

AIRBORNE GEOPHYSICAL SURVEY
1988

PROSPEROUS LAKE - HIDDEN LAKE AREA
NORTHWEST TERRITORIES

85I/12, J/9 (E)
Parts of 85I/11, 5, 6, 13, 14, J/8

GAMMA RAY SPECTROMETER, VLF AND MAGNETOMETER
COLOUR MAPS

with accompanying
Stacked Profiles and Geology Map Overlay

Scale 1:150,000



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1978

GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA
OTTAWA

1989

LEVÉ GÉOPHYSIQUE AÉRIEN DE RÉGION
PROSPEROUS LAKE - HIDDEN LAKE DANS LES T.N.-O.

La Commission géologique du Canada a effectué en 1987 un levé géophysique aérien multiparamétrique dans la région du Prosperous Lake - Hidden Lake (Territoires du Nord-Ouest). La carte-index montre l'étendue du secteur d'étude. Le levé visait avant tout à obtenir des données spectrométriques quantitatives de rayons gamma. Des données sur le champ électromagnétique VLF et sur le champ magnétique total ont aussi été recueillies.

Les données sont présentées sous forme d'ensemble de onze cartes polychromes à 1/150 000, soit le débit d'exposition, le potassium, les concentrations en équivalent uranium et en équivalent thorium, les rapports eU/eTh, eU/K et eTh/K, la carte des radioéléments ternaires (J. Broome, J.M. Carson, J.A. Grant et K.L. Ford, 1987, *A Modified Ternary Radioelement Mapping Technique and its Application to the South Coast of Newfoundland, Étude de la CGC 87-14*), la carte du champ magnétique total et la carte du champ EM total à très basse fréquence et la carte du quadrature VLF.

Toutes les données ont été recueillies à une seconde d'intervalle. Les mesures ont été effectuées à l'aide d'un spectromètre à 256 canaux comportant 12 détecteurs au NaI (TI) mesurant 102 sur 102 sur 406 mm. L'appareil était opéré à une hauteur moyenne de 125 m au-dessus du sol, à une vitesse de 190 km/h. Les lignes de vol est-ouest respectaient un intervalle de 500 mètres entre elles. Les mesures magnétométriques aériennes ont été faites au moyen d'un magnétomètre aéroporté à proton modèle G-803 de marque Geometrics, selon une résolution de 1 gamma. Les mesures aériennes à très basse fréquence ont été effectuées à l'aide d'un appareil aéroporté VLF Totem 2A des Industries Herz, Ltée. Le champ électromagnétique primaire est produit par la station VLF NLK à Seattle (Washington).

Le potassium est mesuré directement à partir de photons de rayons gamma de 1,46 MeV émis par le ^{40}K . Par contre, l'uranium et le thorium sont mesurés indirectement à partir des photons de rayons gamma émis par des produits de filiation propres à leurs chaînes de désintégration respectives: le compte d'uranium est déterminé au moyen de photons d'environ 1,76 MeV émis par le ^{214}Bi alors que le compte de thorium est établi à partir de photons de 2,62 MeV provenant du ^{208}Ti . Les fenêtres énergétiques utilisées sont les suivantes:

Potassium	40K	1,36 à 1,56 MeV
Uranium	^{214}Bi	1,66 à 1,86 MeV
Thorium	^{208}Ti	2,41 à 2,81 MeV

Les comptes d'uranium, de thorium et de potassium ont été corrigés pour tenir compte des temps morts, des changements de température ambiante, du rayonnement de fond, de la diffusion spectrale et des écarts entre l'altitude réelle et l'altitude nominale du levé. Les données cartographiées présentent des concentrations moyennes de surface: la proportion d'affleurements, de mort-terrains, de régions couvertes par de la végétation ou par de l'eau et la quantité d'eau dans le sol peuvent tous influer sur les résultats. Par conséquent, les concentrations indiquées sur les cartes sont généralement plus faibles que celles du socle rocheux.

Afin de déterminer les facteurs qui permettent de convertir les mesures aériennes en concentrations, on a comparé les taux de comptage obtenus au cours du levé aux taux mesurés au-dessus d'une bande d'essai de la région d'Ottawa pour laquelle les concentrations au sol étaient connues. Les facteurs de conversion utilisés sont les suivants:

1% de K	91,0 cps
1 ppm eU	9,1 cps
1 ppm eTh	7,0 cps

Le taux d'exposition, exprimé en micro-roentgens par heure ($\mu\text{R}/\text{h}$), a été calculé à partir de concentrations connues de potassium, d'uranium et de thorium (Grasty, R.L., Carson, J.M., Charbonneau, B.W. et Holman, P.B. 1984. Natural Background Radiation in Canada. Commission géologique du Canada, Bulletin 360). On peut comparer ces données à celles exprimées auparavant en unités de concentration de radioélément (Ur) en considérant que $1\mu\text{R}/\text{h}$ équivaut à environ 1,67 Ur.

Pour obtenir des renseignement sur la disponibilité de cet dossier public, on peut écrire à l'endroit suivant: La Commission géologique du Canada, 601 rue Booth, Ottawa, Ontario; ou téléphone (613) 995-4342.

Le fond de carte provient de la Direction des levés et de la cartographie.

La cartographie a été exécutée par la Commission géologique du Canada.

Le levé aéroporté magnétique, VLF et de spectrométrie par rayons gamma a été effectué, compilé et défrayé par la Commission géologique du Canada

AIRBORNE GEOPHYSICAL SURVEY
PROSPEROUS LAKE - HIDDEN LAKE AREA, N.W.T.

In 1988 a multiparameter geophysical survey was flown by the Geological Survey of Canada in the Prosperous Lake - Hidden Lake area of the Northwest Territories. The area surveyed is shown on the index map. The main purpose of the survey was to acquire quantitative gamma ray spectrometric information. VLF electromagnetic and total field magnetic data were also recorded.

Data are presented as a set of eleven 1:150 000 colour maps (exposure rate, potassium, equivalent uranium and equivalent thorium concentrations, the eU/eTh, eU/K and eTh/K ratios, the ternary radioelement map (J. Broome, J.M. Carson, J.A. Grant and K.L. Ford, 1987 *A Modified Ternary Radioelement Mapping Technique and its Application to the South Coast of Newfoundland, GSC Paper 87-14*)), the total magnetic field map and the VLF-EM total field and VLF quadrature maps.

