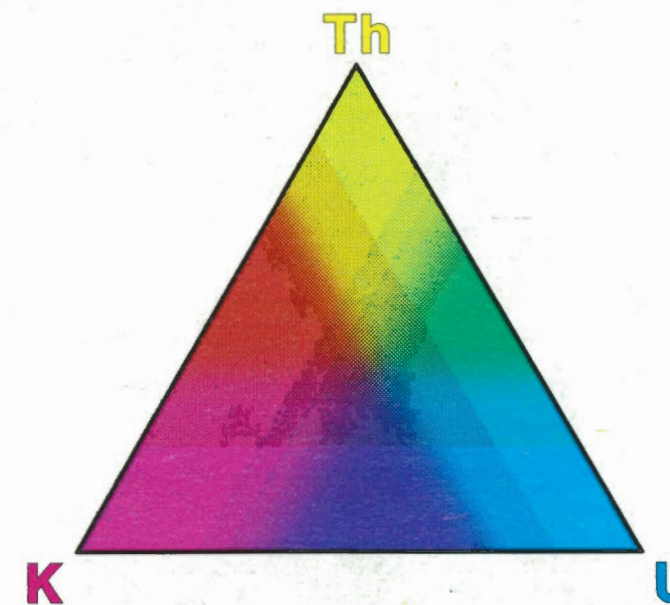
ATLANTIC OCEAN

Map 3561(10)G Carte

St. Peter's - Framboise
Nova Scotia
NTS 11F/10, 11F/9 and 11F/5 (part of)

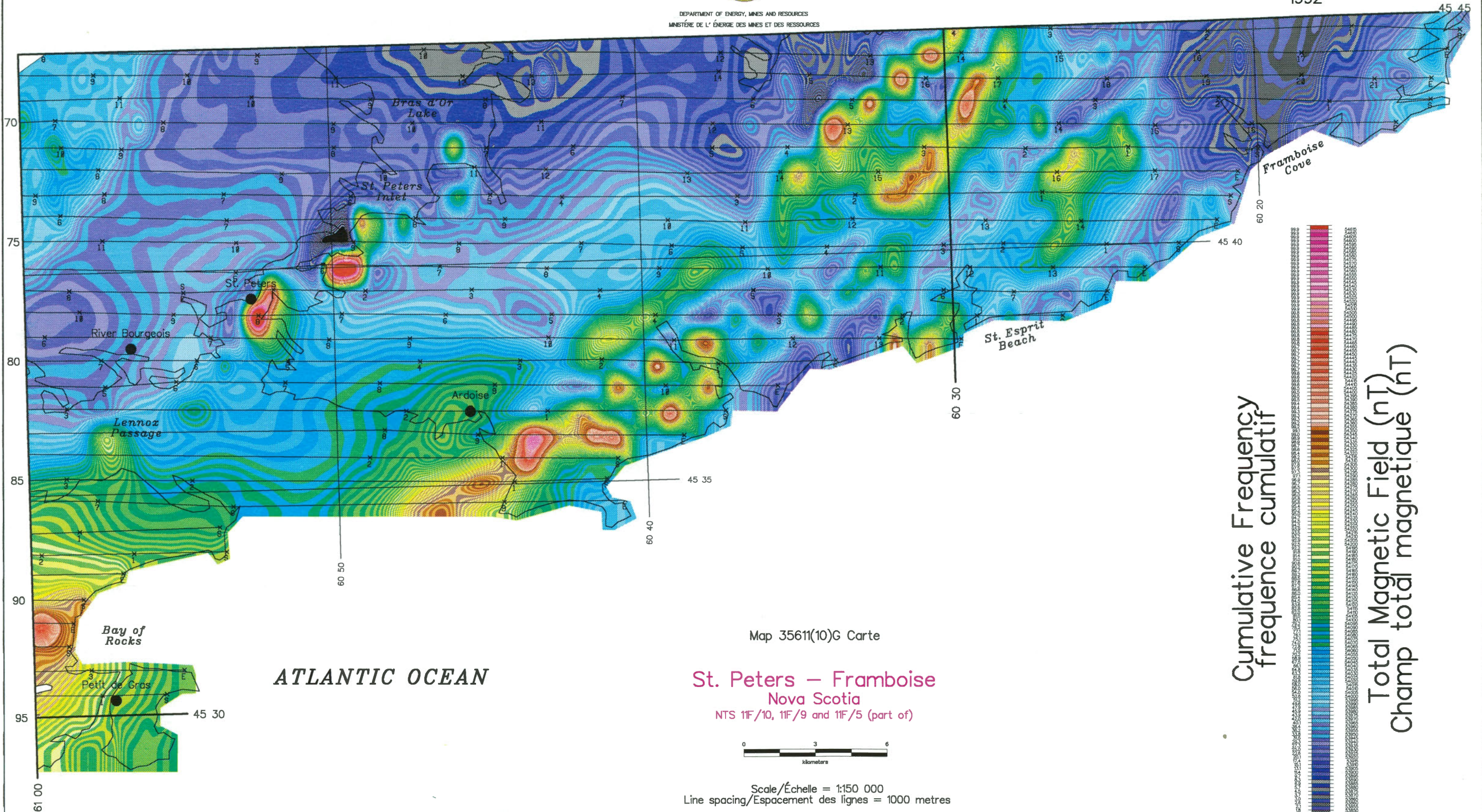


Scale/Échelle = 1:150 000
Line spacing/Espacement des lignes = 1000 metres





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ATLANTIC OCEAN

Map 35611(10)G Carte

St. Peter's - Framboise
 Nova Scotia
 NTS 11F/10, 11F/9 and 11F/5 (part of)

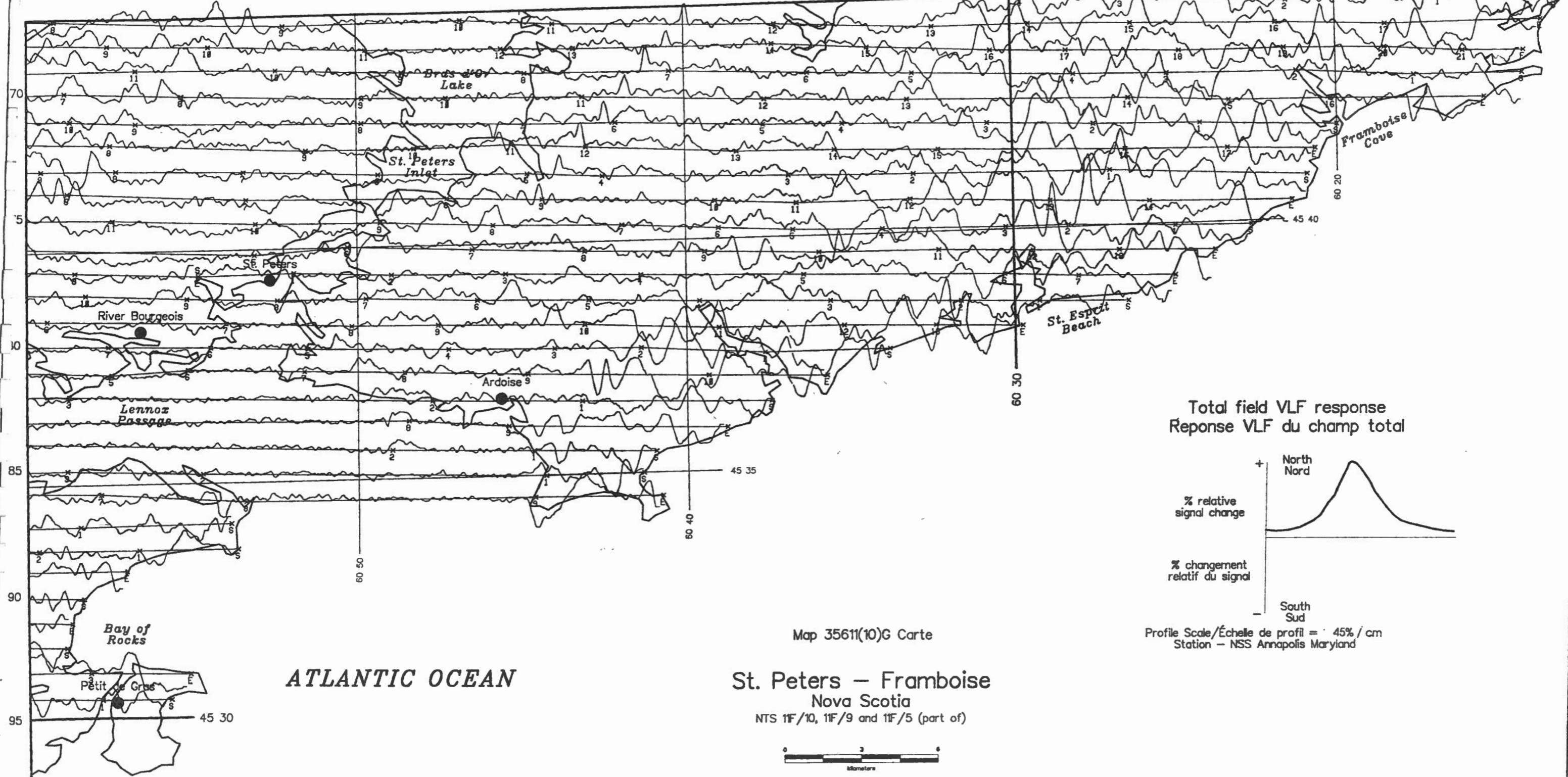


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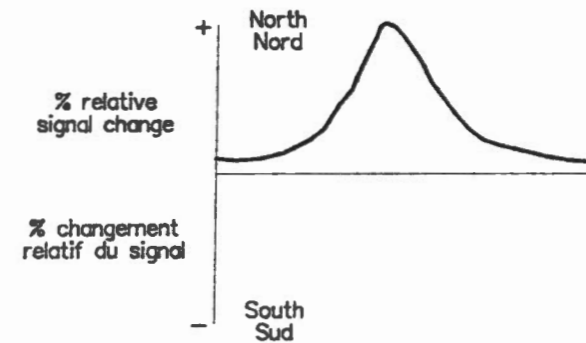
Total Magnetic Field (nT)
 Champ total magnétique (nT)



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Total field VLF response
 Réponse VLF du champ total



Profile Scale/Échelle de profil = 45% / cm
 Station - NSS Annapolis Maryland

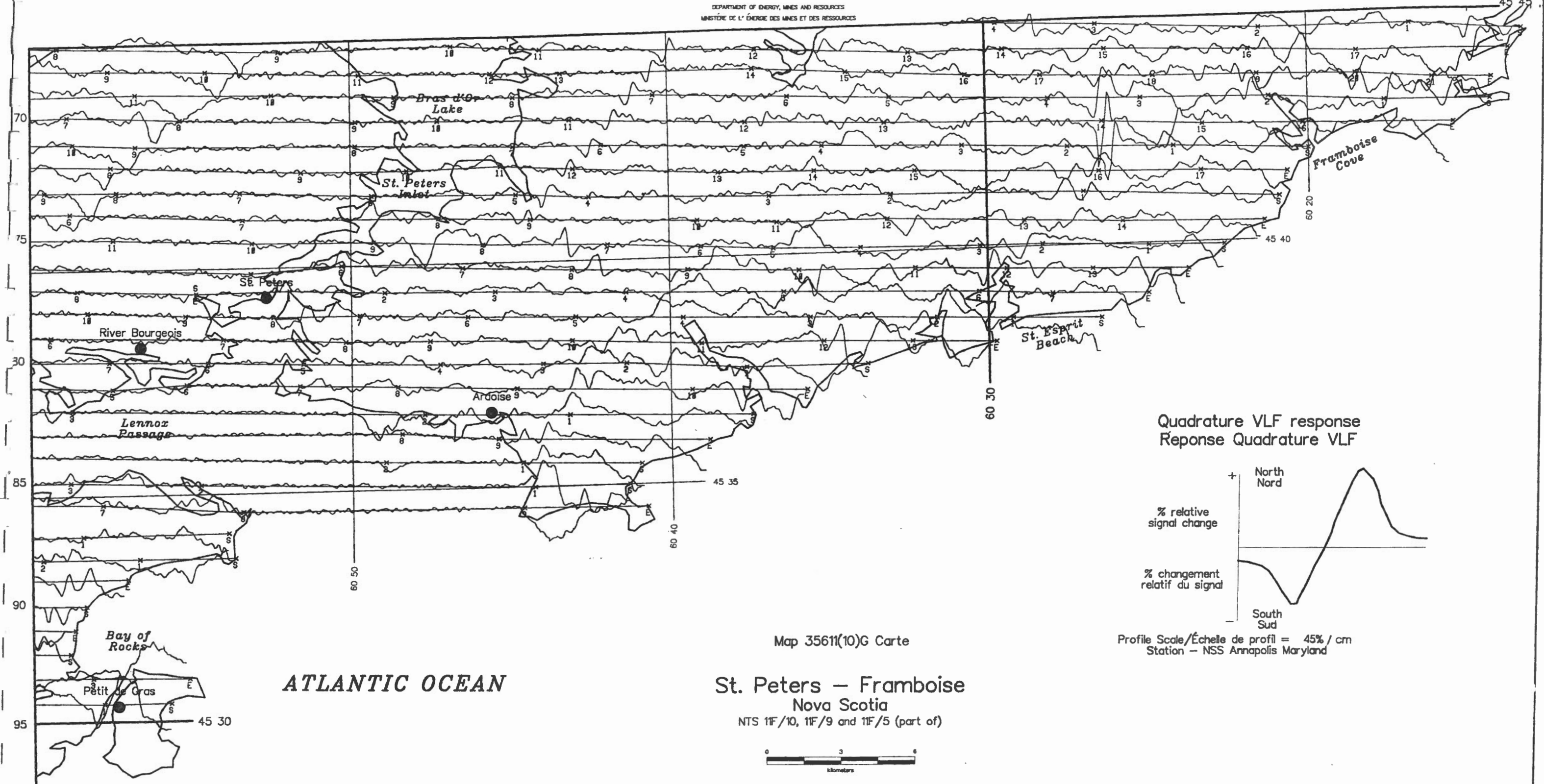
ATLANTIC OCEAN

Map 35611(10)G Carte
 St. Peters - Framboise
 Nova Scotia
 NTS 11F/10, 11F/9 and 11F/5 (part of)

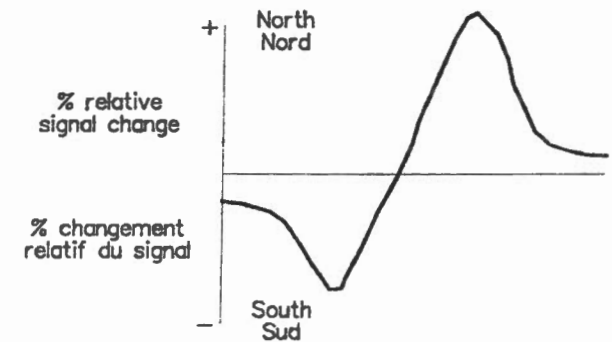


Scale/Échelle = 1:150 000
 Line spacing/Espacement des lignes = 1000 metres

VLF Total Field (%)
 Champ total TBF (%)



Quadrature VLF response
Réponse Quadrature VLF



Profile Scale/Échelle de profil = 45% / cm
Station - NSS Annapolis Maryland

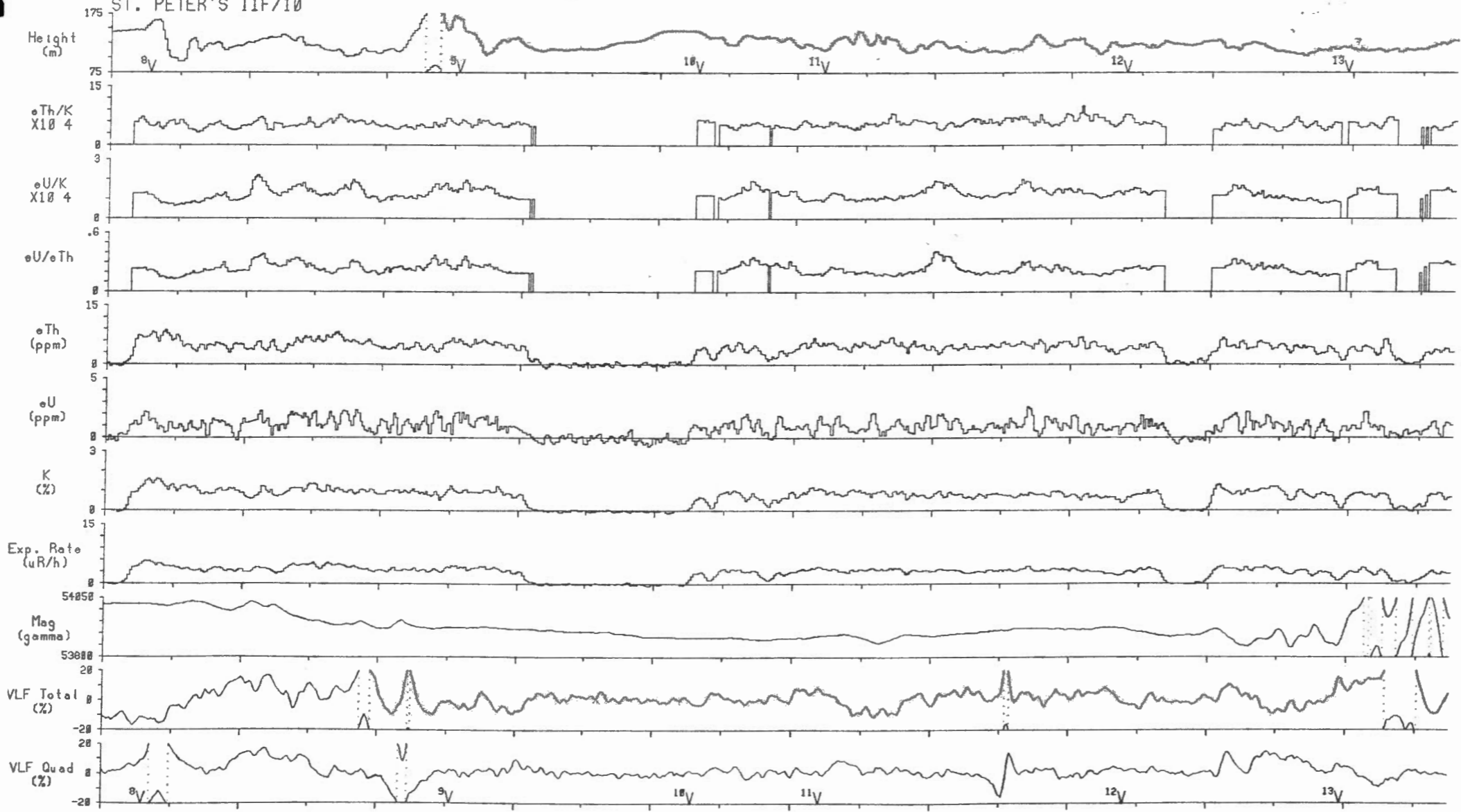
Map 3561(10)G Carte

St. Peters - Framboise
Nova Scotia
NTS 11F/10, 11F/9 and 11F/5 (part of)



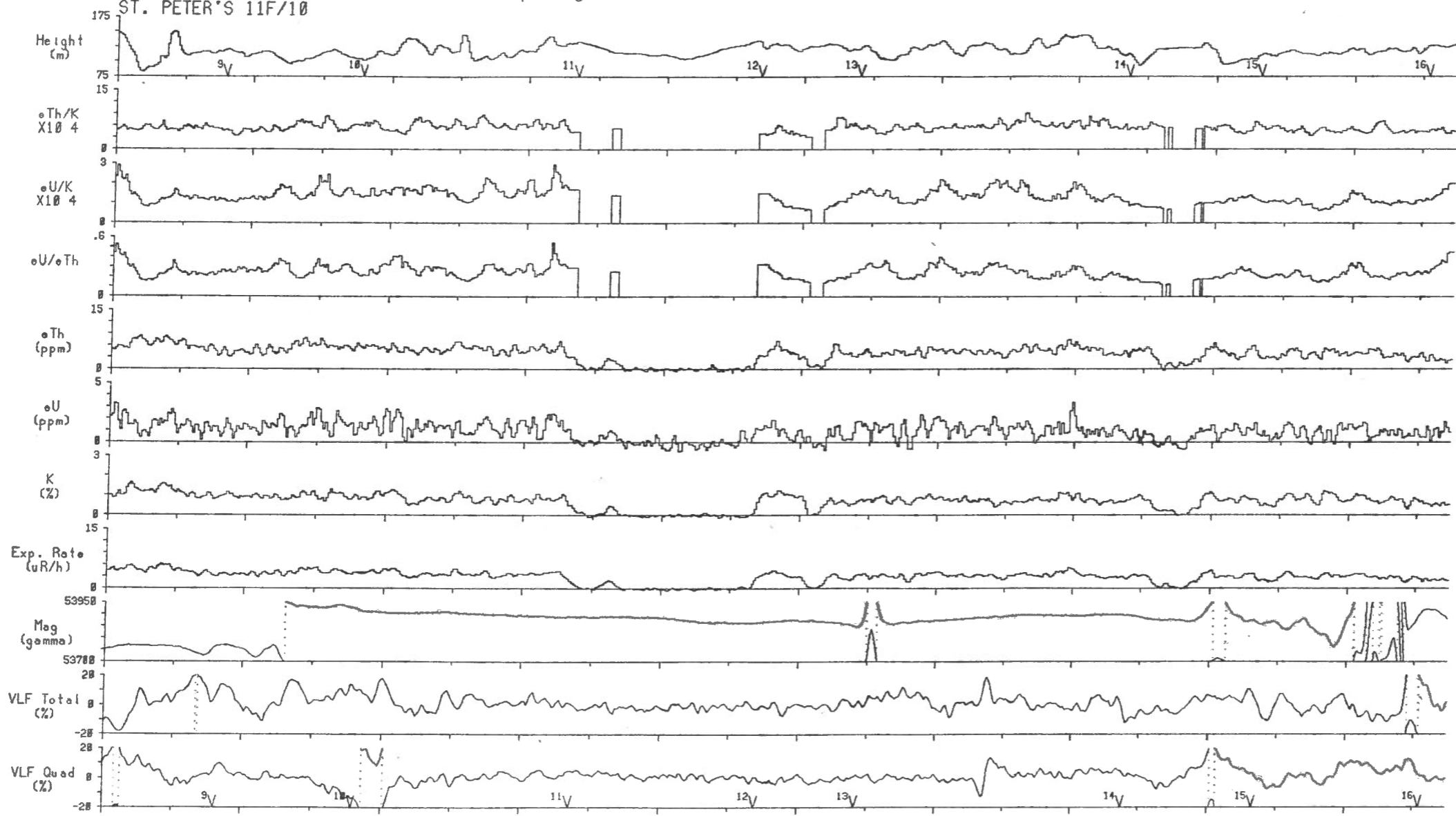
Scale/Échelle = 1:150 000
Line spacing/Espacement des lignes = 1000 metres

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
 ST. PETER'S 11F/10



Line 67 | 2 km | Scale 1:150000

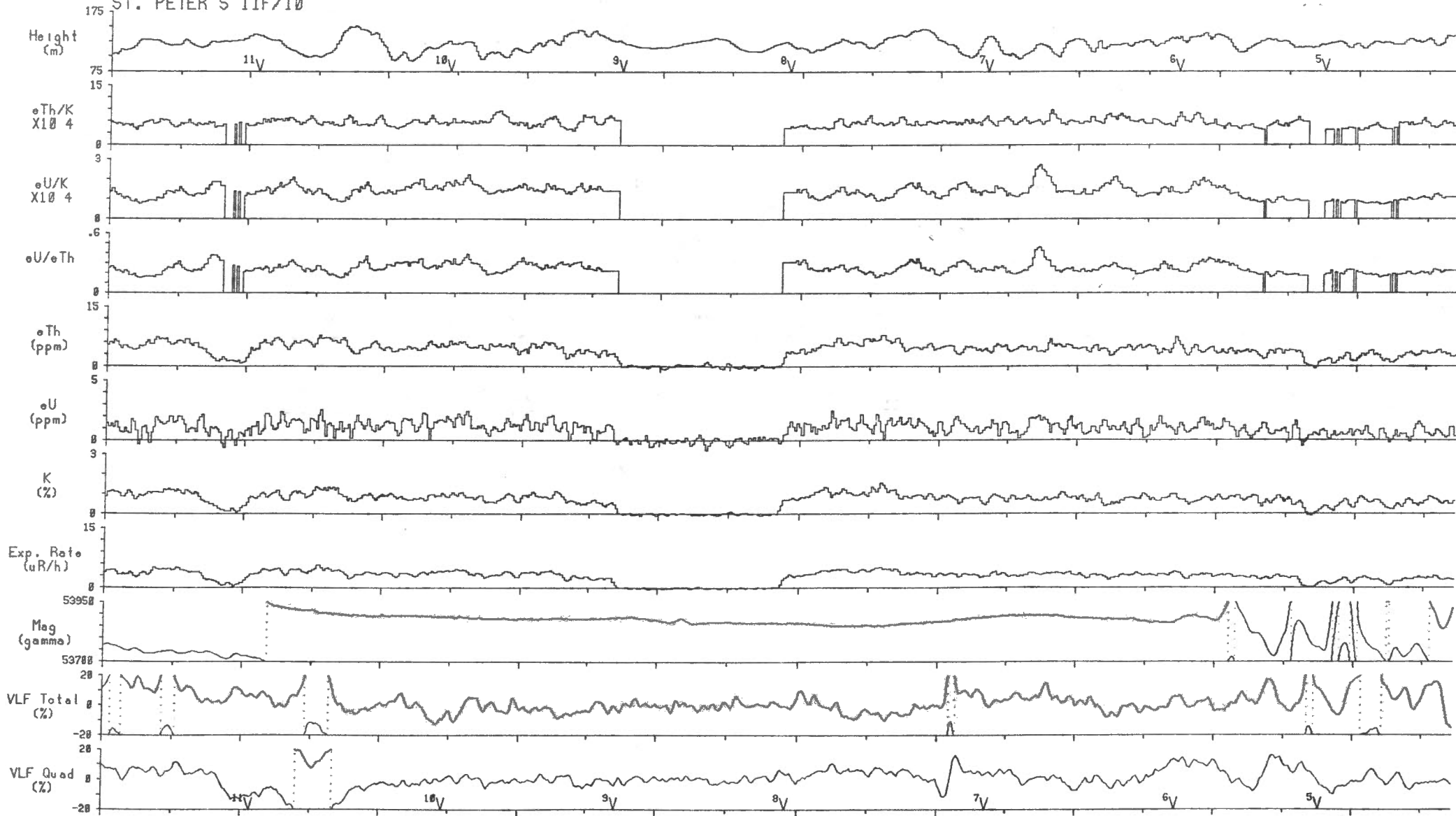
Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
 ST. PETER'S 11F/10

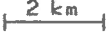


Line 68 2 km Scale 1:150000

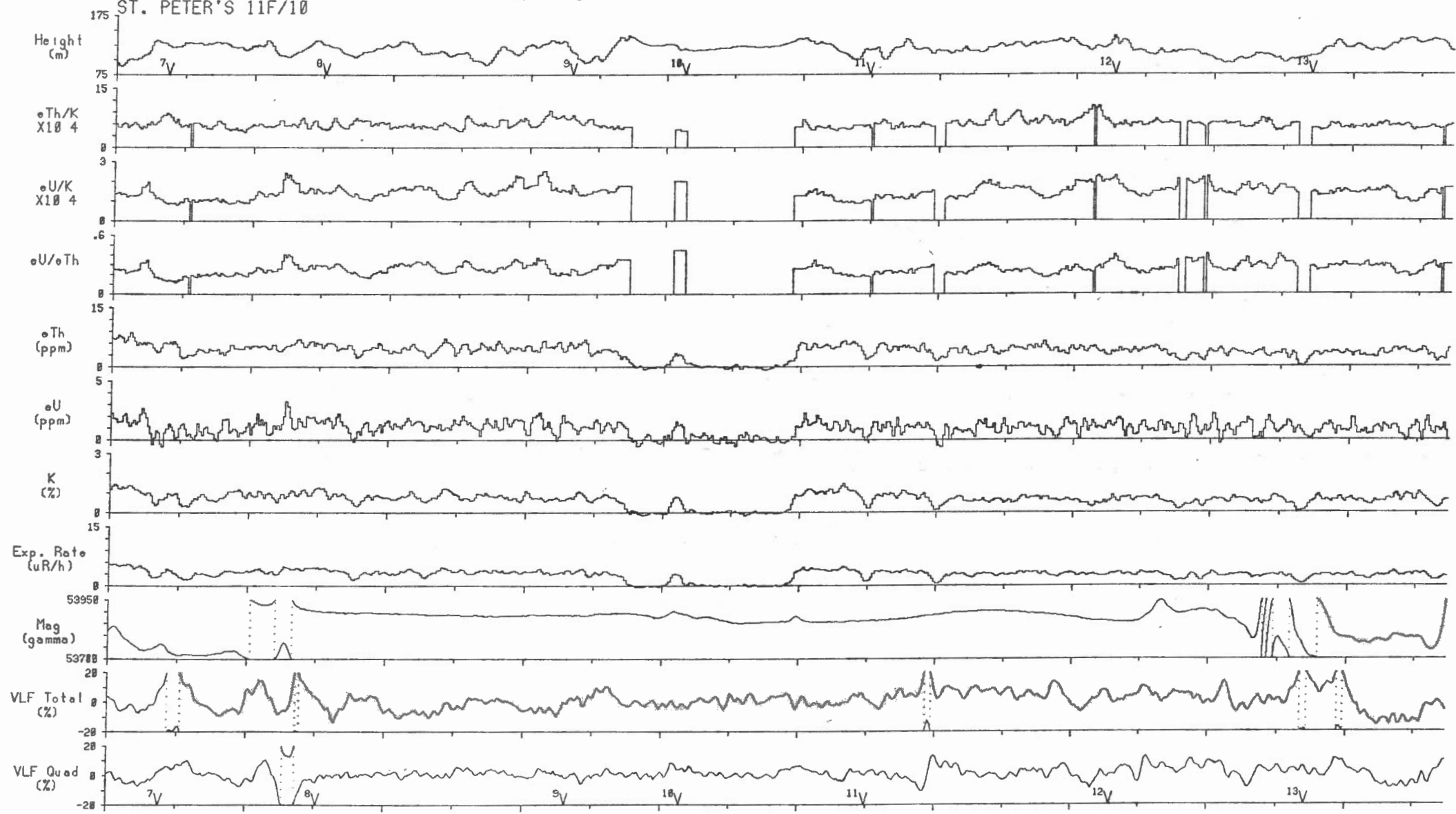
Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)

ST. PETER'S 11F/10



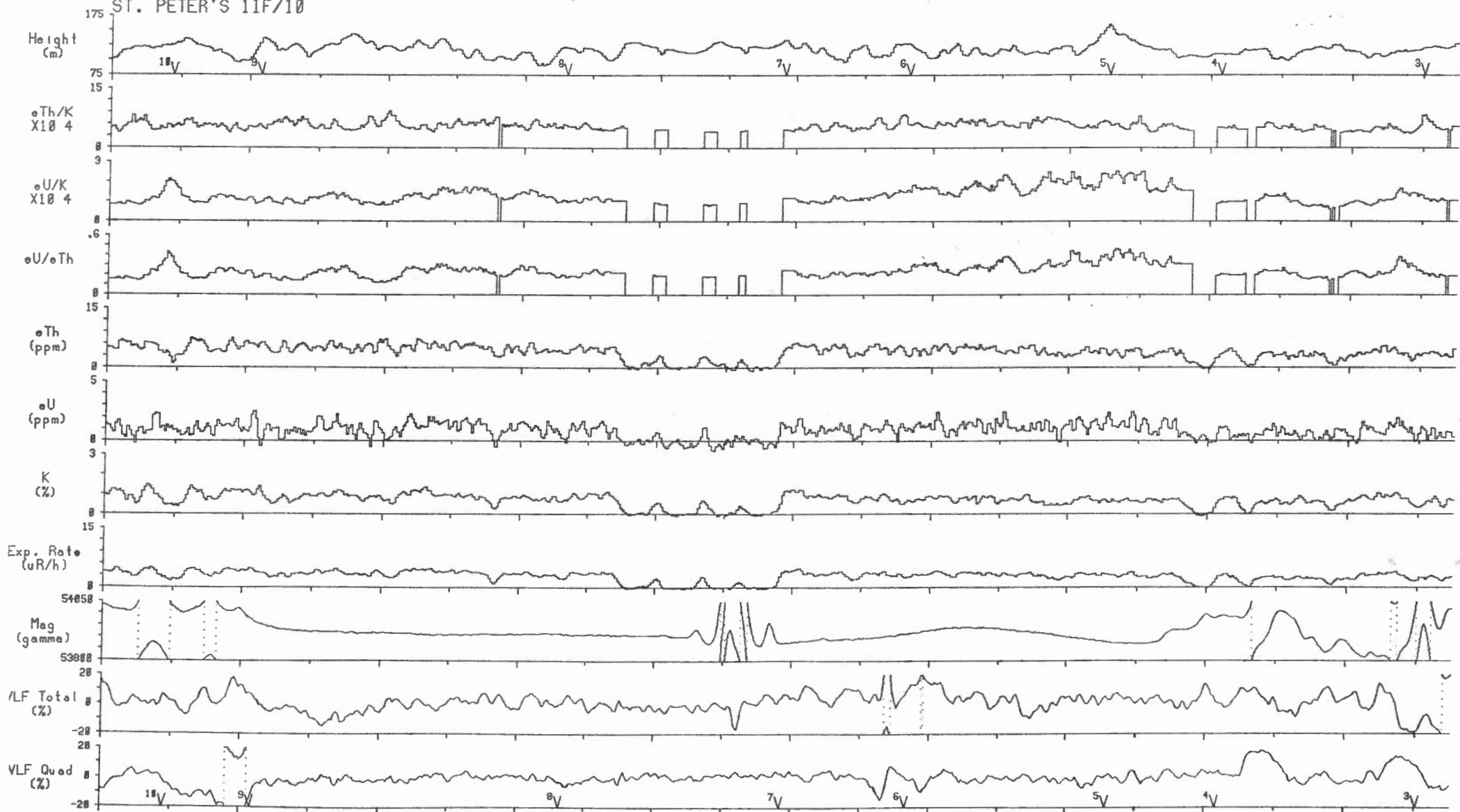
Line 69  Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
ST. PETER'S 11F/10