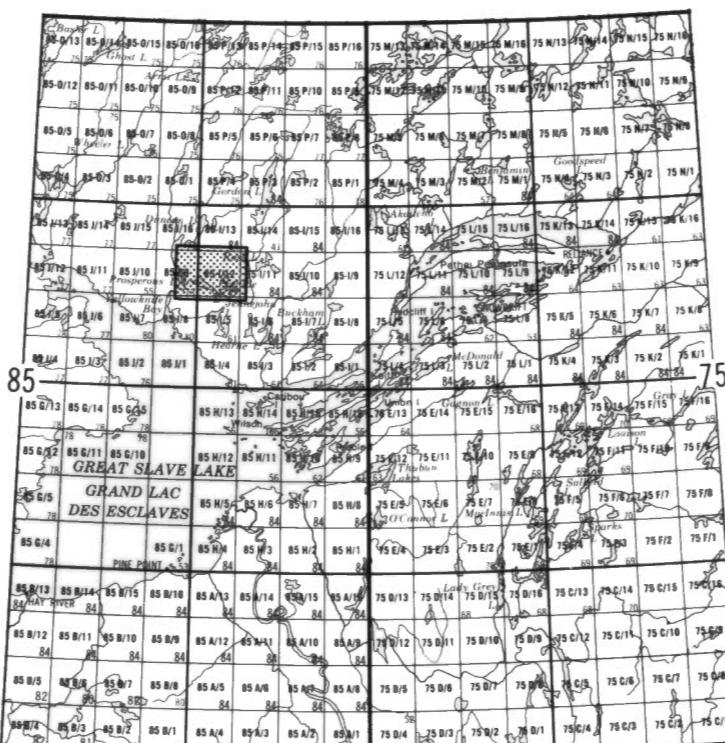
All data were sampled at 1 second intervals. The airborne radiometric measurements were made using a 256 channel spectrometer, with twelve 102x102x406 mm NaI (TI) detectors, flown at a mean terrain clearance of 125 m at 190 km/h. East-west flight lines were at 500 metre line spacing. The airborne magnetometer measurements were made using a Geometrics Model G-803 Airborne Proton Magnetometer with a 1 gamma resolution. The airborne VLF measurements were obtained using a Herz Industries Ltd. Totem 2A airborne VLF system. The primary electromagnetic field is generated by VLF station NLK at Seattle, Washington.

Potassium is measured directly from the 1.46 MeV gamma ray photons emitted by ^{40}K , whereas uranium and thorium are measured indirectly from gamma ray photons emitted by daughter products in their decay chains. Uranium is monitored by means of gamma ray photons at approximately 1.76 MeV from ^{214}Bi , and thorium, from 2.62 MeV photons emitted by ^{208}Ti . The energy windows used are as follows:

Potassium	40K	1.36-1.56 MeV
Uranium	^{214}Bi	1.66-1.86 MeV
Thorium	^{208}Ti	2.41-2.81 MeV

Uranium, thorium and potassium counts have been corrected for dead time, ambient temperature changes, background radiation, spectral scattering and deviations of terrain clearance from the planned survey altitude. The data as presented represent an average surface concentration which is influenced by varying amounts of outcrop, overburden, vegetation, soil moisture and surface waters. As a result, the concentrations as shown are usually lower than the concentrations in the bedrock.

Factors for converting the airborne measurements to concentrations were determined by relating the airborne count rates to the known ground concentrations of a test strip in the Ottawa area. The factors used to convert the airborne measurements to ground concentrations are:



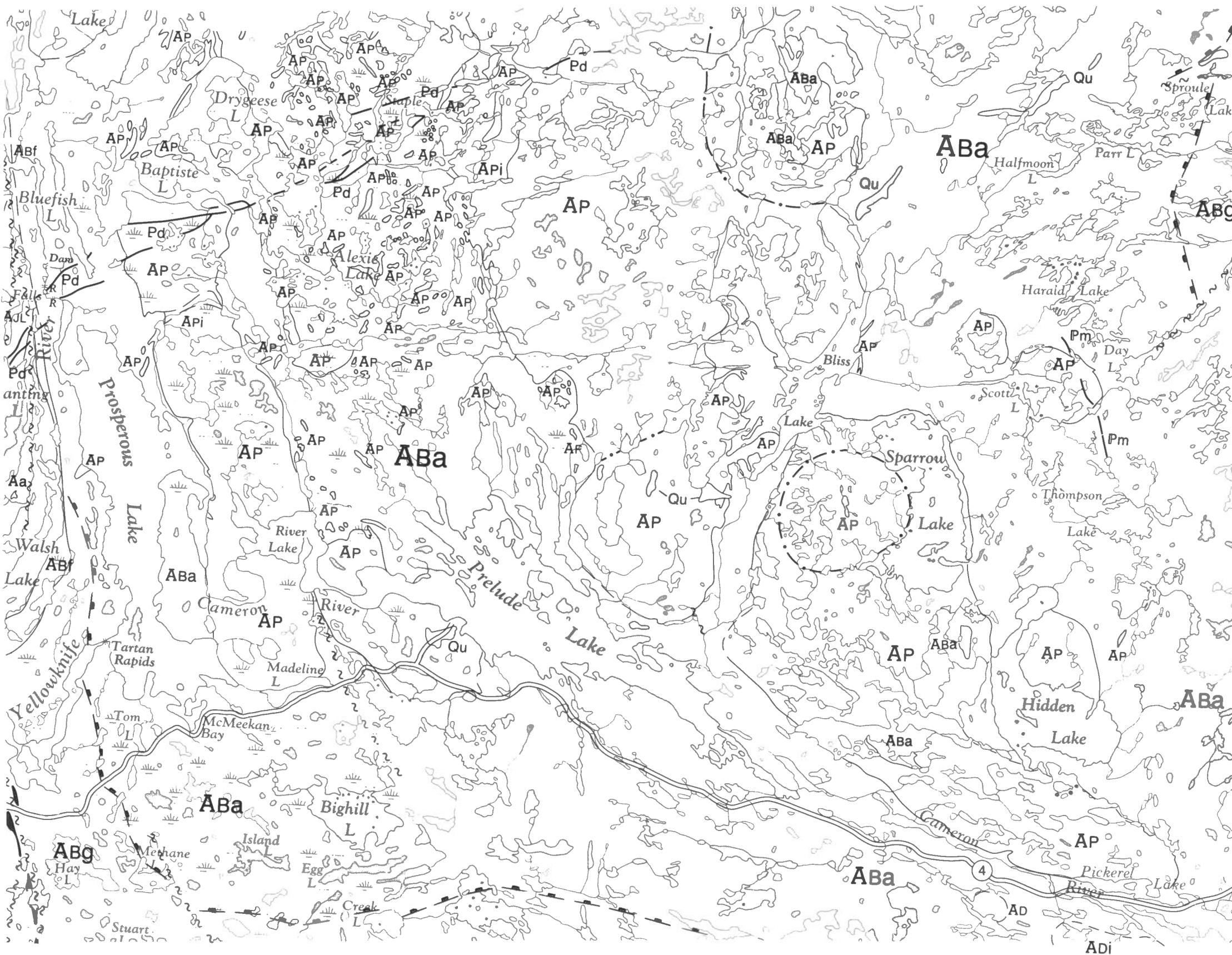
The exposure rate, in micro Roentgens per hour has been computed from the measured concentrations of potassium, uranium and thorium (Grasty, R.L., Carson, J.M., Charbonneau, B.W. and Holman, P.B., 1984, Natural Background Radiation in Canada, Geol. Sur. Can., Bull. 360). To compare these data with earlier total count maps expressed in Units of Radioelement concentrations (Ur), the conversion factor is $1\mu\text{R}/\text{h} = 1.67 \text{ Ur}$.