Line 70 | 2 km | Scale 1:150000

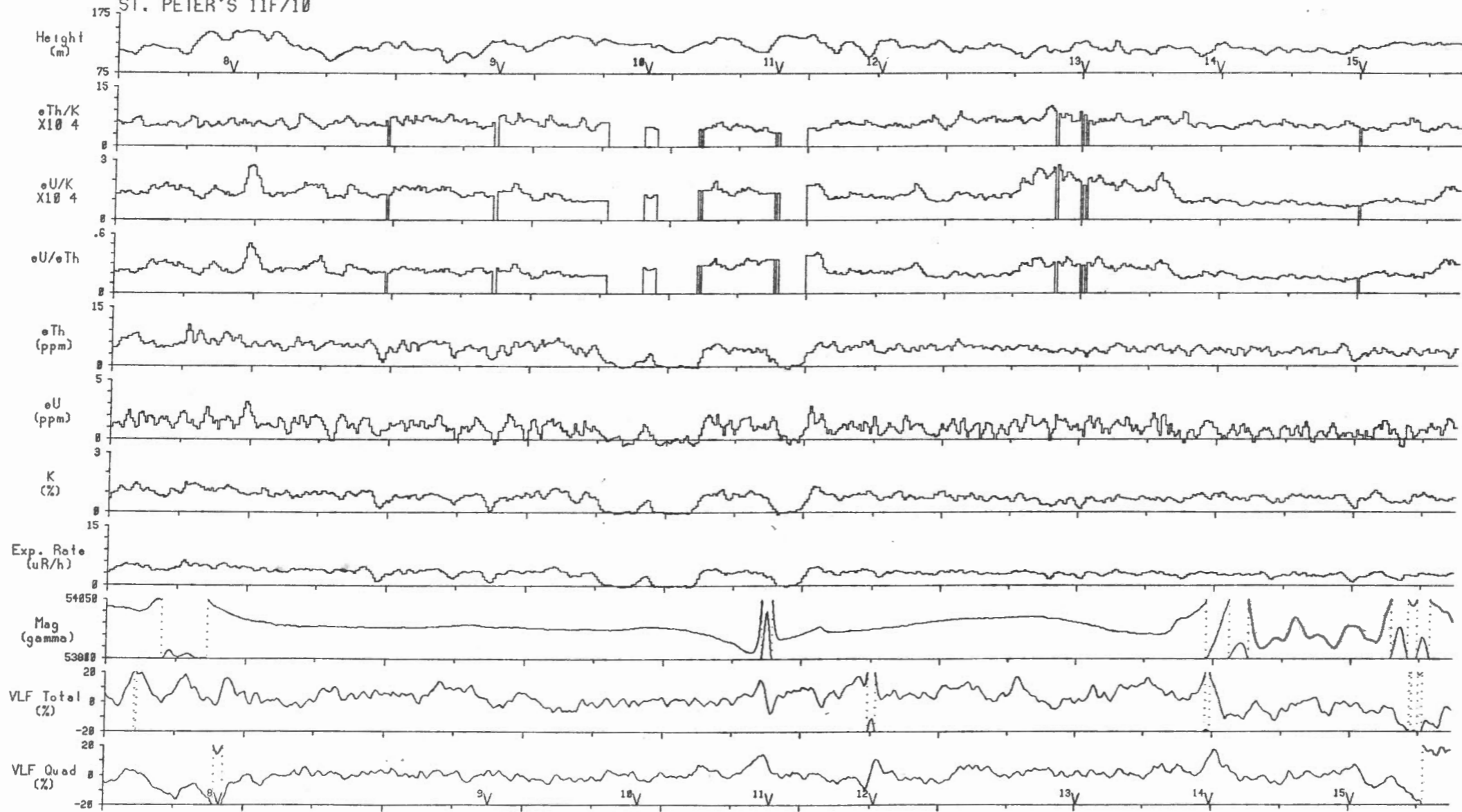
Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
 ST. PETER'S 11F/10



Line 71 | 2 km | Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)

ST. PETER'S 11F/10

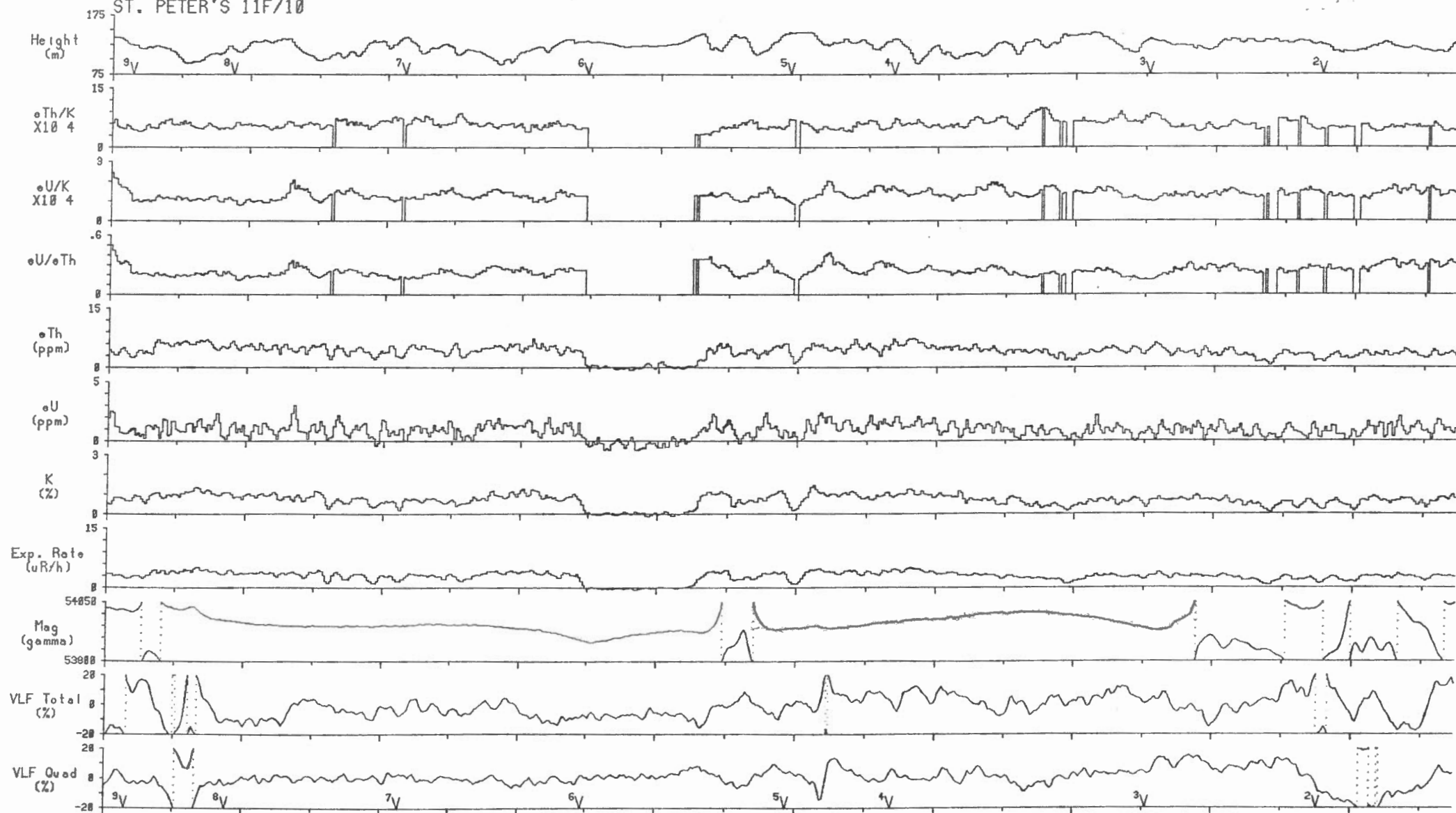


Line 72

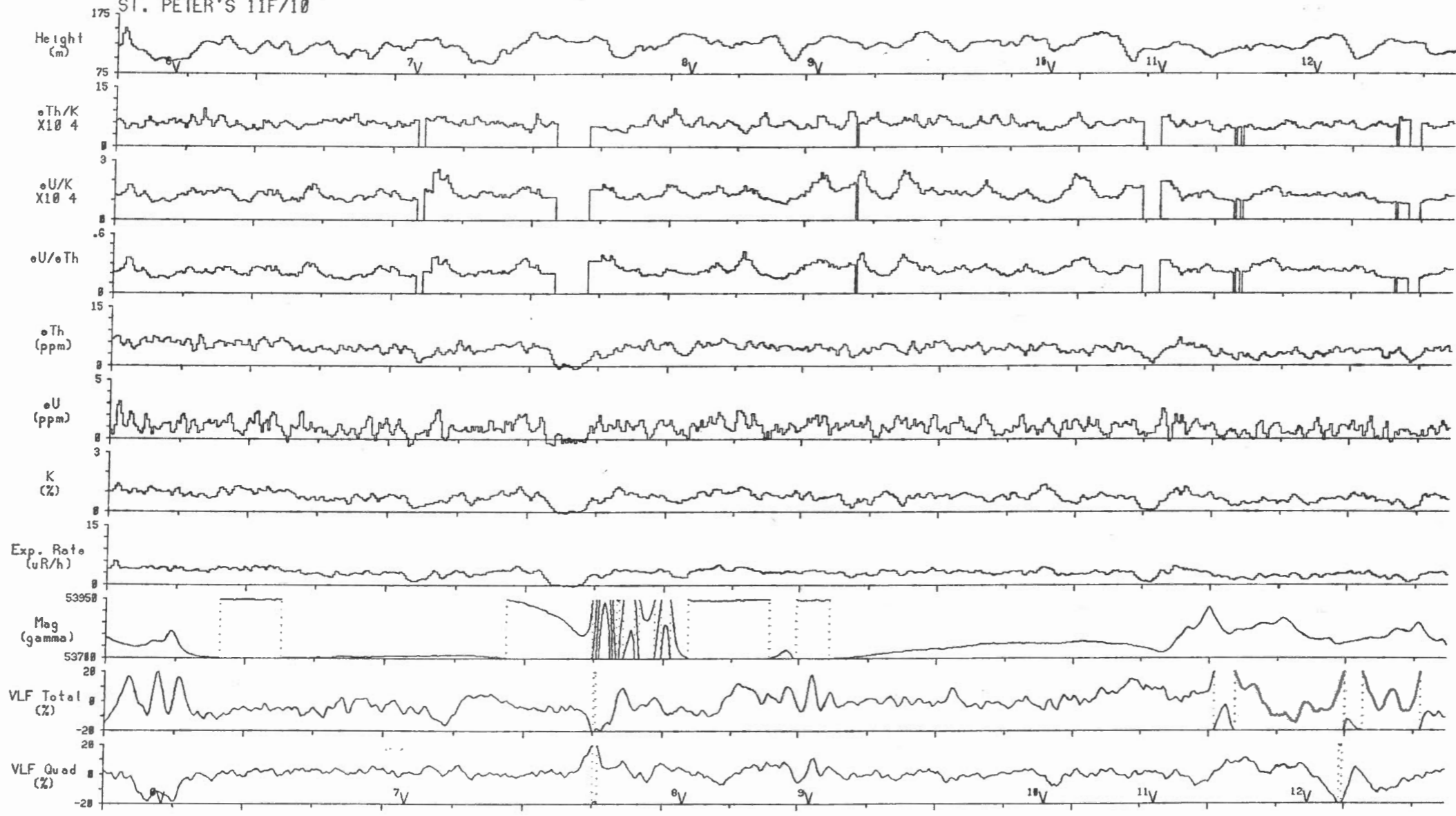
2 km

Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
ST. PETER'S 11F/10



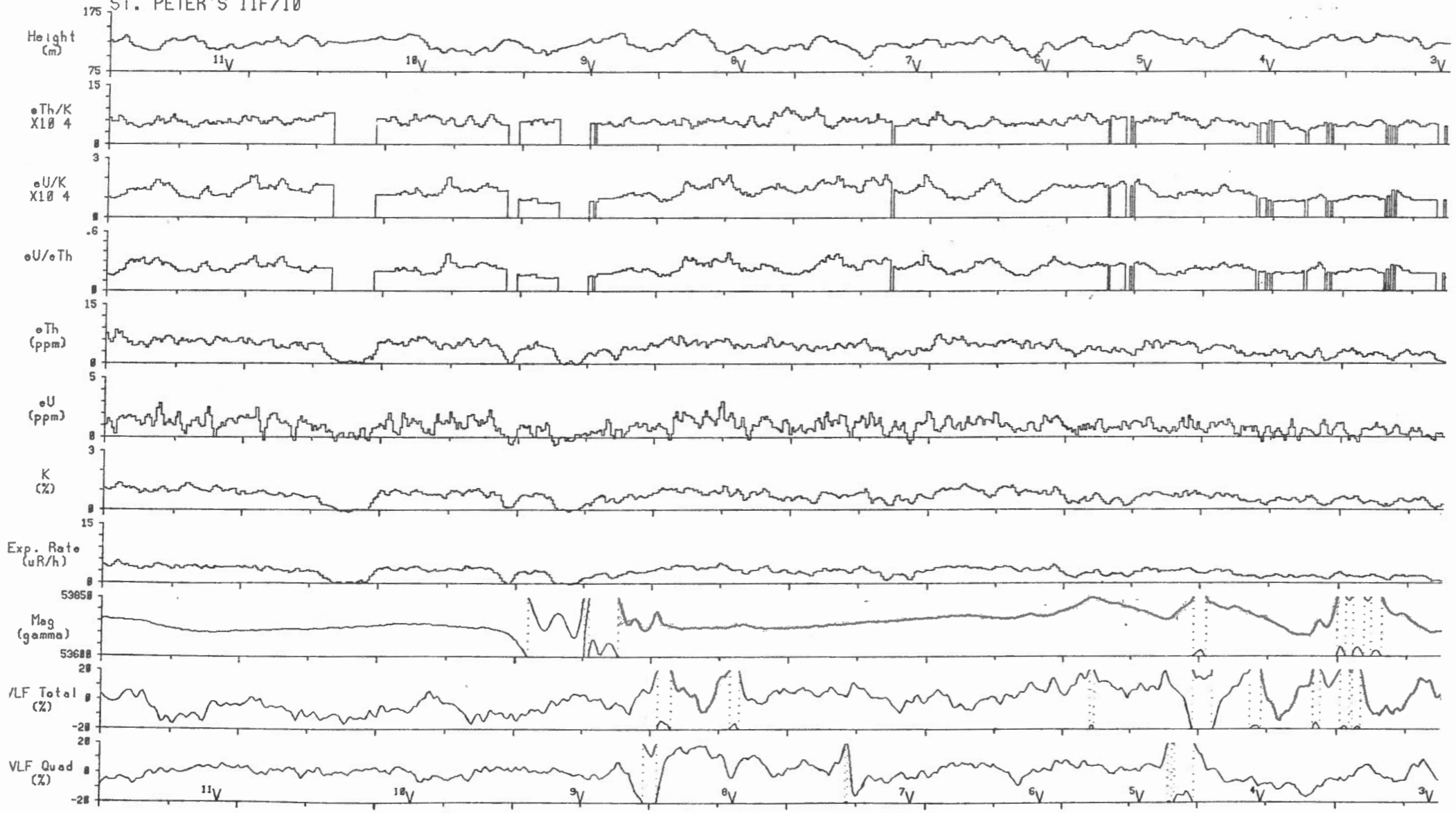
Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
 ST. PETER'S 11F/10



Line 74 | 2 km | Scale 1:150000

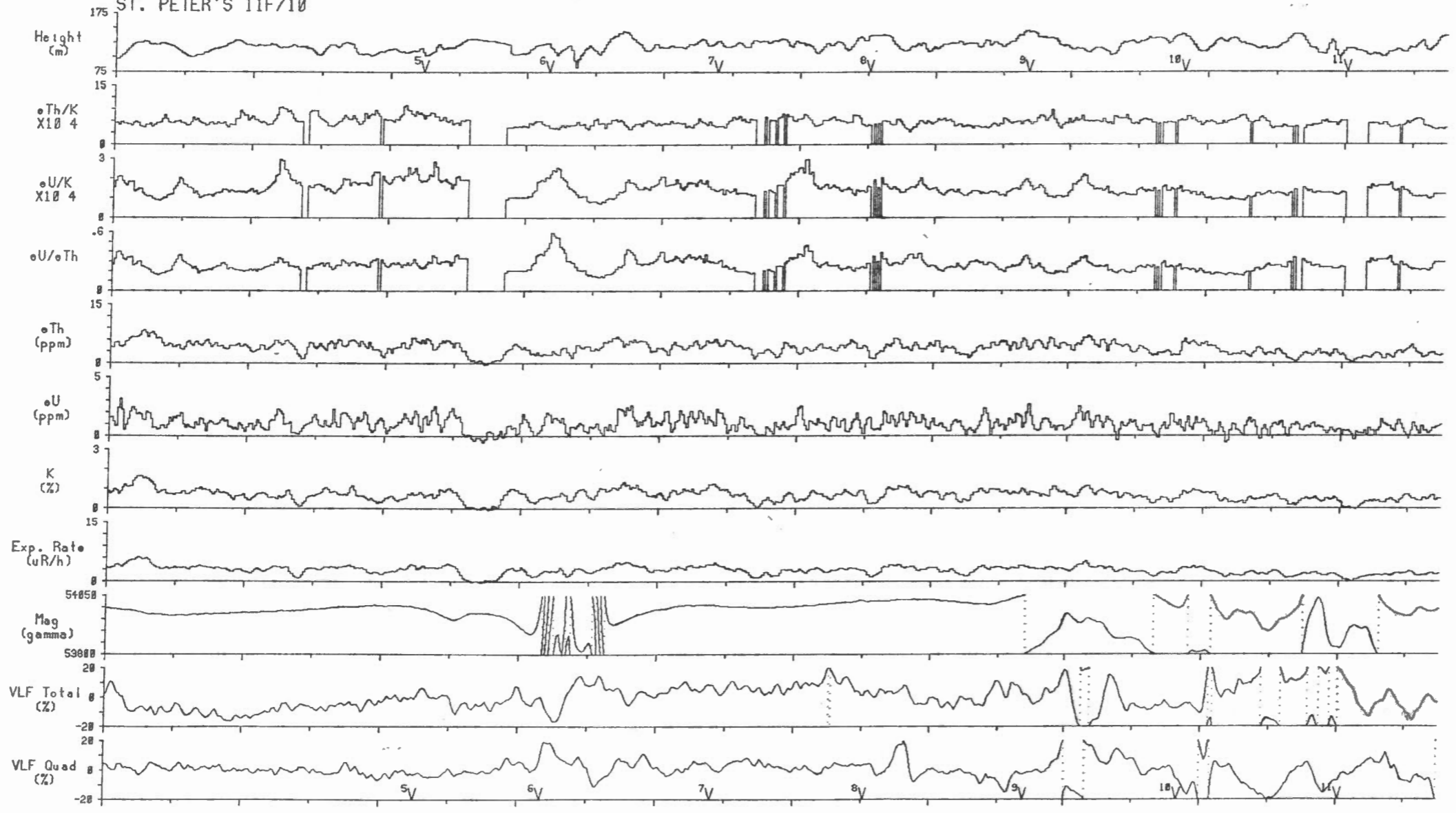
Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)