Information regarding the availability of this Open File release may be obtained from: Geological Survey of Canada, 601 Booth St., Ottawa, Ontario, K1A 0E8. Telephone (613) 995-4342.

Base map material supplied by Surveys and Mapping Branch

Cartography by Geological Survey of Canada

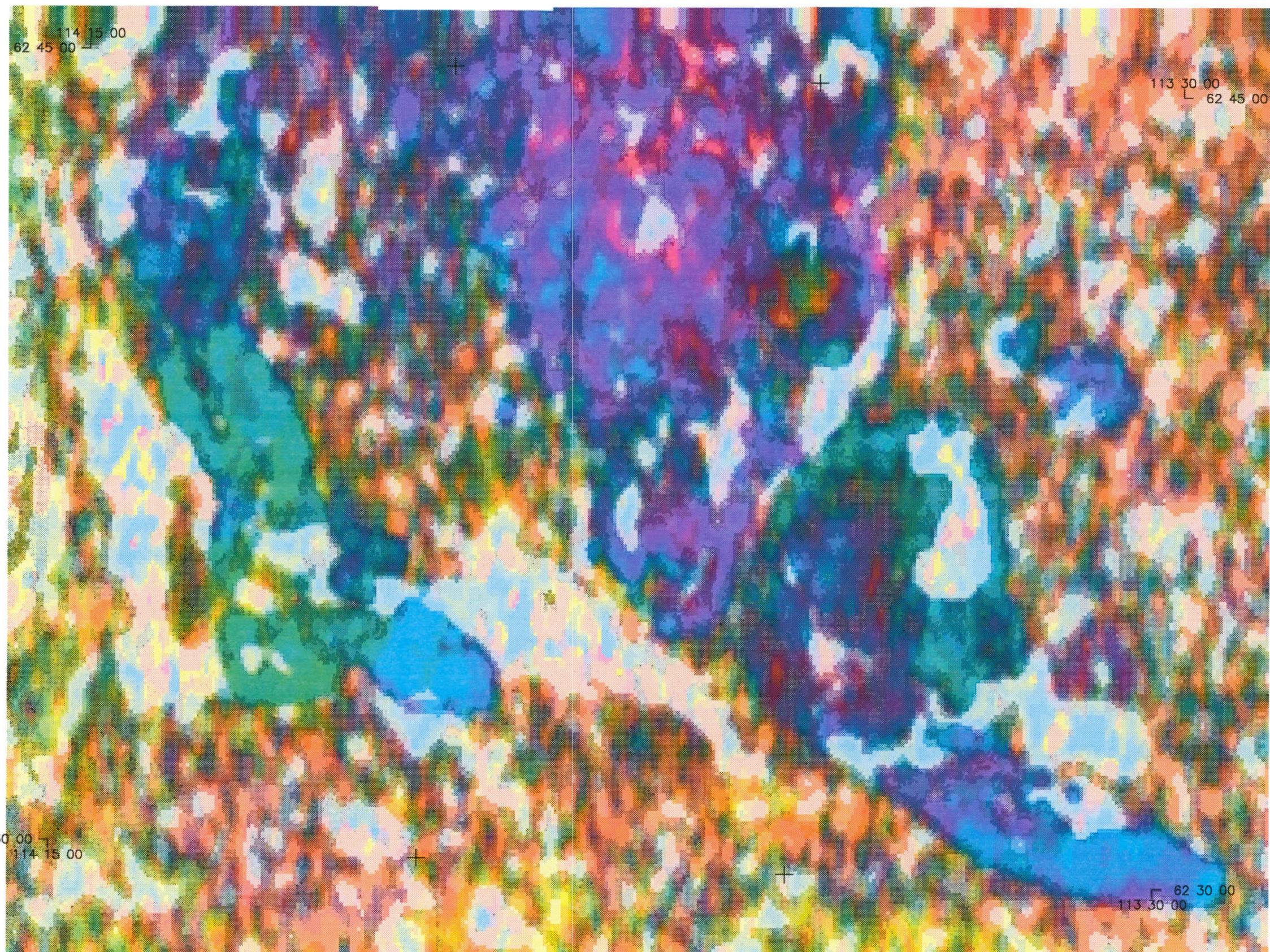
Airborne gamma ray spectrometer, VLF and magnetic survey flown, compiled and funded by Geological Survey of Canada



LEGEND

Qu	Gravel, sand, silt; unconsolidated
Pm	MACKENZIE DYKES: diabase, gabbro, north-northwesterly trend, position approximate or assumed in many cases as dykes defined by aeromagnetic expression; width of dyke exaggerated on map
Pm	MILT SHEETS: diabase, gabbro, flat lying sheets, extent exaggerated on map
Pd	DOGRIB DYKES: diabase, east-northeasterly trend, width of dyke exaggerated on map
AP	PROSPEROUS GRANITE: granite, white to buff to light pink, massive, homogeneous, medium- to medium-coarse-grained, locally inequigranular, biotite-muscovite, pegmatite common With abundant inclusions of Yellowknife rocks
AD	DEFEAT PLUTONIC SUITE (Awb-Ad) Granodiorite, tonalite, granite, undivided, white to pink to dark red, massive to weakly foliated in main western body, homogeneous, equigranular, biotite, rarely hornblende-bearing With abundant inclusions of Yellowknife rocks
Aa	Amphibolite, dark green to black, massive to weakly foliated, intruded as sills into Yellowknife Supergroup rocks and probably contemporaneous with them
ABg	DUNCAN LAKE GROUP (east of Yellowknife, unnamed at Russell Lake and Stagg Lake) BURWASH FORMATION (unnamed at Russell Lake and Stagg Lake): greywacke, siltstone, mudstone, greenschist grade, greywacke siltstone turbidites interbedded with mudstone, well preserved sedimentary structures, complexly deformed, cleavage present, minor thin intermediate to felsic tuffaceous layers locally present Schist, psammitic to pelitic, typically interlayered, amphibolite grade equivalent to Abg, typically coarsely porphyroblastic, primary sedimentary structures locally preserved, complexly deformed, contains various assemblages of quartz-plagioclase-biotite-muscovite-cordierite-andalusite-sillimanite-staurolite-garnet
AJL	JACKSON LAKE FORMATION: sandstone, conglomerate, locally developed basal conglomerate contains volcanic and / or granitoid clasts, sandstones are felsic lithic wackes, commonly crossbedded, commonly with thin argillaceous interbeds with local thin lenses of fine conglomerate, greenschist grade, occurs at Yellowknife
Abf	BANTING FORMATION

Geology simplified from Map 1601A by the Geological Survey of Canada



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Airborne Gamma Ray Spectrometer Survey

of the

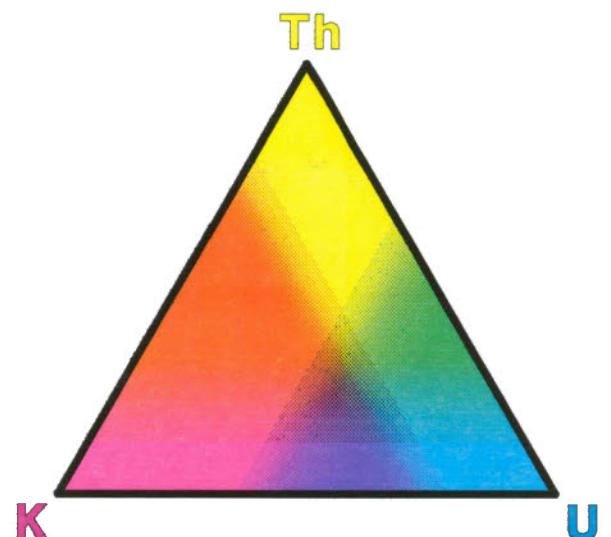
Prosperous Lake – Hidden Lake Area, N.W.T.

1988

85 I/12, 85 J/9(E)

Parts of 85 I/11,5,6,13,14, 85 J/8

TERNARY RADI ELEMENT MAP



Scale = 1:150 000
Line spacing = 500 metres

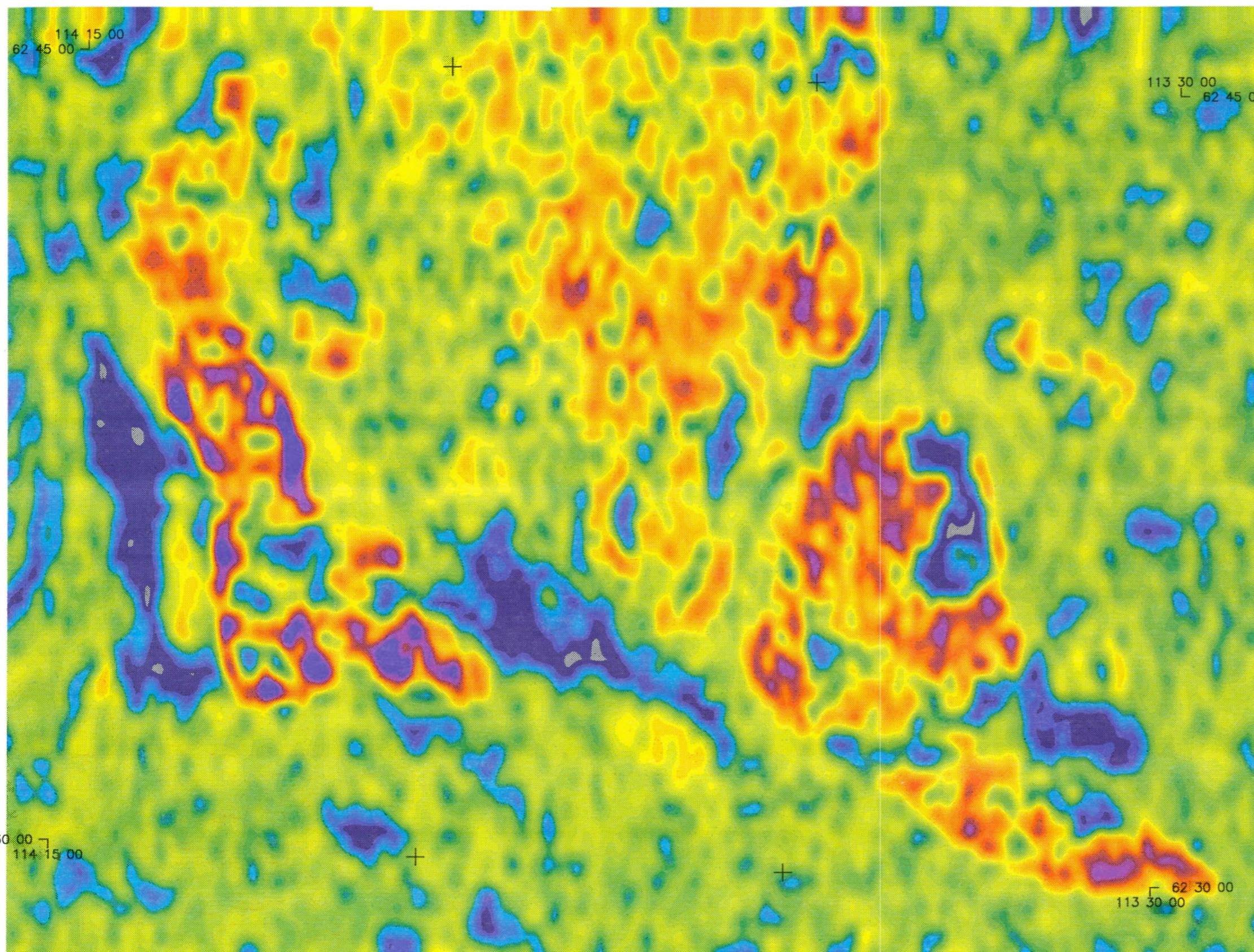
Survey flown, compiled and funded by
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Mineral Resources Division
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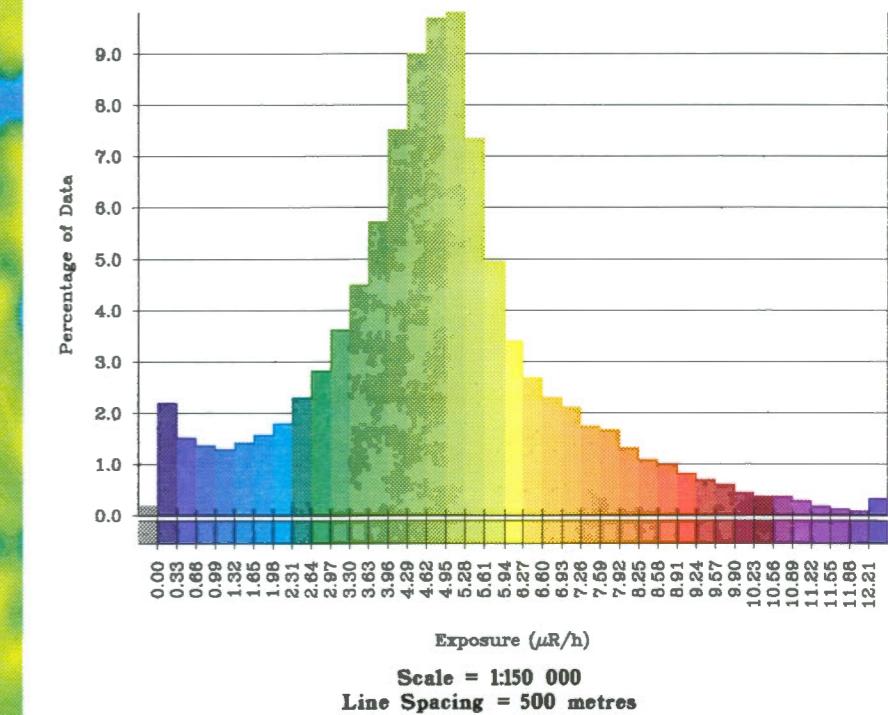
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 Airborne Gamma Ray Spectrometer Survey
 of the
Prosperous Lake – Hidden Lake Area, N.W.T.
 1988
 85 I/12, 85 J/9(E)
 Parts of 85 I/11,5,6,13,14, 85 J/8
EXPOSURE ($\mu\text{R}/\text{h}$)