ST. PETER'S 11F/10



Line 75 $\overline{\quad 2 \text{ km} \quad}$ Scale 1:150000

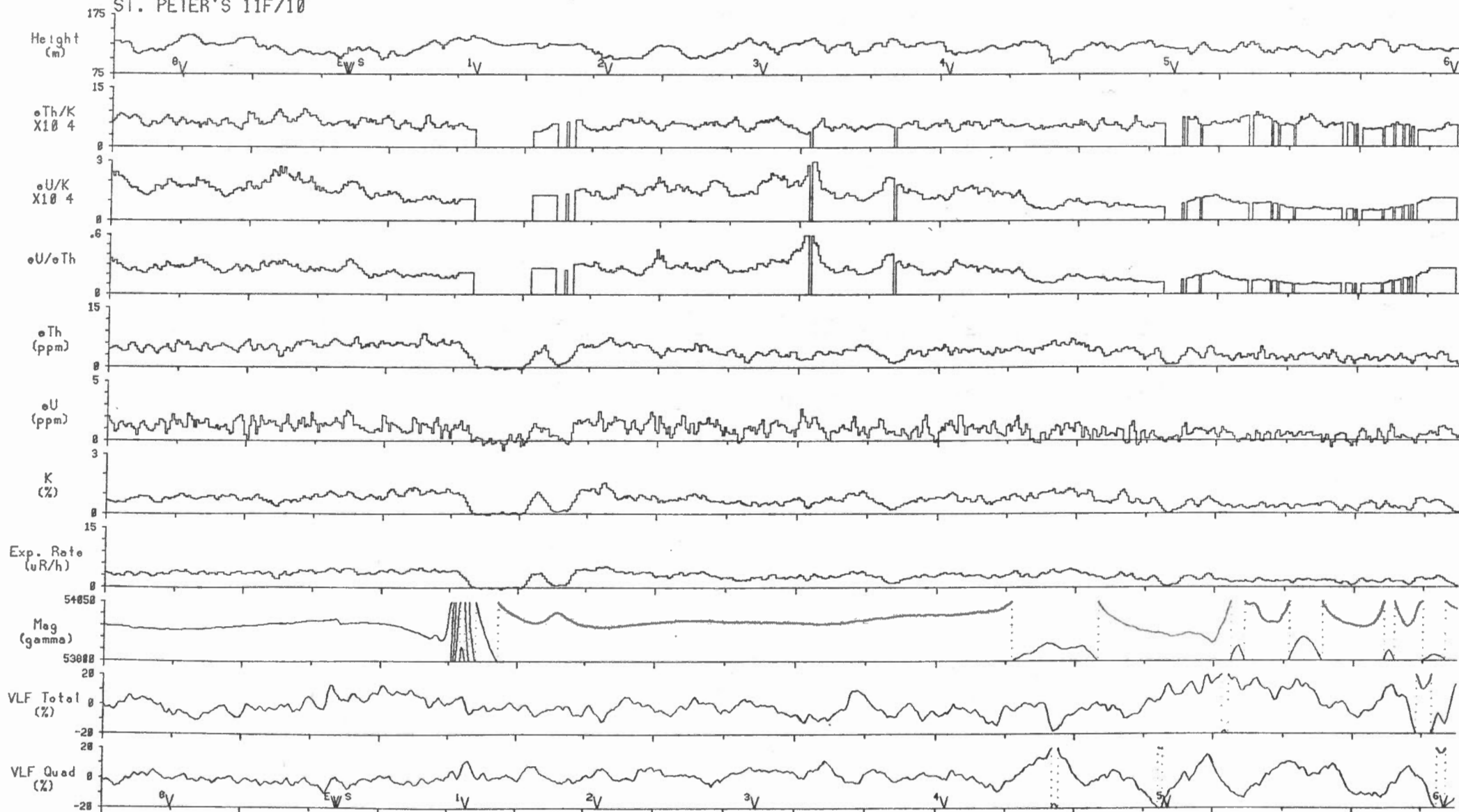
Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
 ST. PETER'S 11F/10



Line 76 | 2 km | Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)

ST. PETER'S 11F/10



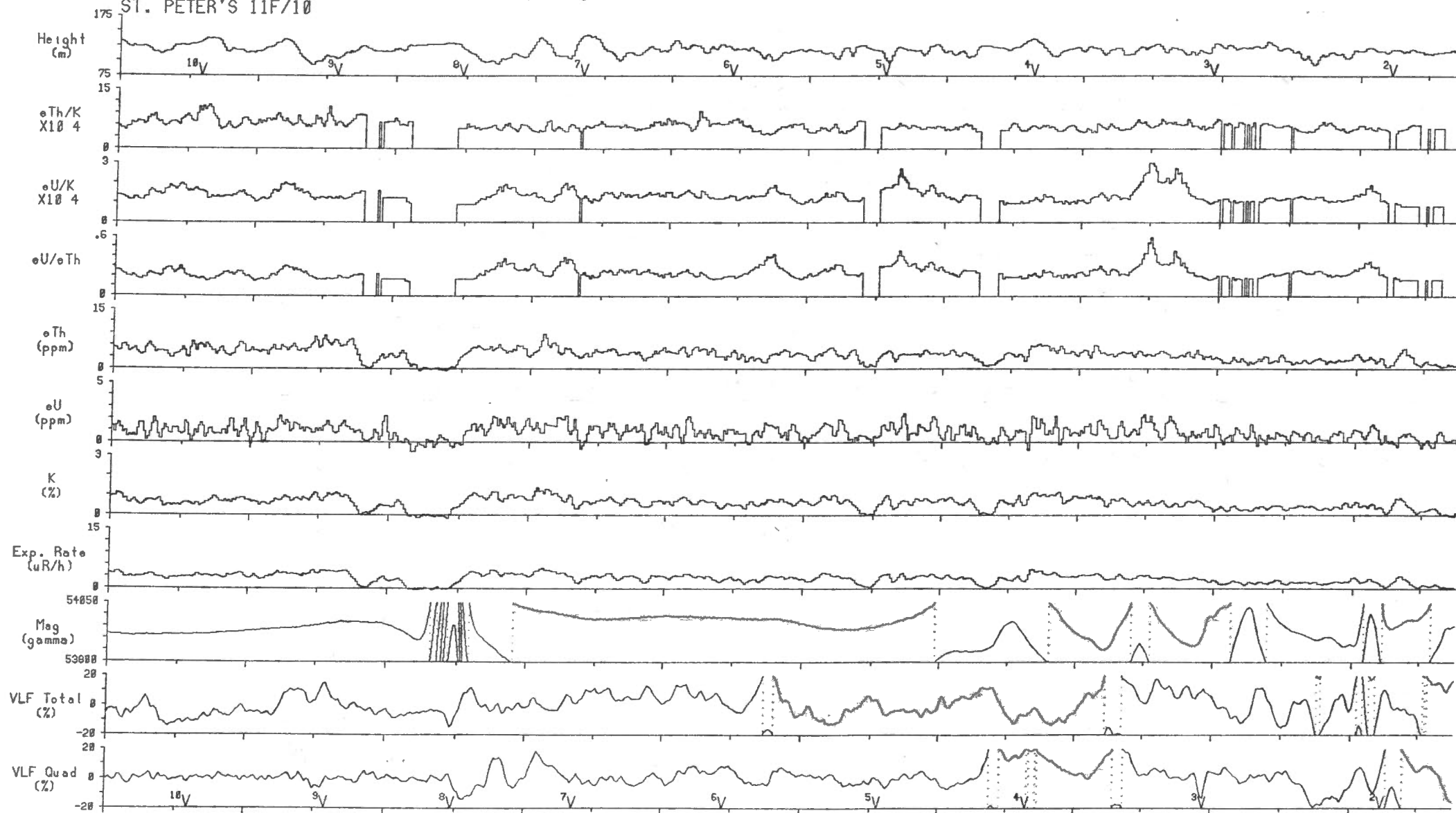
Line 77

2 km

Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)

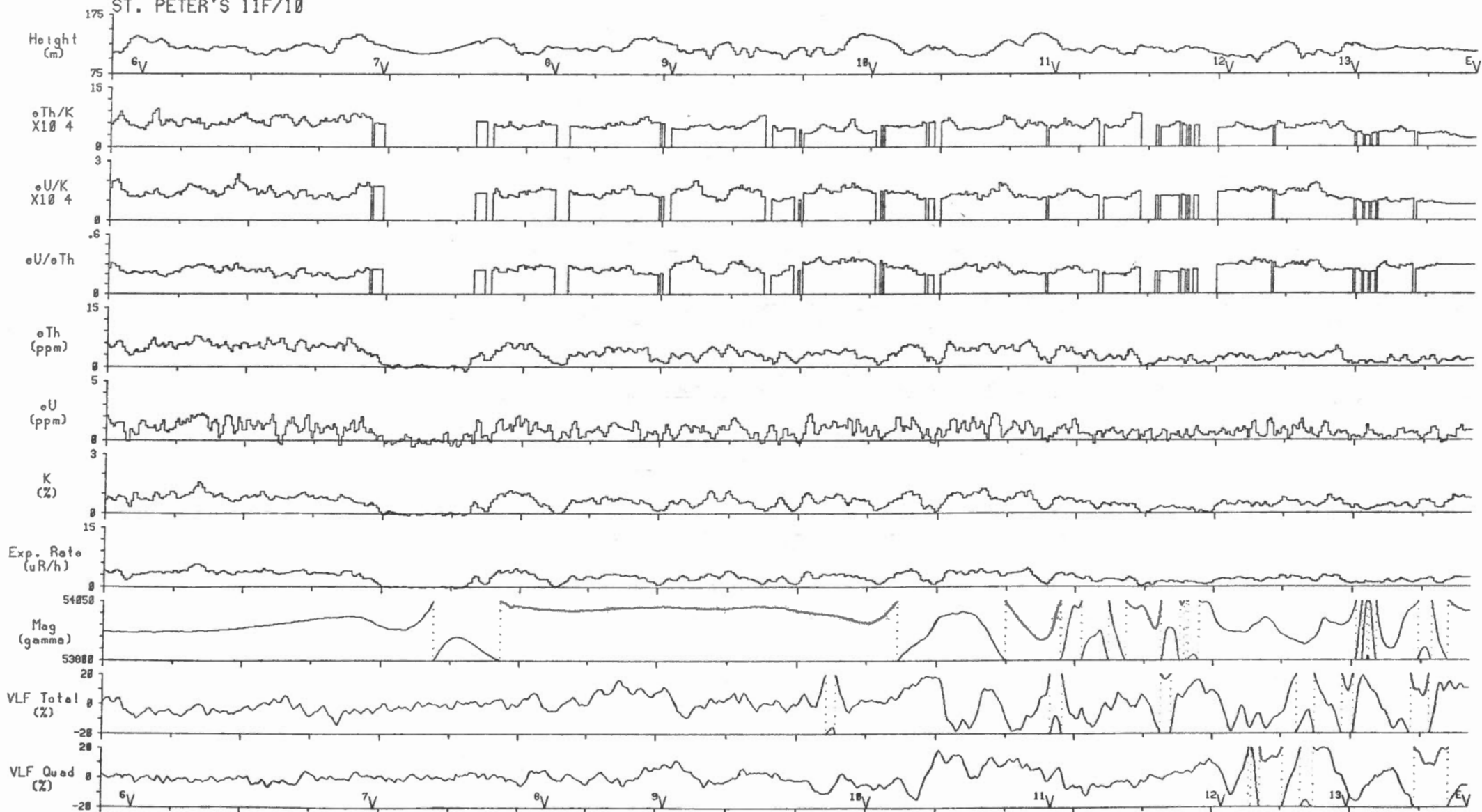
ST. PETER'S 11F/10



Line 78 | 2 km | Scale 1:150000

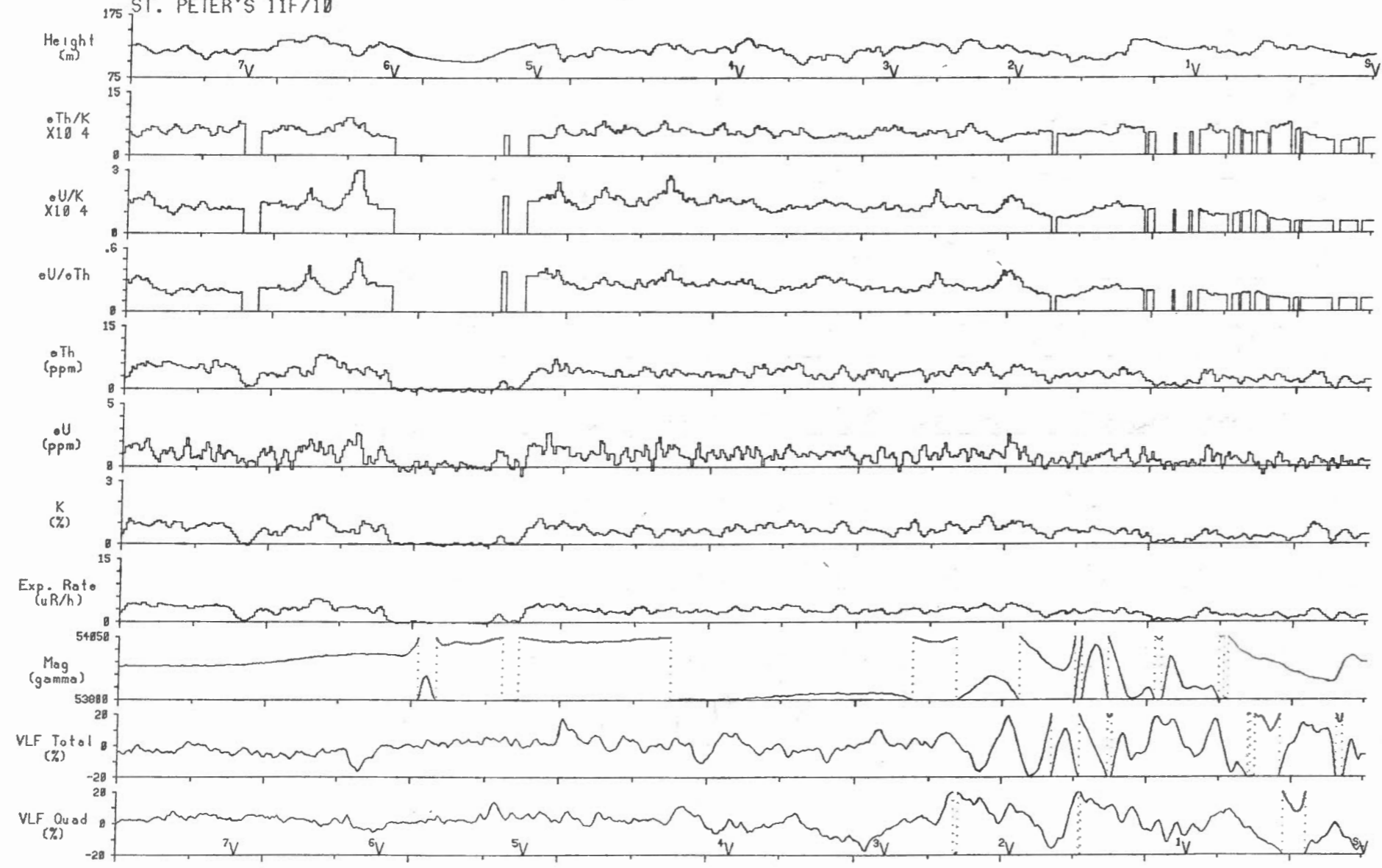
Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)

ST. PETER'S 11F/10



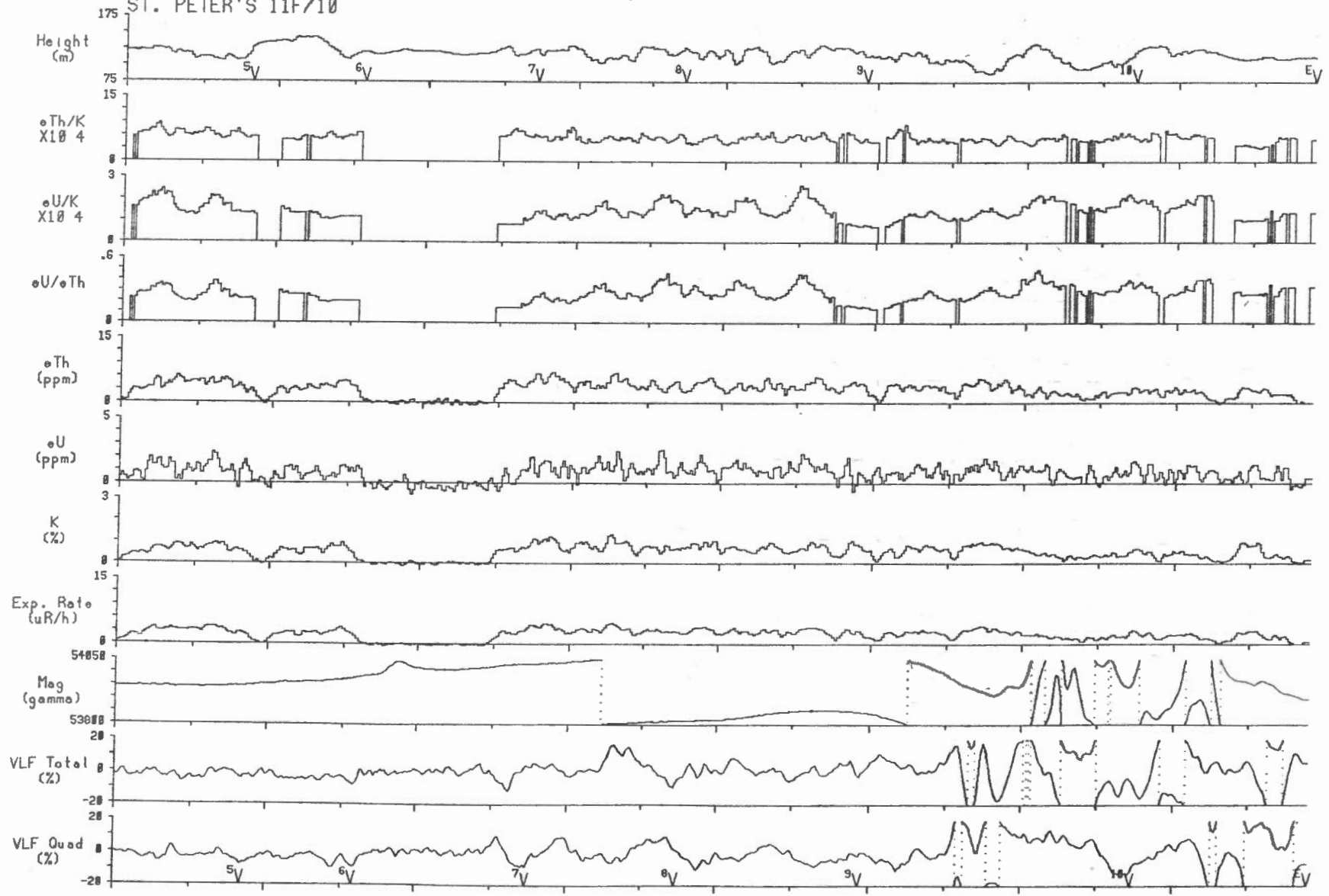
Line 79 | 2 km | Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
 ST. PETER'S 11F/10

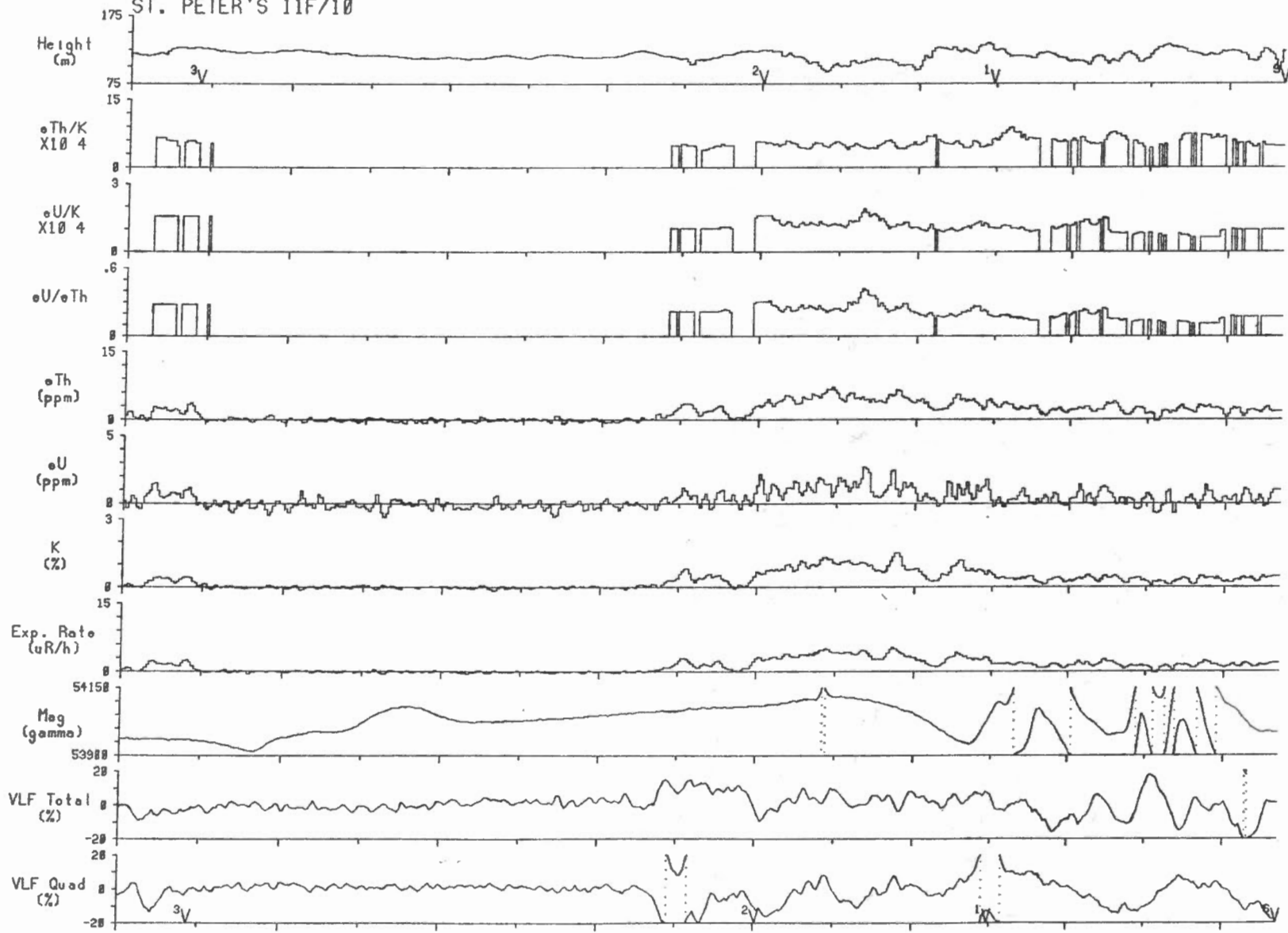


Line 80 | 2 km | Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
 ST. PETER'S 11F/10

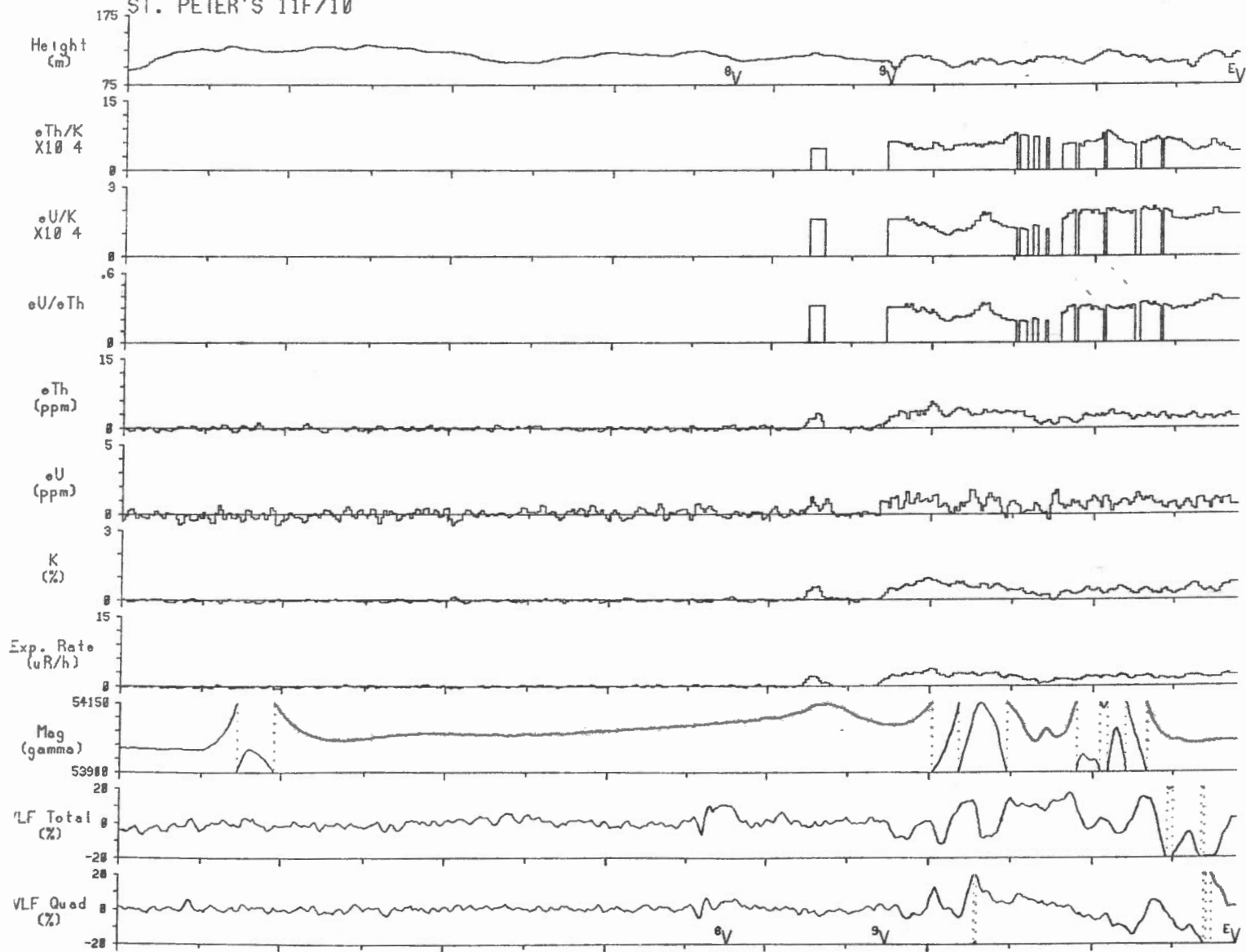


Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
 ST. PETER'S 11F/10

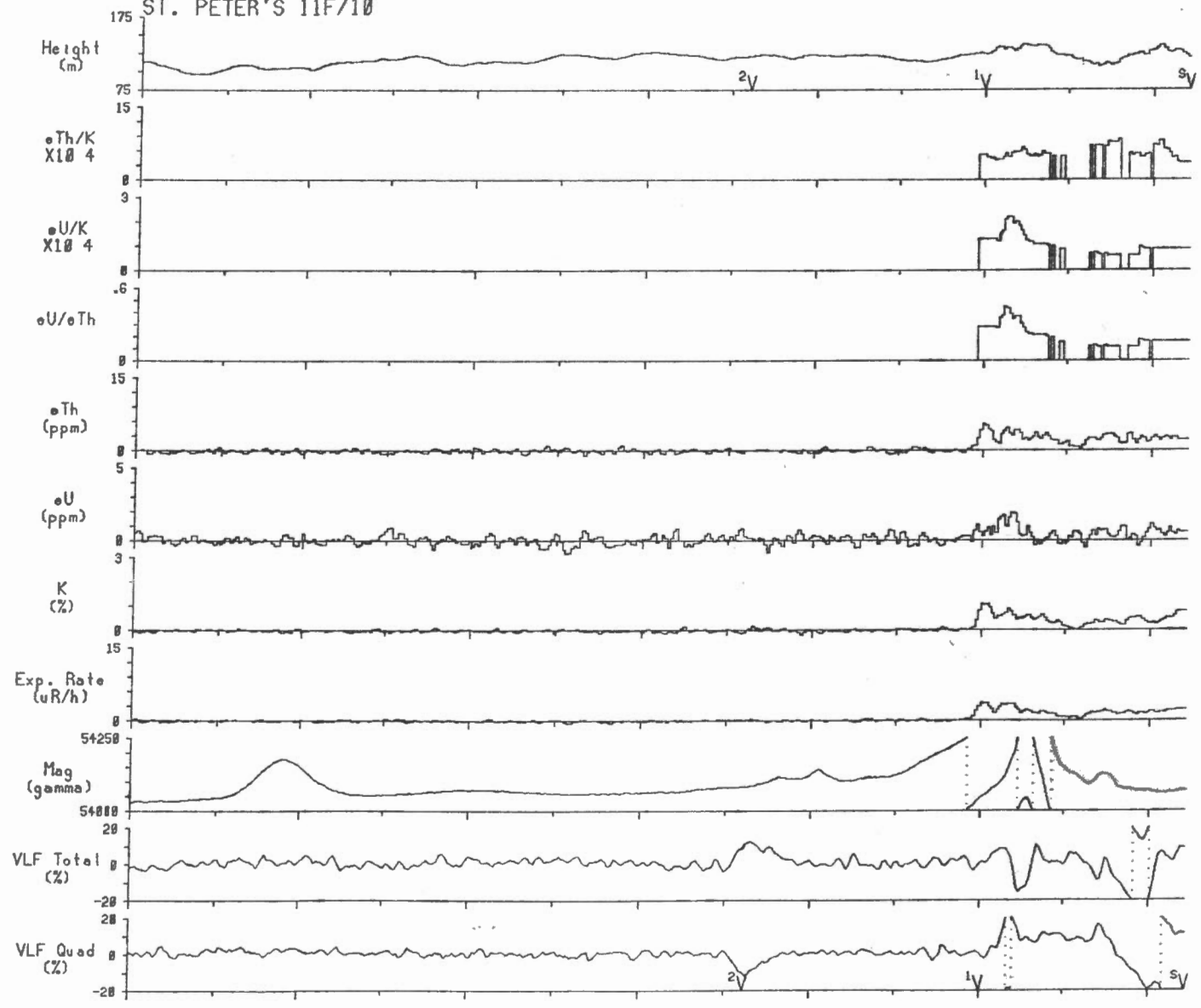


Line 82 2 km Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
 ST. PETER'S 11F/10

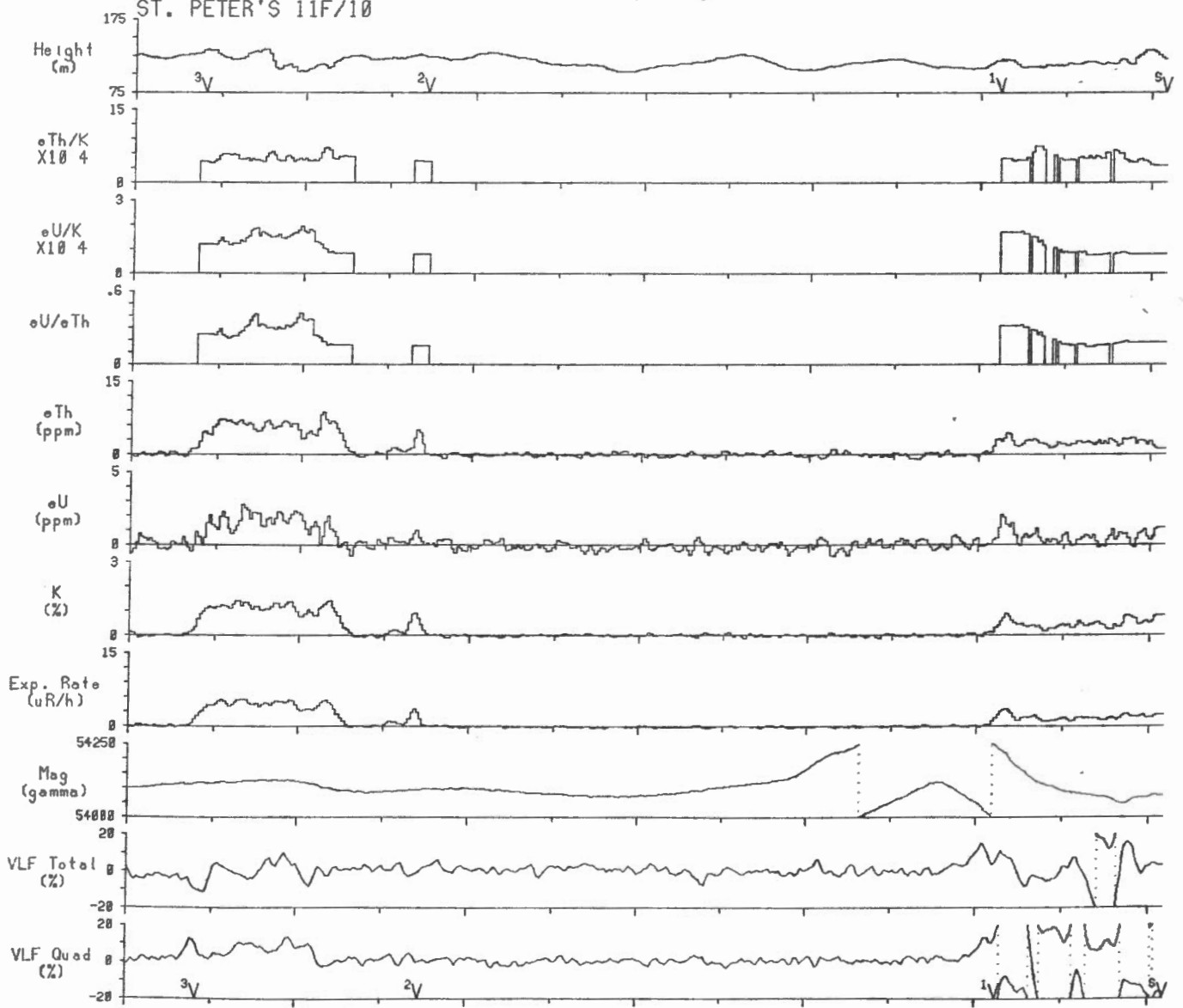


Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
 ST. PETER'S 11F/10



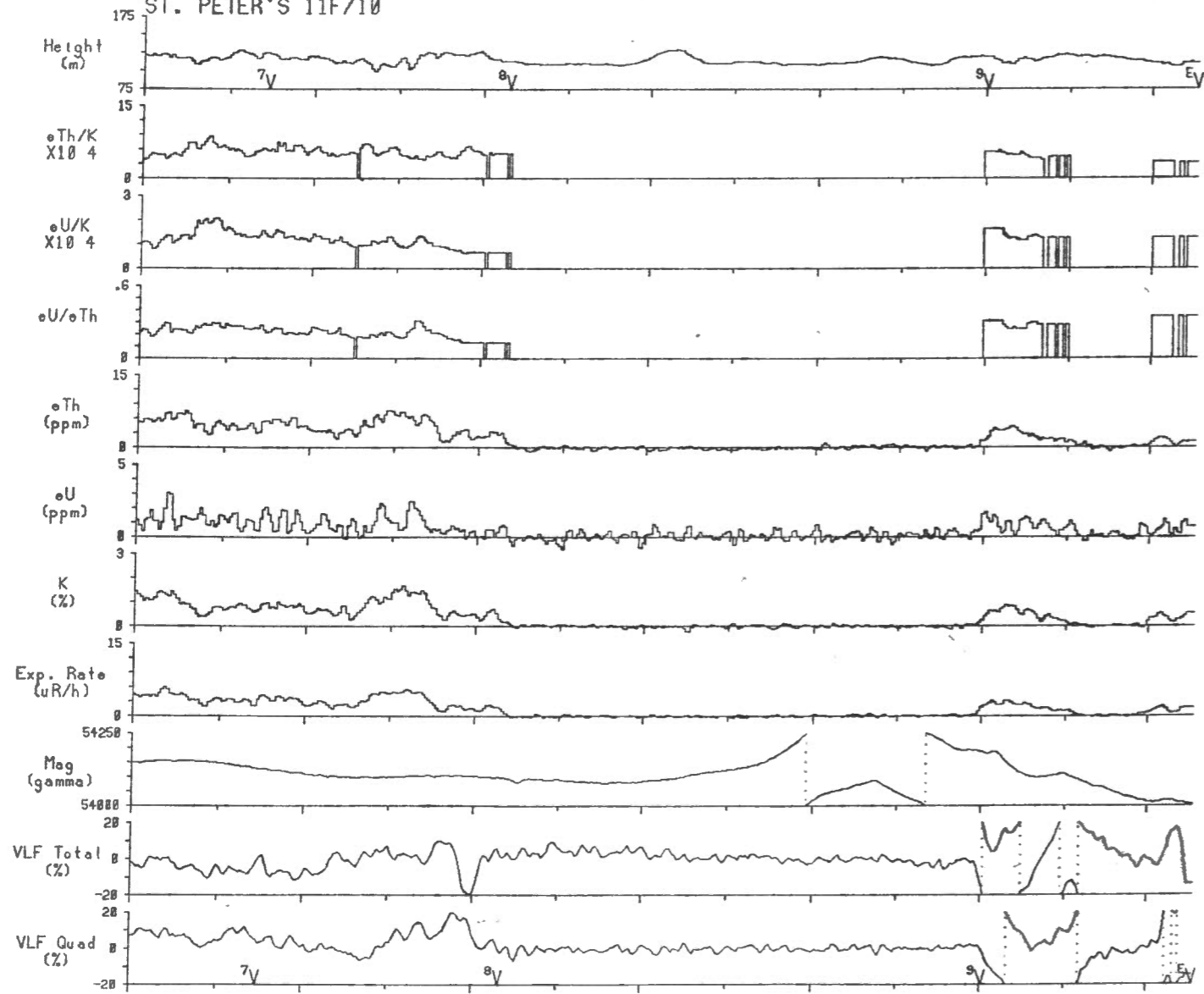
Line 84 | 2 km | Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
 ST. PETER'S 11F/10