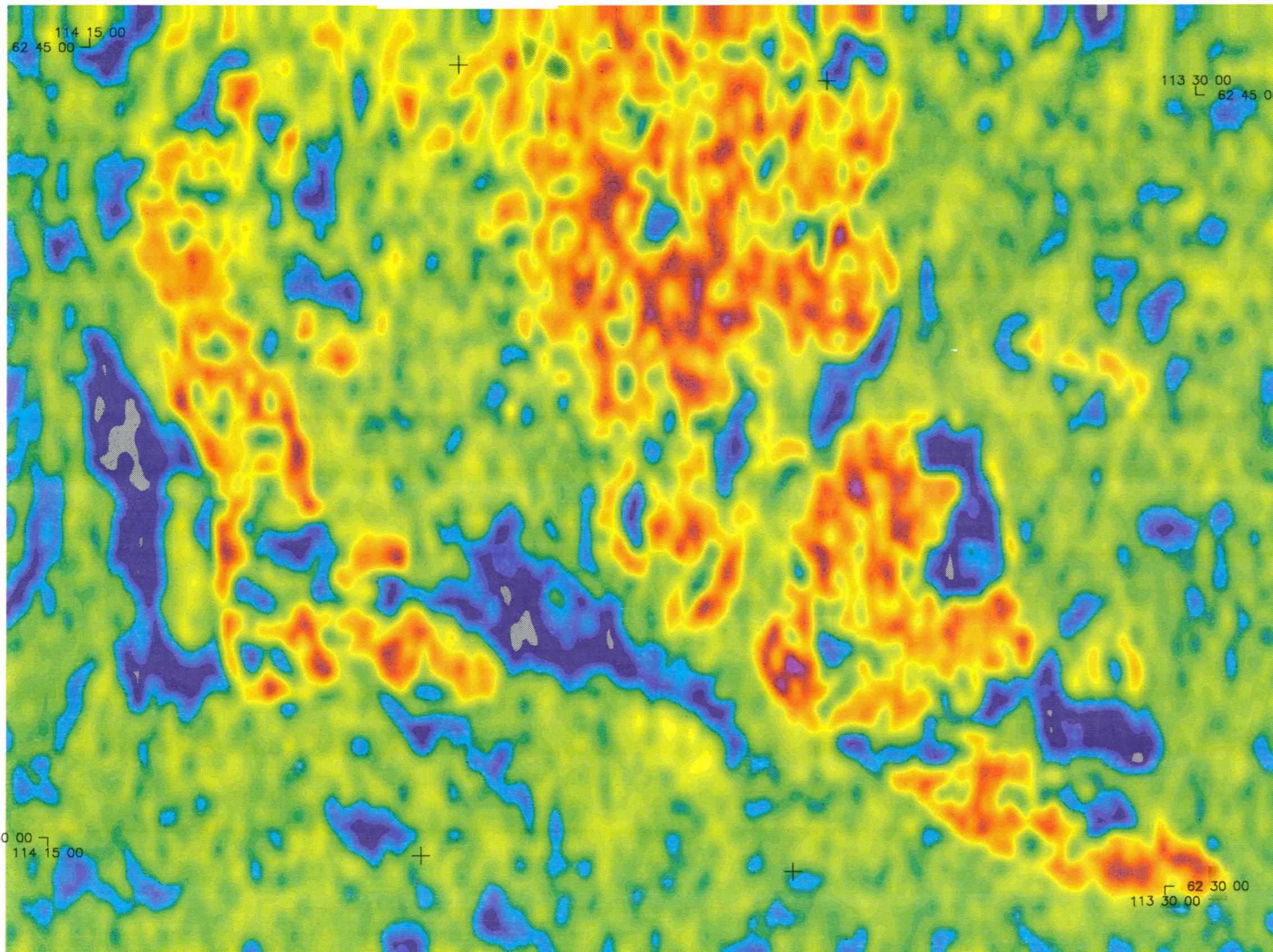
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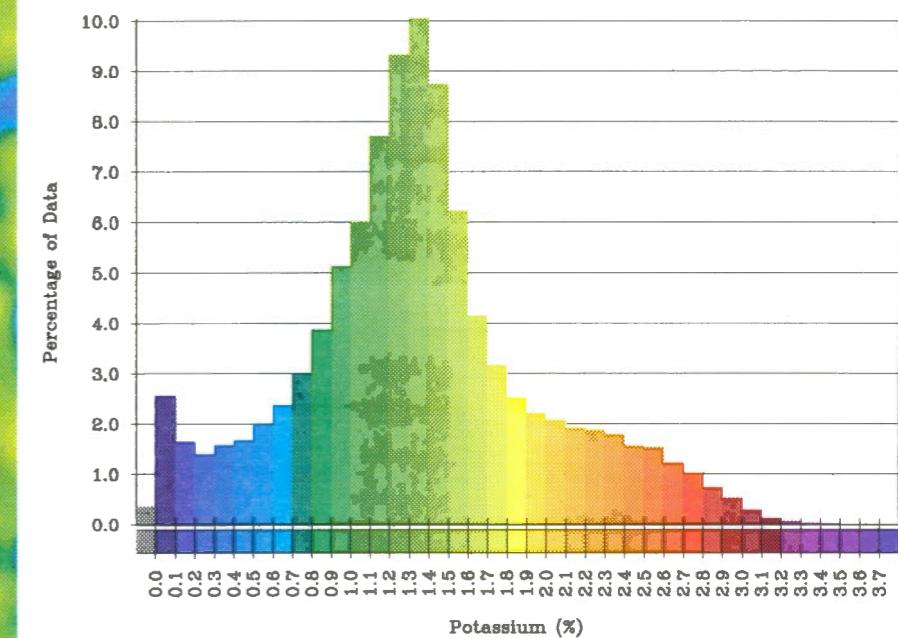
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Airborne Gamma Ray Spectrometer Survey
of the
Prosperous Lake - Hidden Lake Area, N.W.T.
1988
85 I/12, 85 J/9(E)
Parts of 85 I/11,5,6,13,14, 85 J/8
POTASSIUM (%)