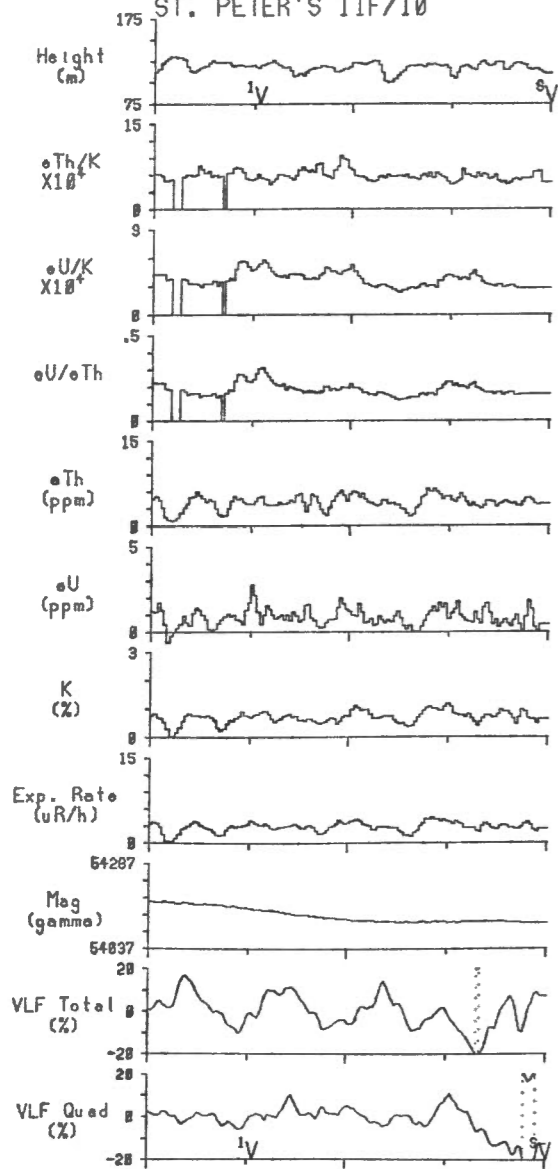
Line 85 | 2 km | Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
 ST. PETER'S 11F/10



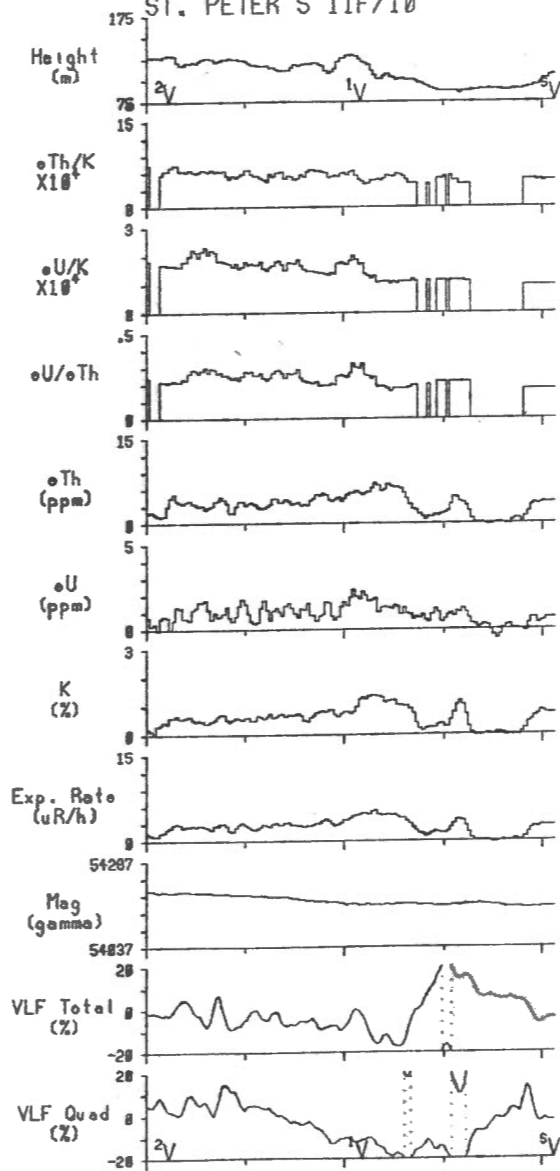
Line 86 | 2 km | Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
ST. PETER'S 11F/10



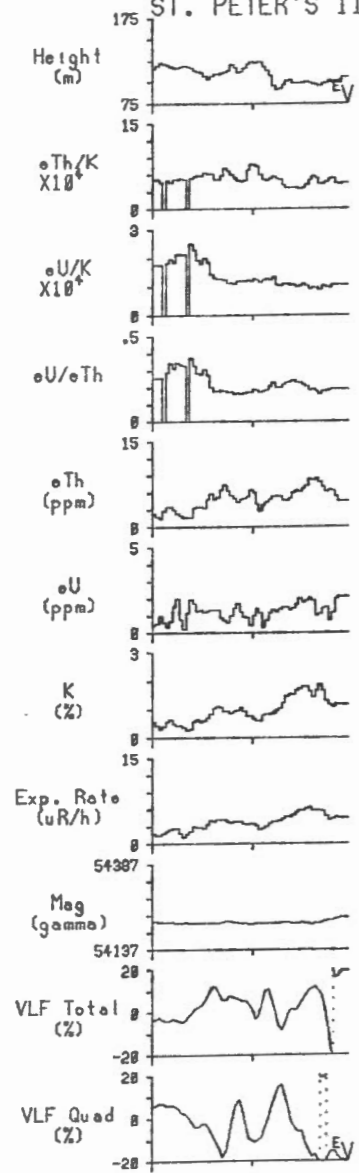
Line 87 | 2 km | Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
ST. PETER'S 11F/10



Line 88 | 2 km | Scale 1:150000

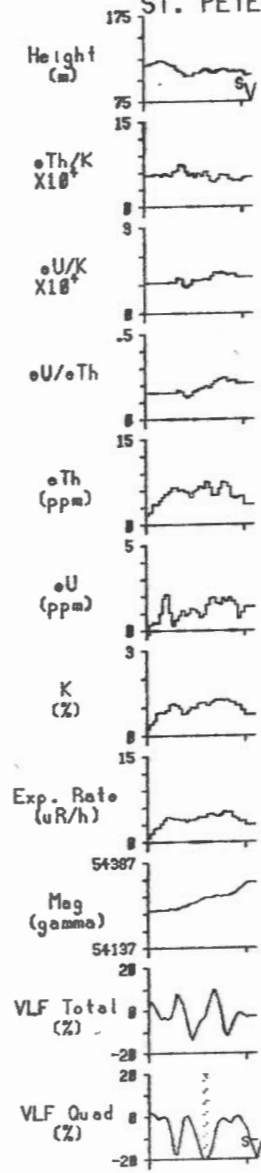
Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
ST. PETER'S 11F/10



Line 89 | 2 km

Scale 1:150000

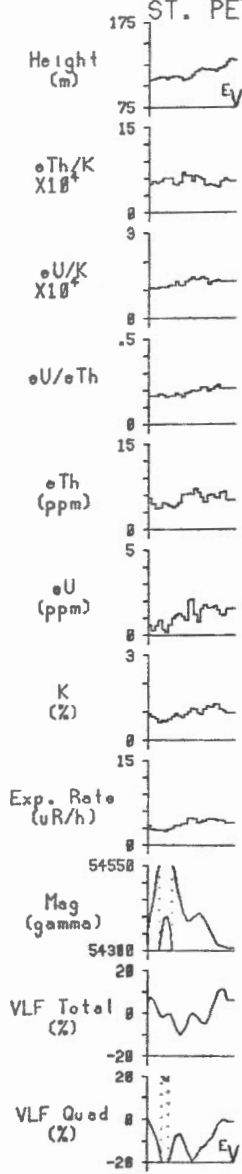
Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
ST. PETER'S 11F/10



Line 90 | 2 km

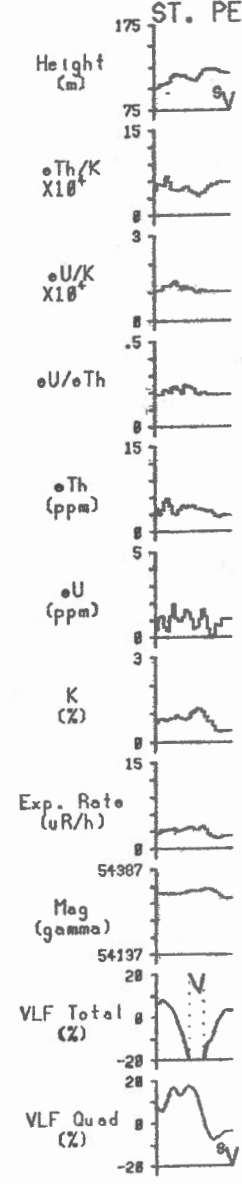
Scale 1:150000

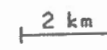
Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
ST. PETER'S 11F/10



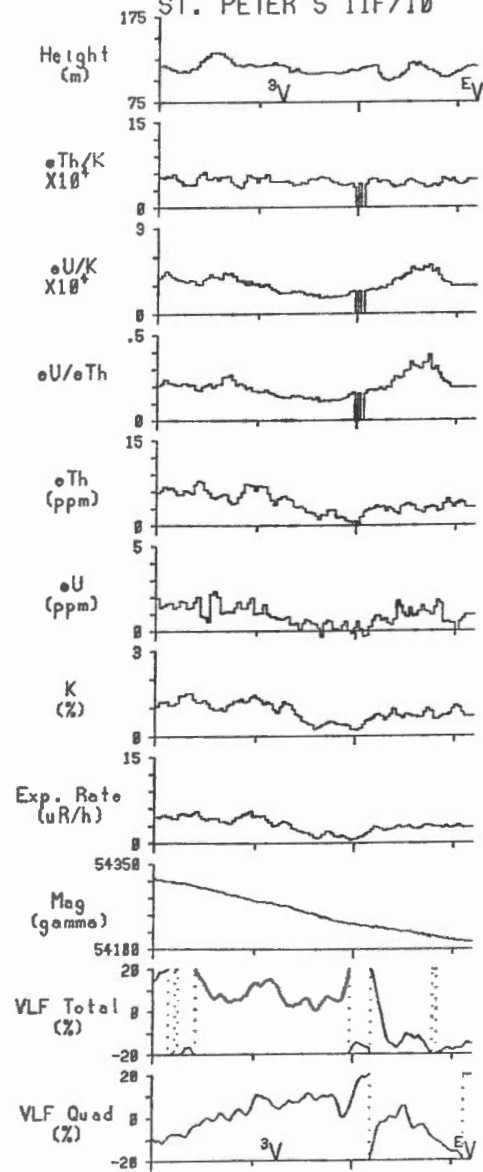
Line 91  Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
ST. PETER'S 11F/10



Line 92  Scale 1:150000

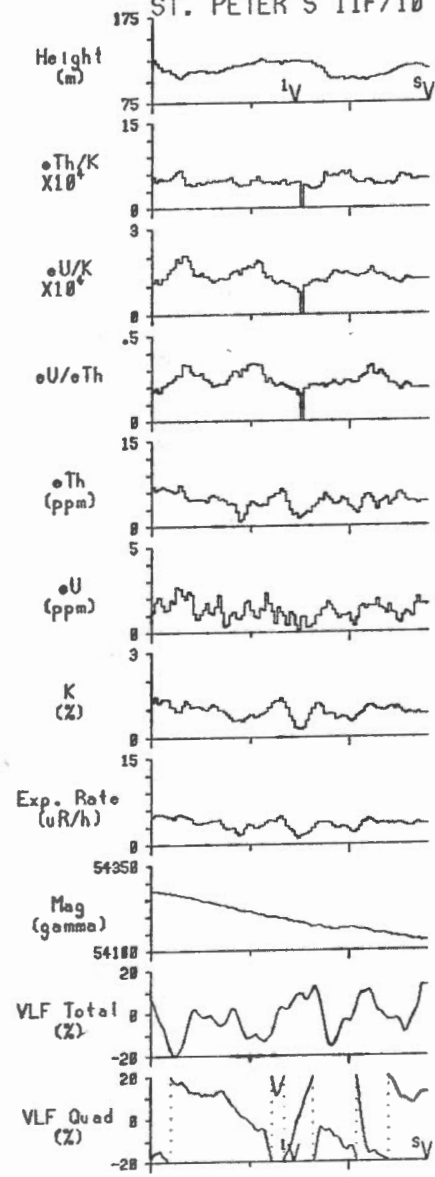
Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
ST. PETER'S 11F/10



Line 93 2 km

Scale 1:150000

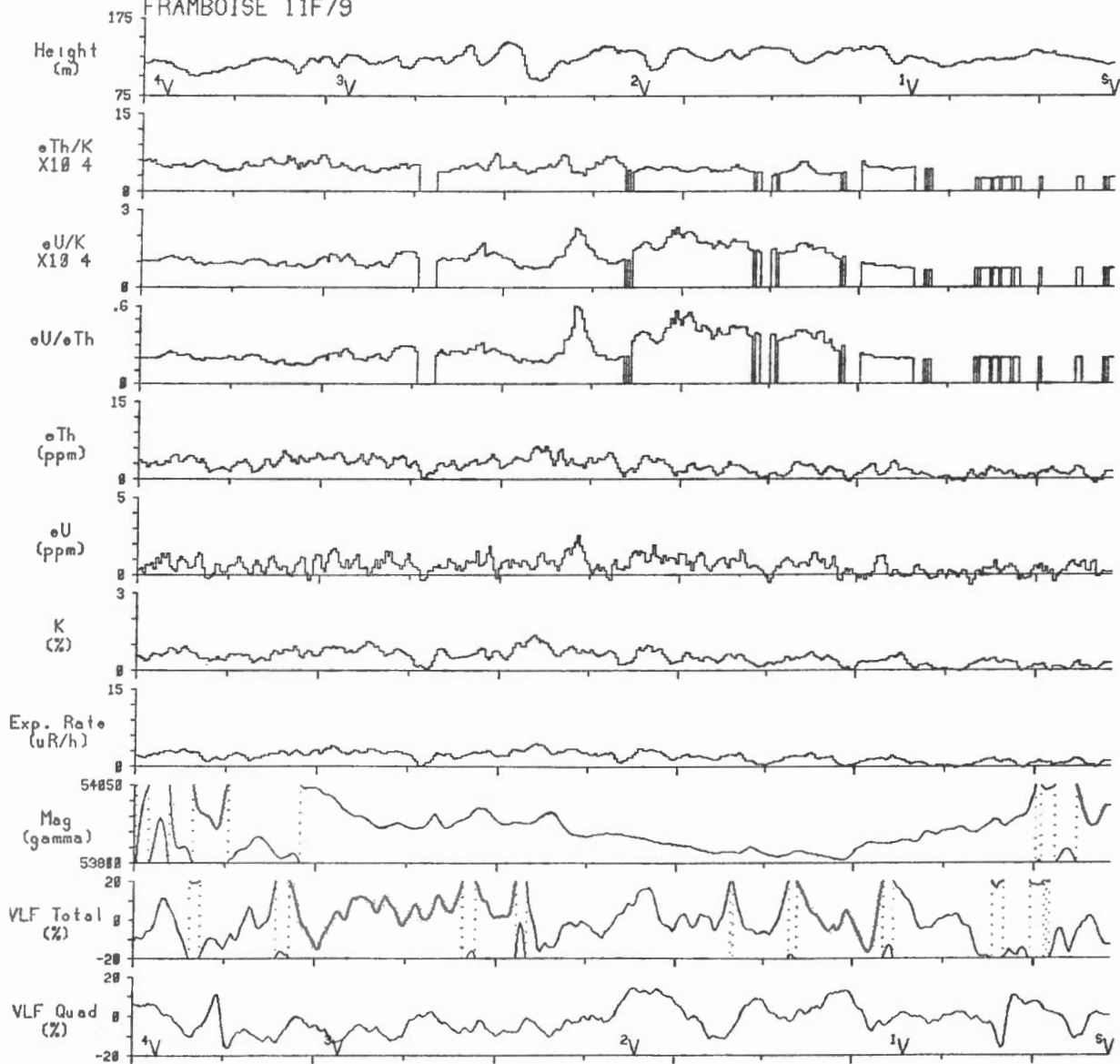
Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
ST. PETER'S 11F/10



Line 94 2 km

Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
FRAMBOISE 11F/9

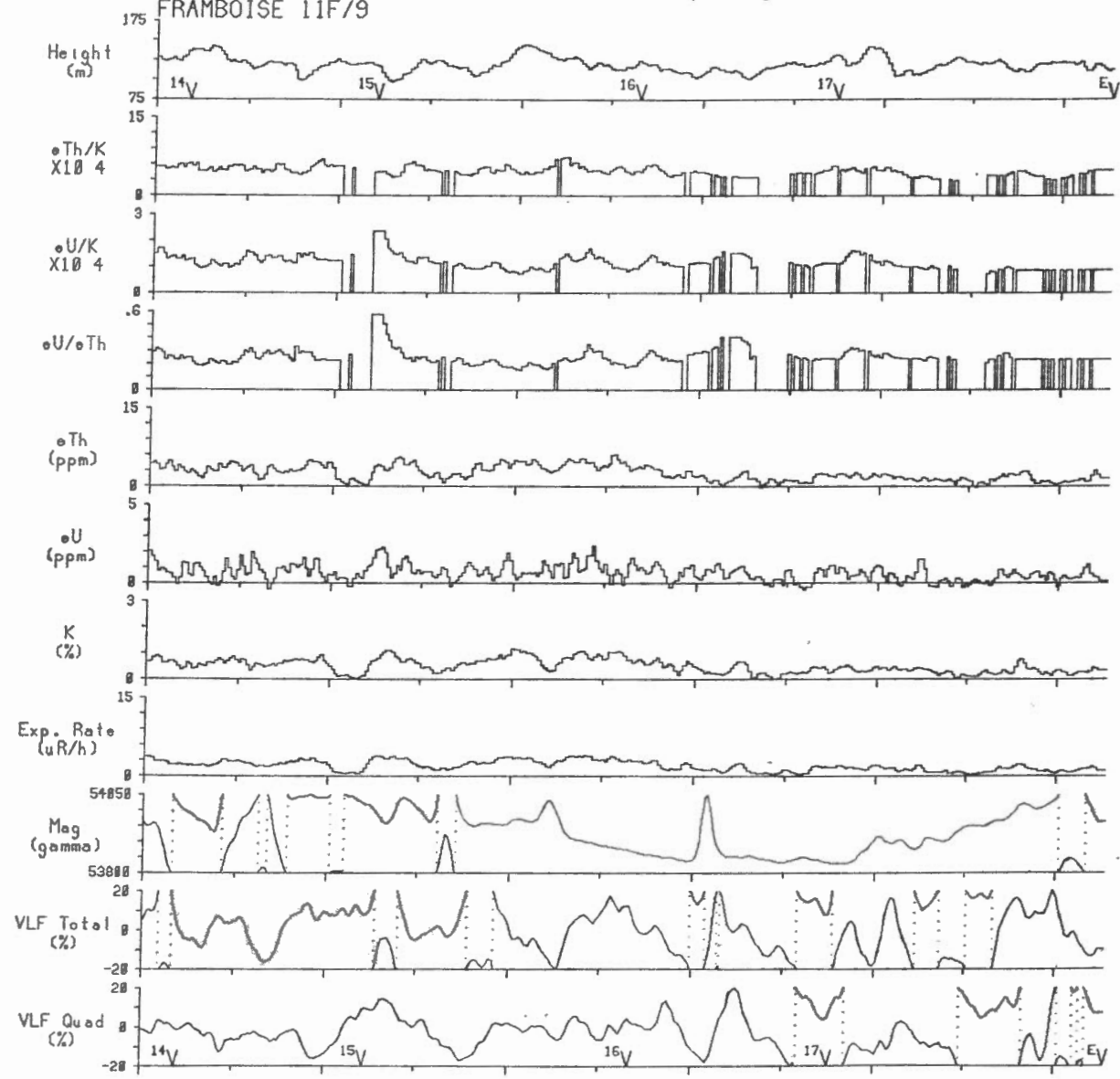


Line 66

2 km

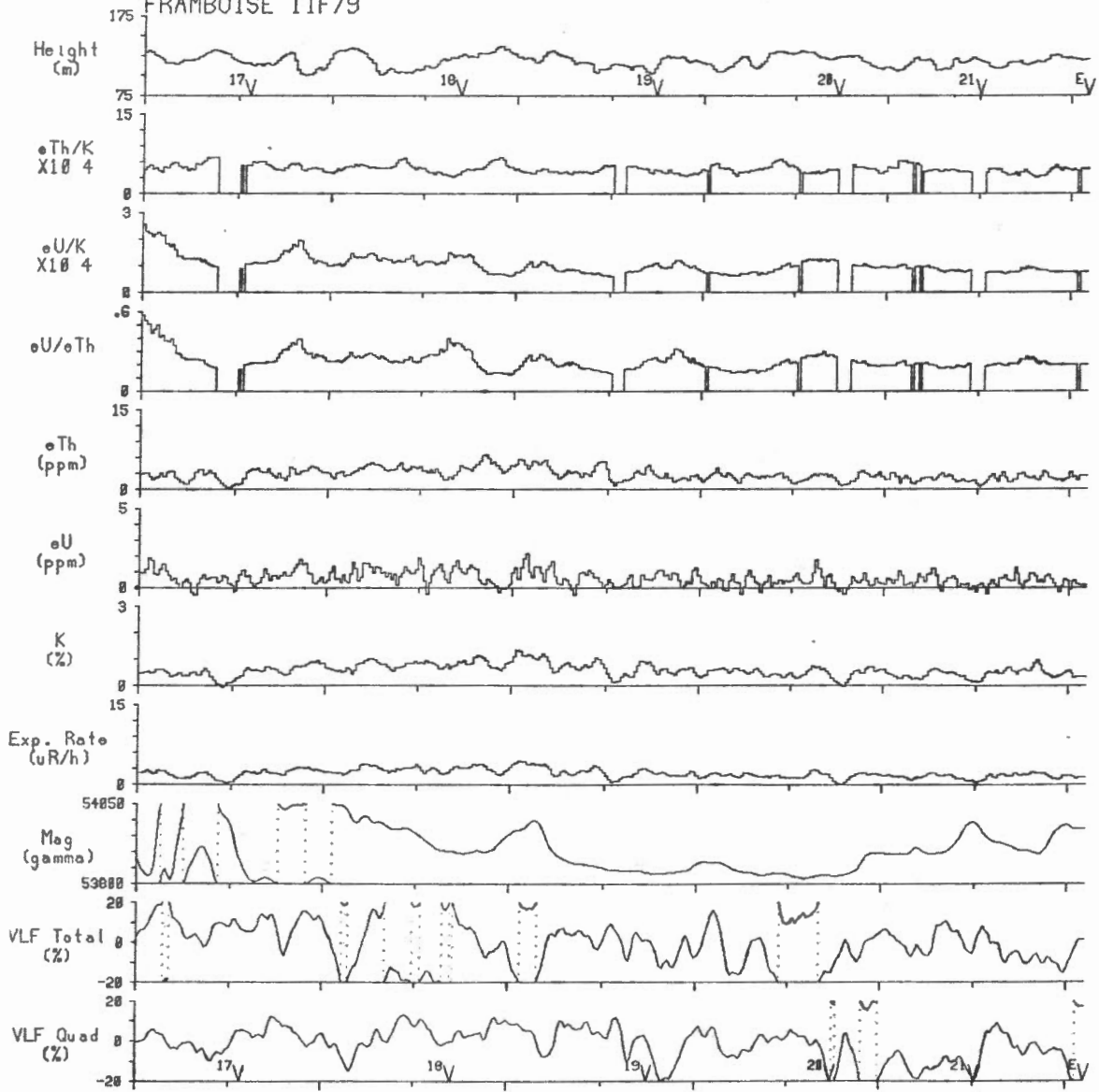
Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
 FRAMBOISE 11F/9



Line 67 $\overline{\text{2 km}}$ Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
FRAMBOISE 11F/9

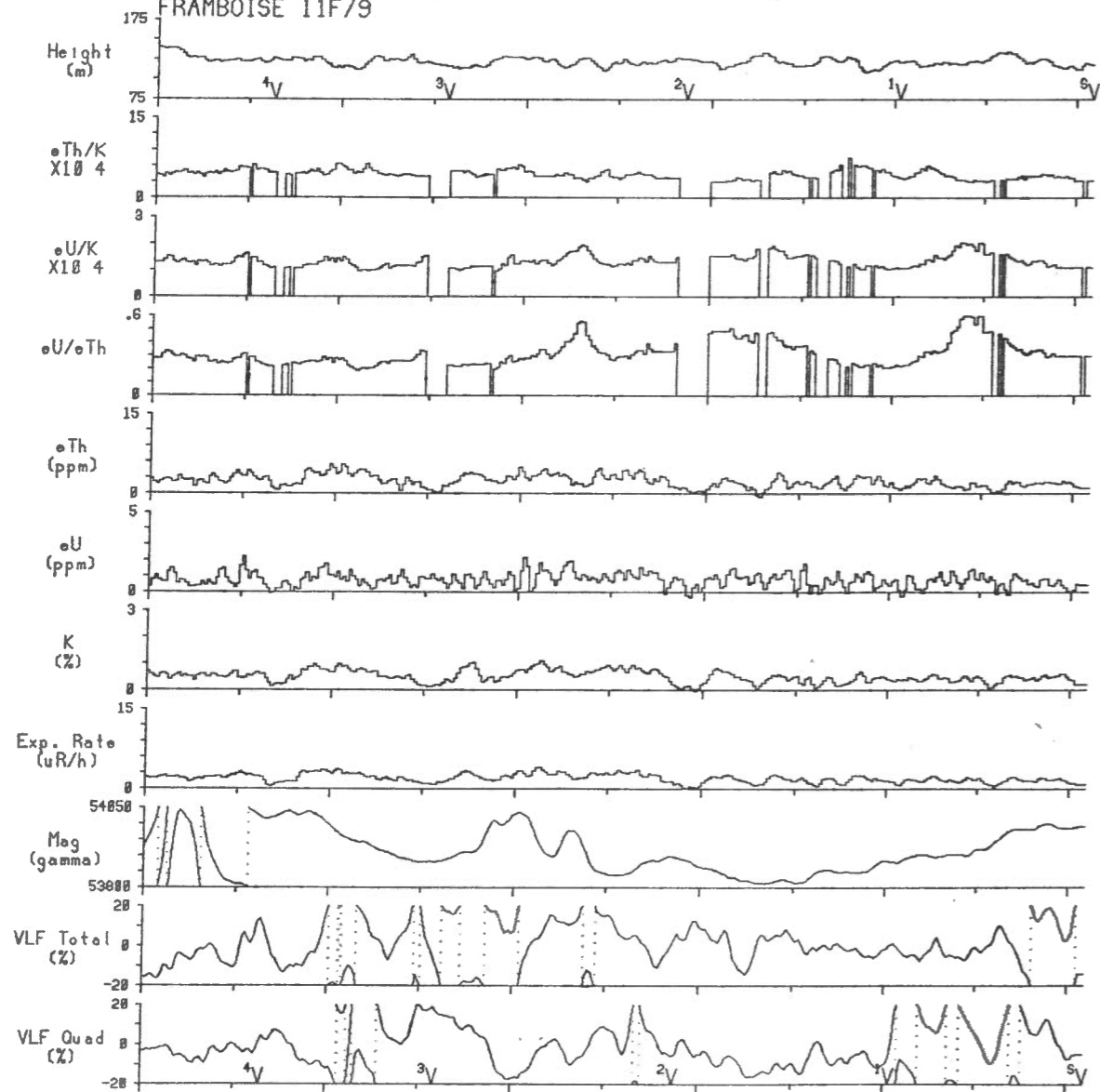


Line 68

2 km

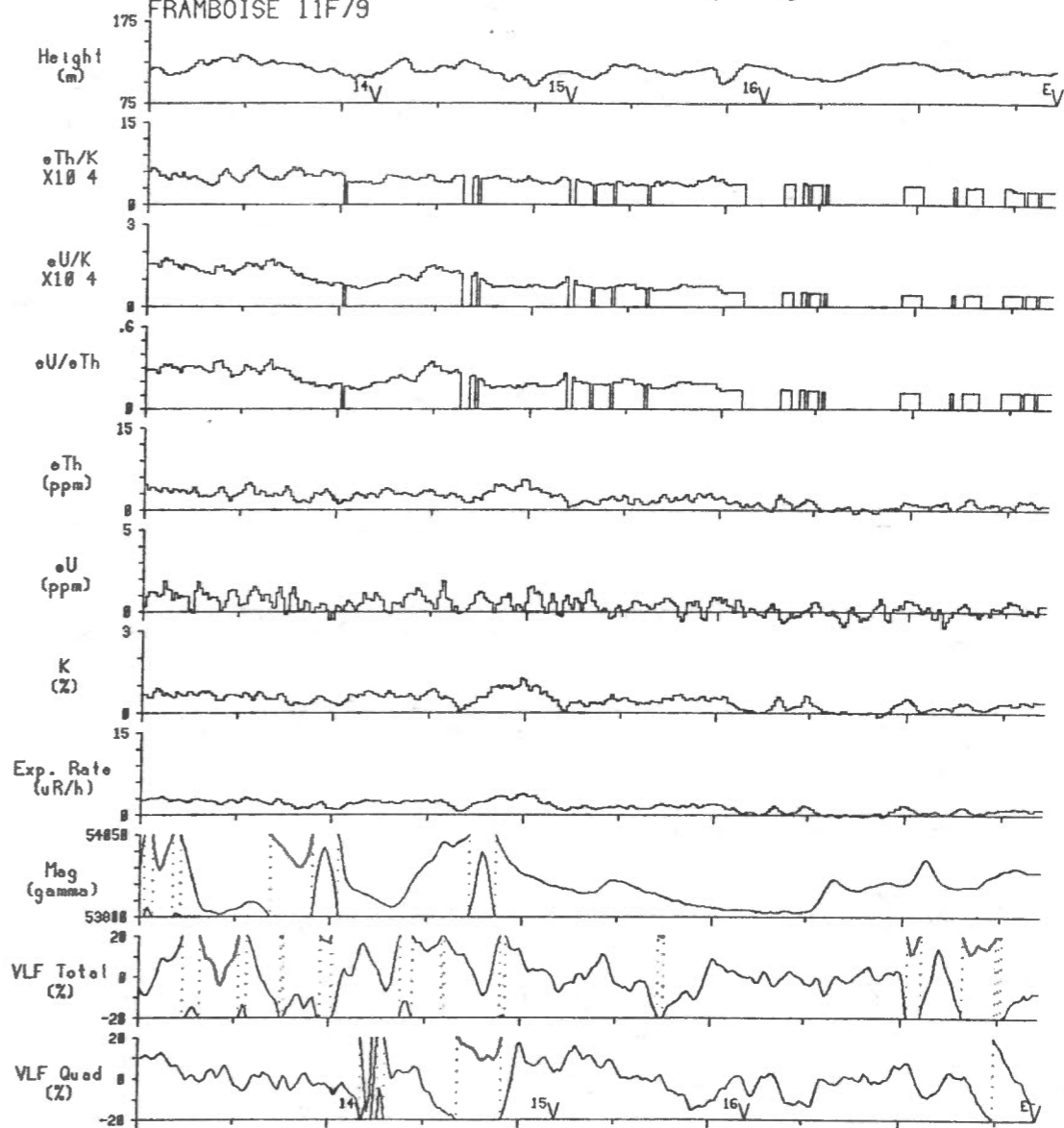
Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
FRAMBOISE 11F/9



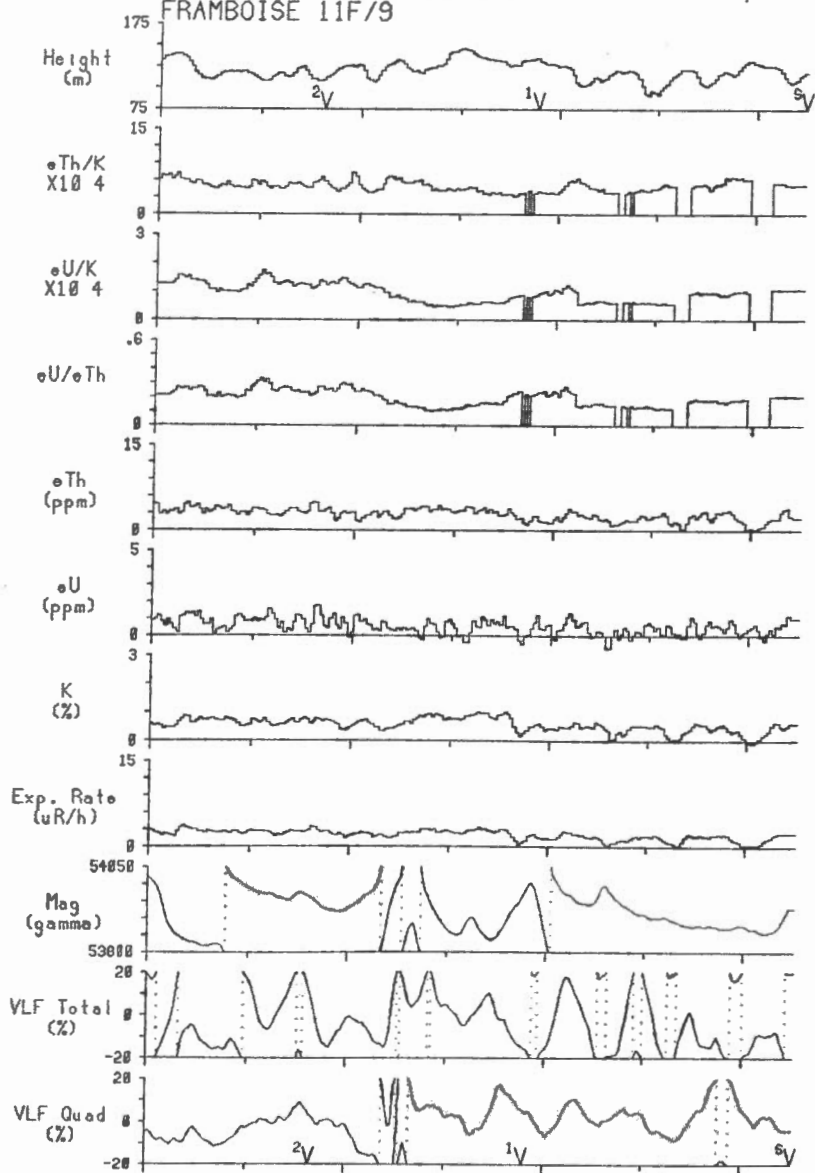
Line 69 2 km Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
FRAMBOISE 11F/9