Scale = 1:150 000
Line Spacing = 500 metres

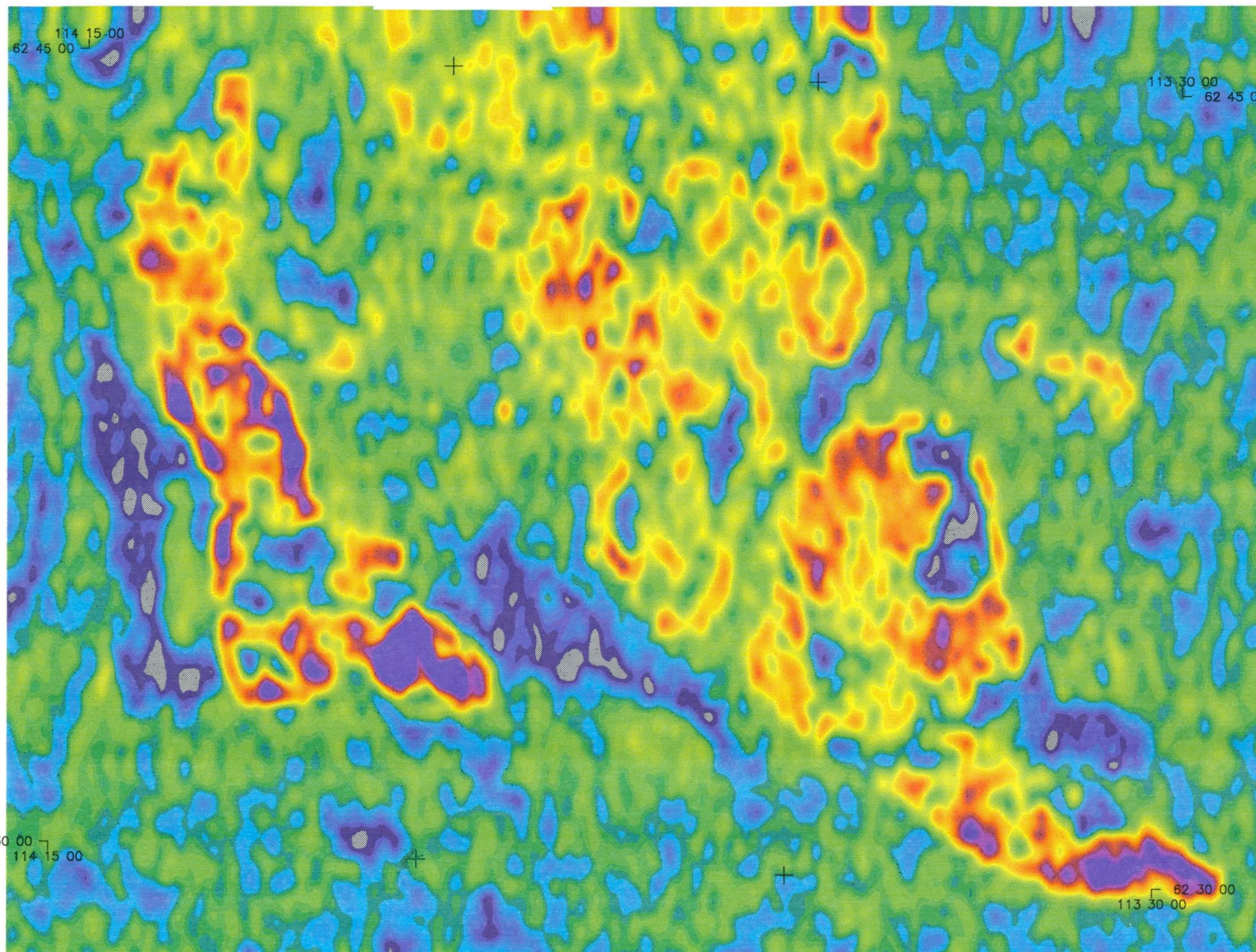
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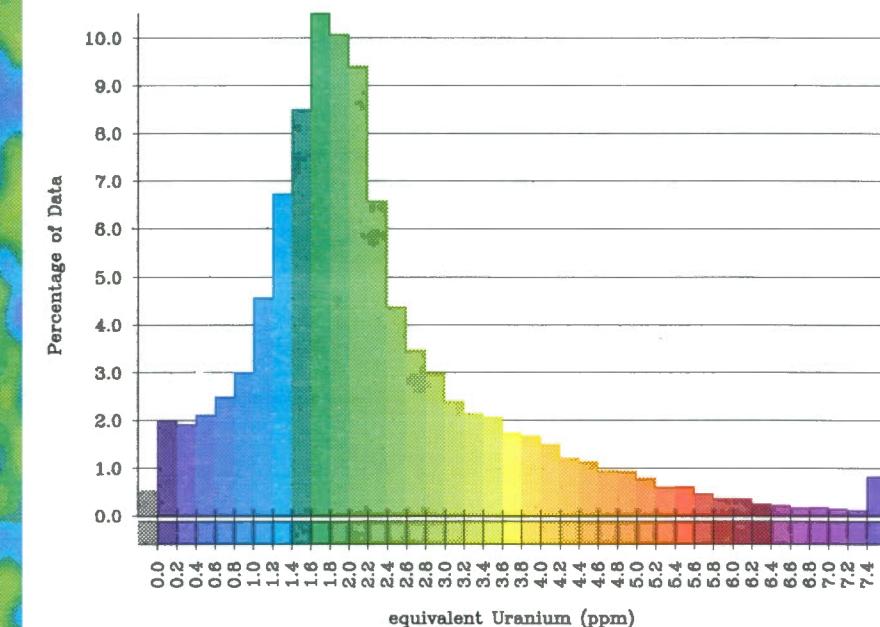
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85 I/12, 85 J/9(E)
Parts of 85 I/11,5,6,13,14, 85 J/8
EQUIVALENT URANIUM (PPM)