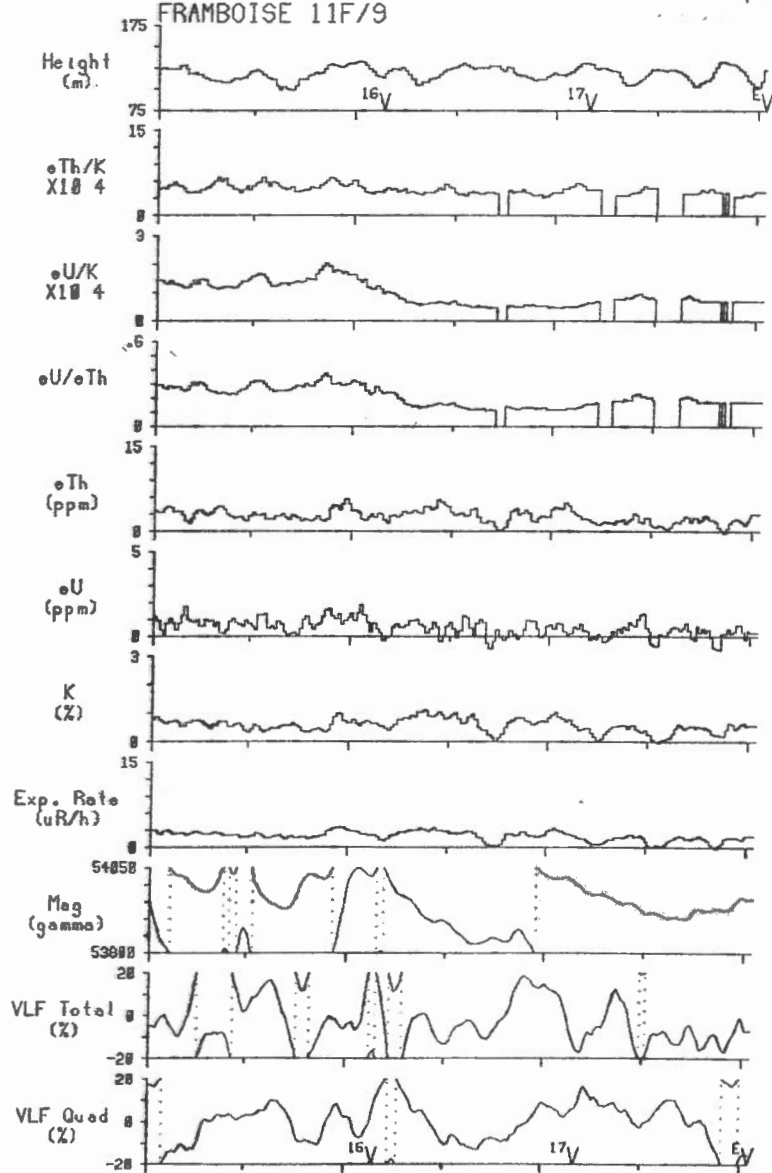
Line 70 2 km Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
FRAMBOISE 11F/9



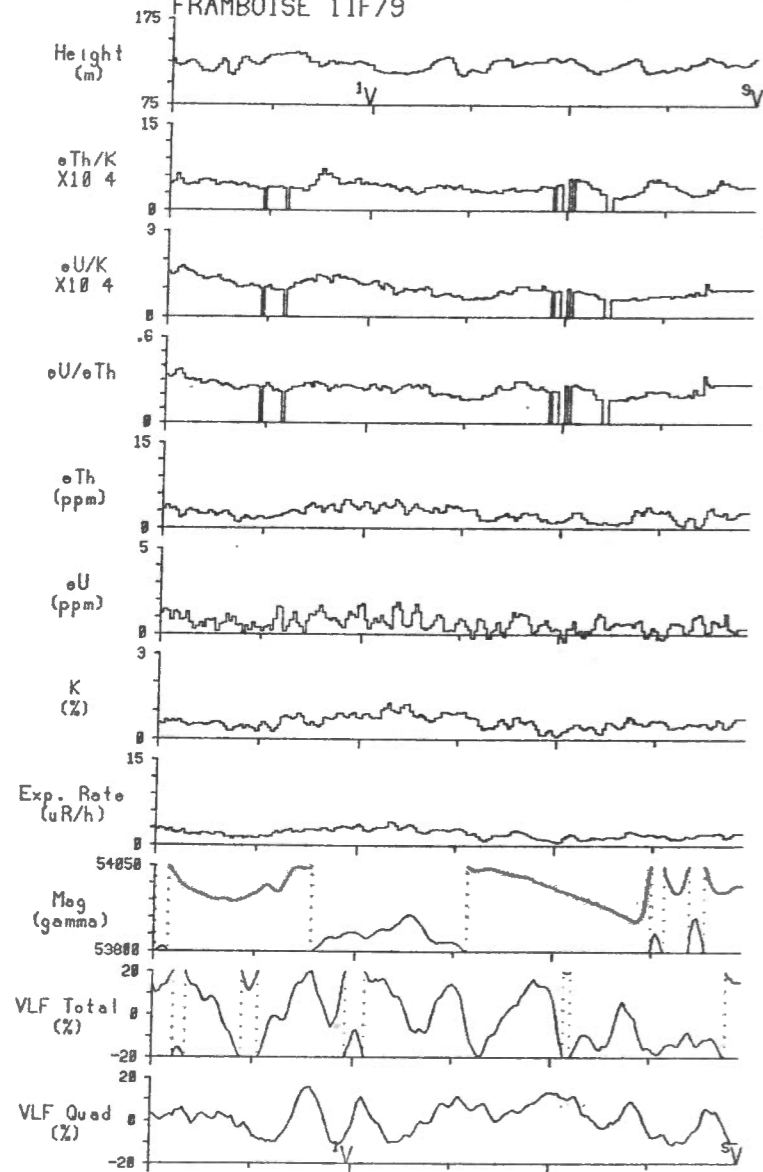
Line 71 | 2 km | Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
FRAMBOISE 11F/9



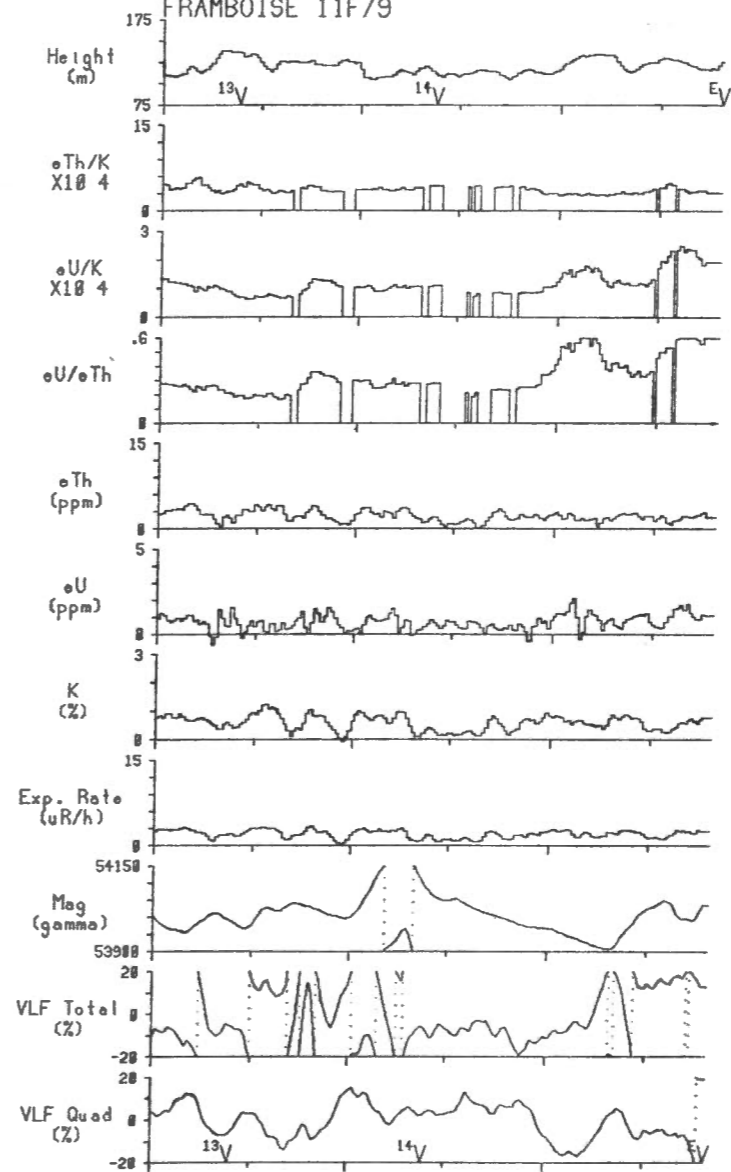
Line 72 | 2 km | Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
FRAMBOISE 11F/9



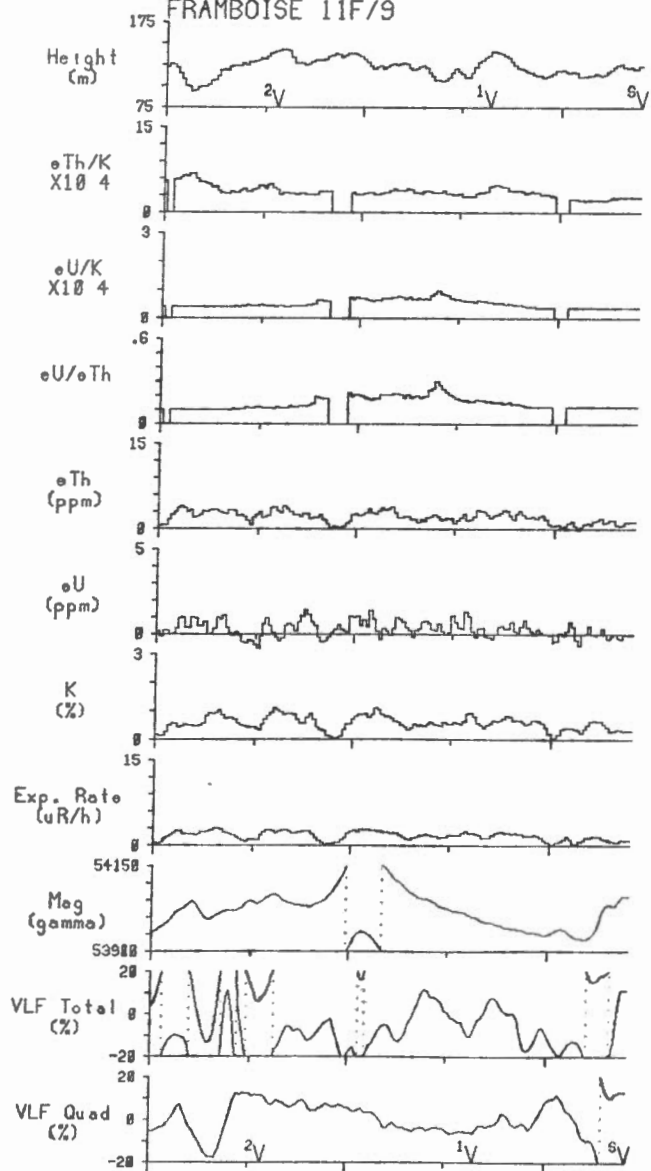
Line 73 | 2 km | Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
FRAMBOISE 11F/9



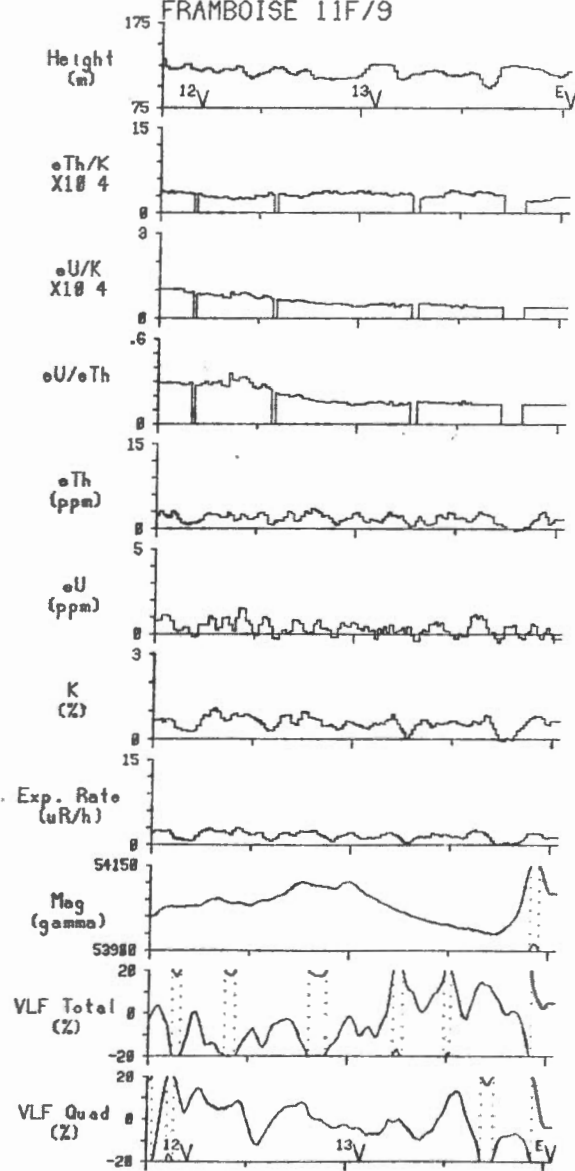
Line 74 | 2 km | Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
FRAMBOISE 11F/9



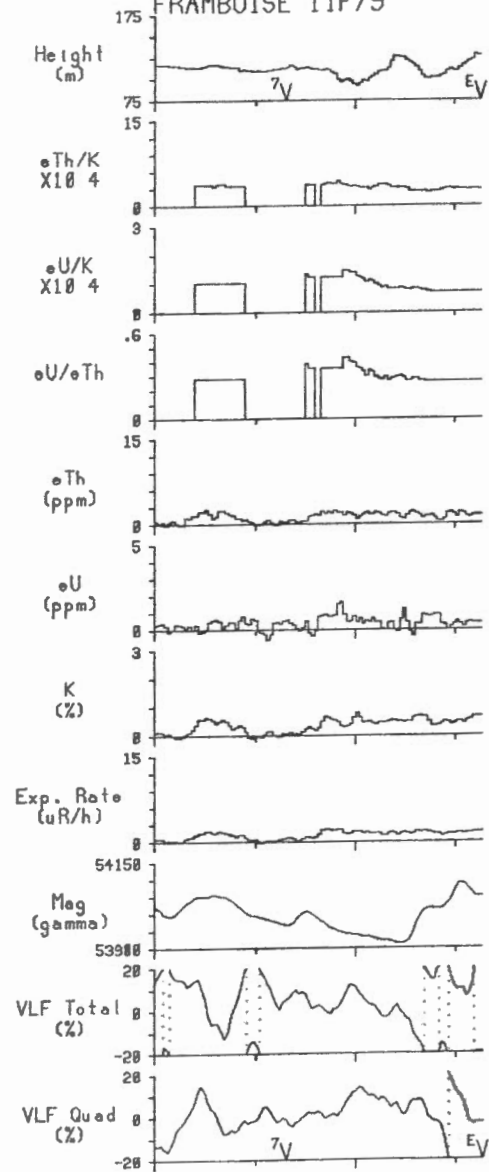
Line 75 2 km Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
FRAMBOISE 11F/9



Line 76 2 km Scale 1:150000

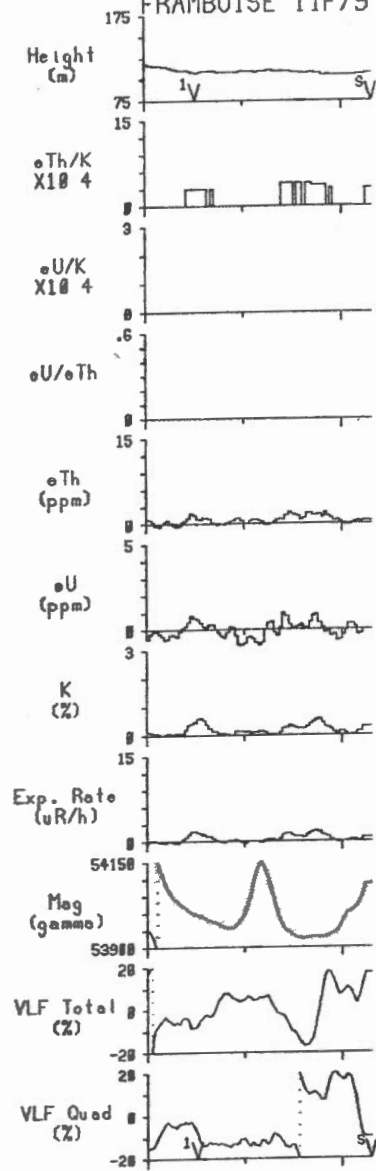
Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
FRAMBOISE 11F/9



Line 77 | 2 km

Scale 1:150000

Bras d'Or Lake Area, N.S. 1990 (line spacing=1 km)
FRAMBOISE 11F/9



Line 78 | 2 km

Scale 1:150000