Scale = 1:150 000
Line Spacing = 500 metres

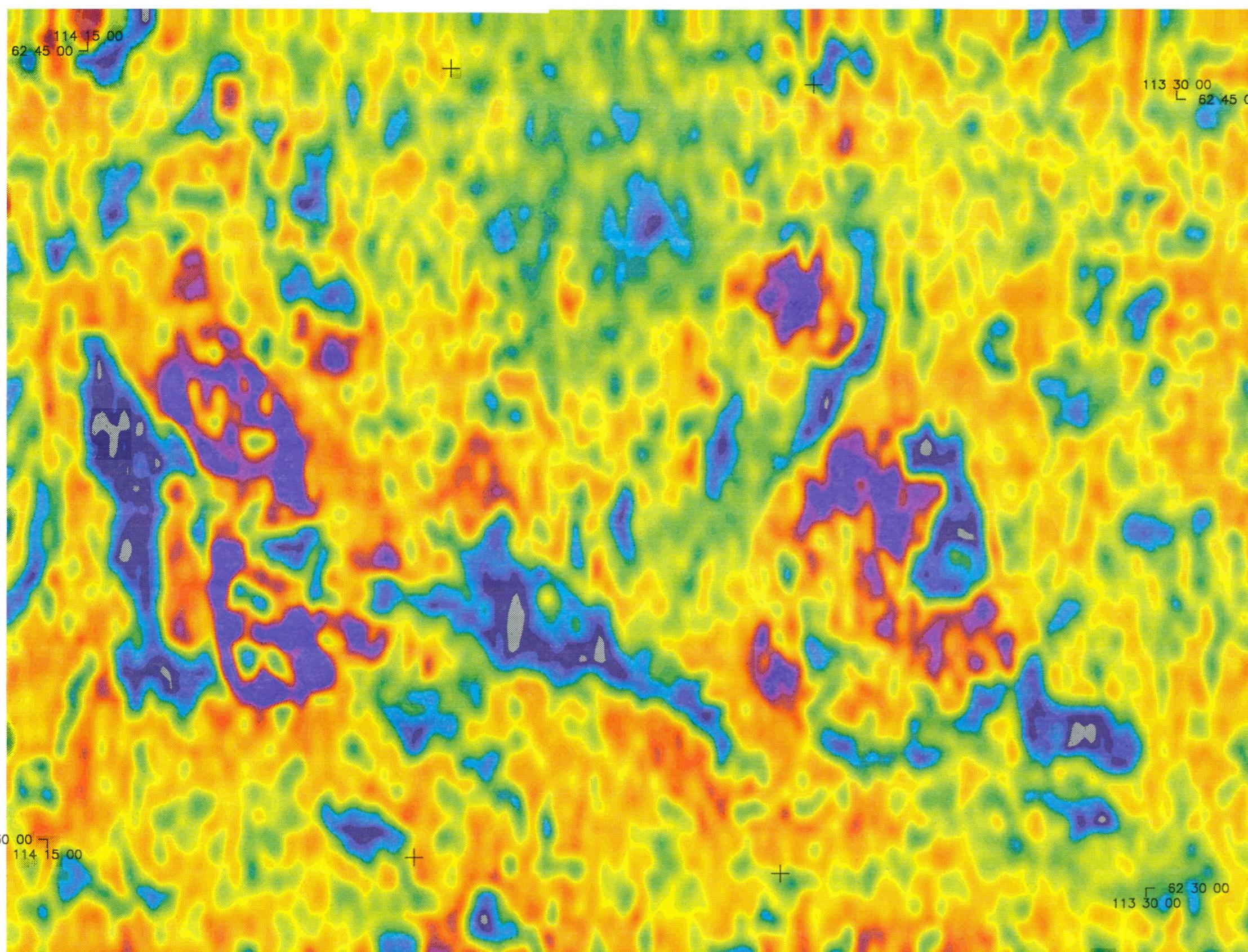
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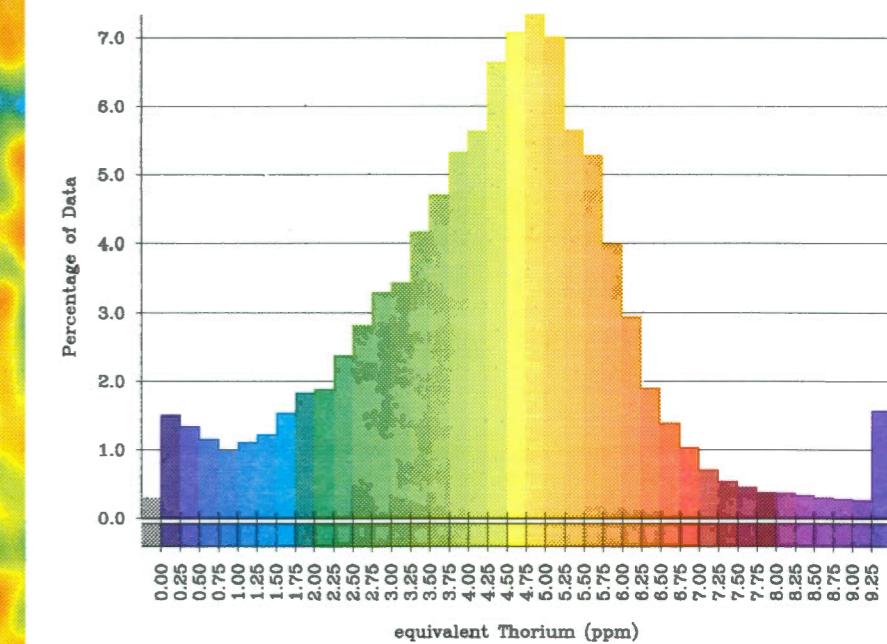
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1988
85 I/12, 85 J/9(E)
Parts of 85 I/11,5,6,13,14, 85 J/8
EQUIVALENT THORIUM (PPM)



Scale = 1:150 000
Line Spacing = 500 metres

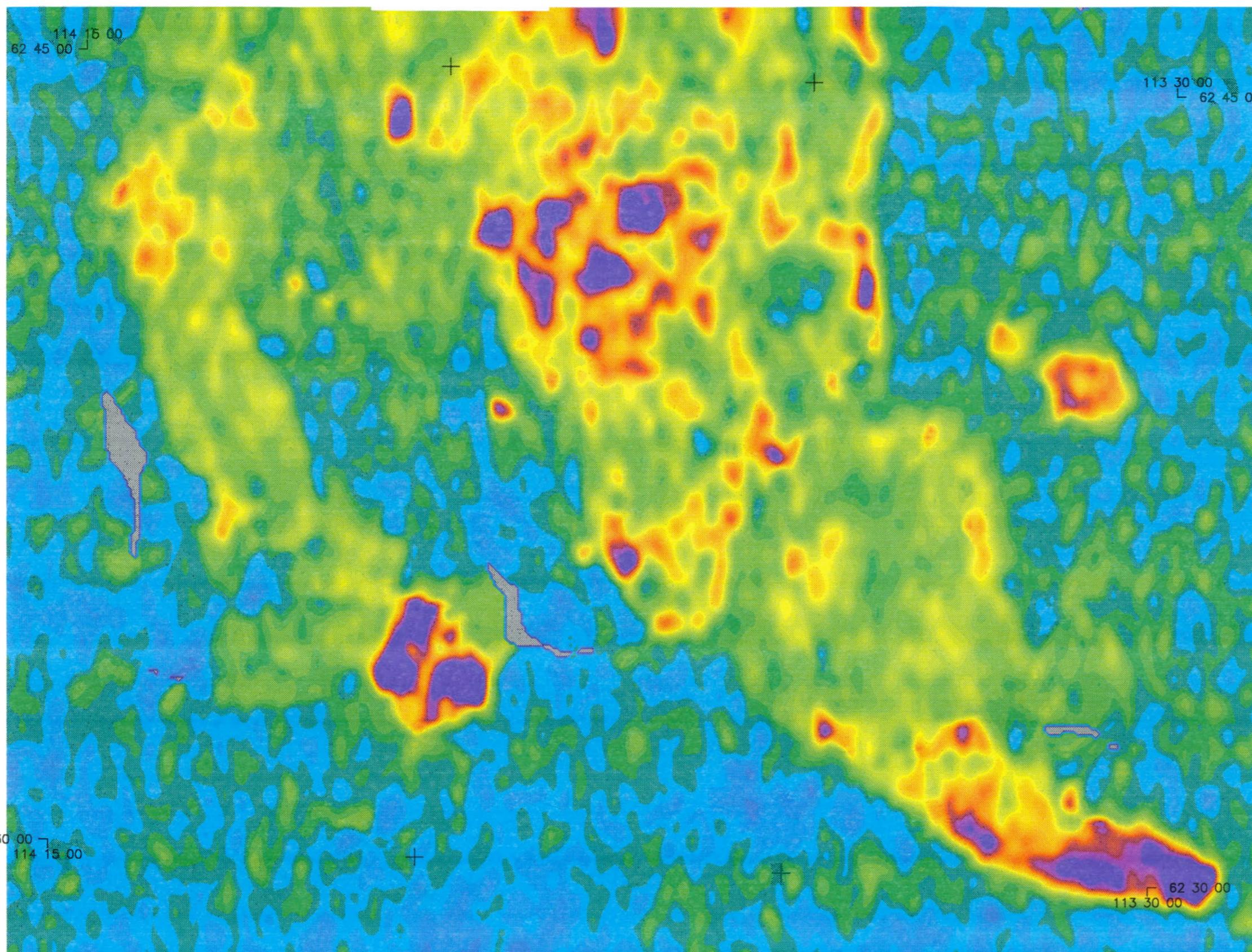
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Airborne Gamma Ray Spectrometer Survey
of the

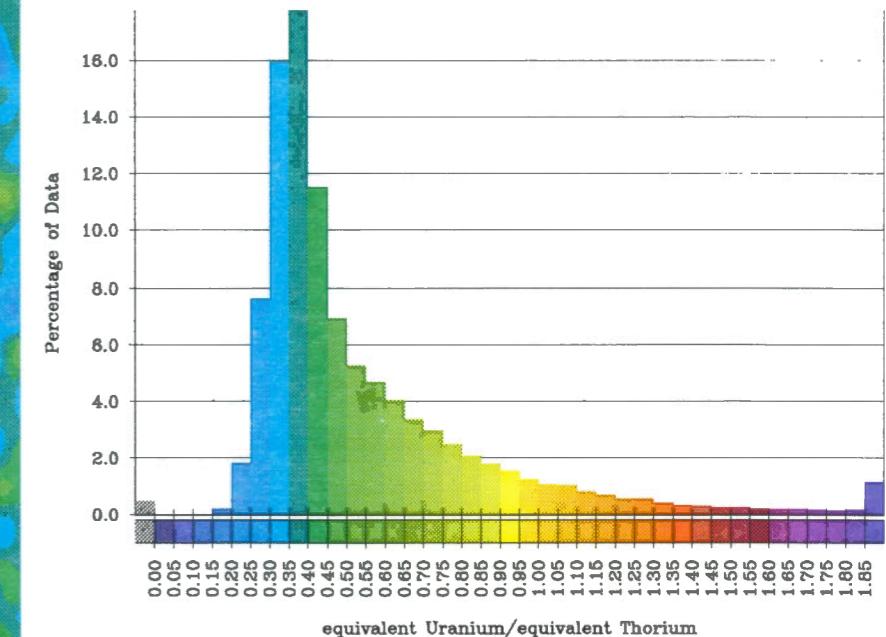
Prosperous Lake - Hidden Lake Area, N.W.T.

1988

85 I/12, 85 J/9(E)

Parts of 85 I/11,5,6,13,14, 85 J/8

EQUIVALENT URANIUM/EQUIVALENT THORIUM



Scale = 1:150 000
Line Spacing = 500 metres

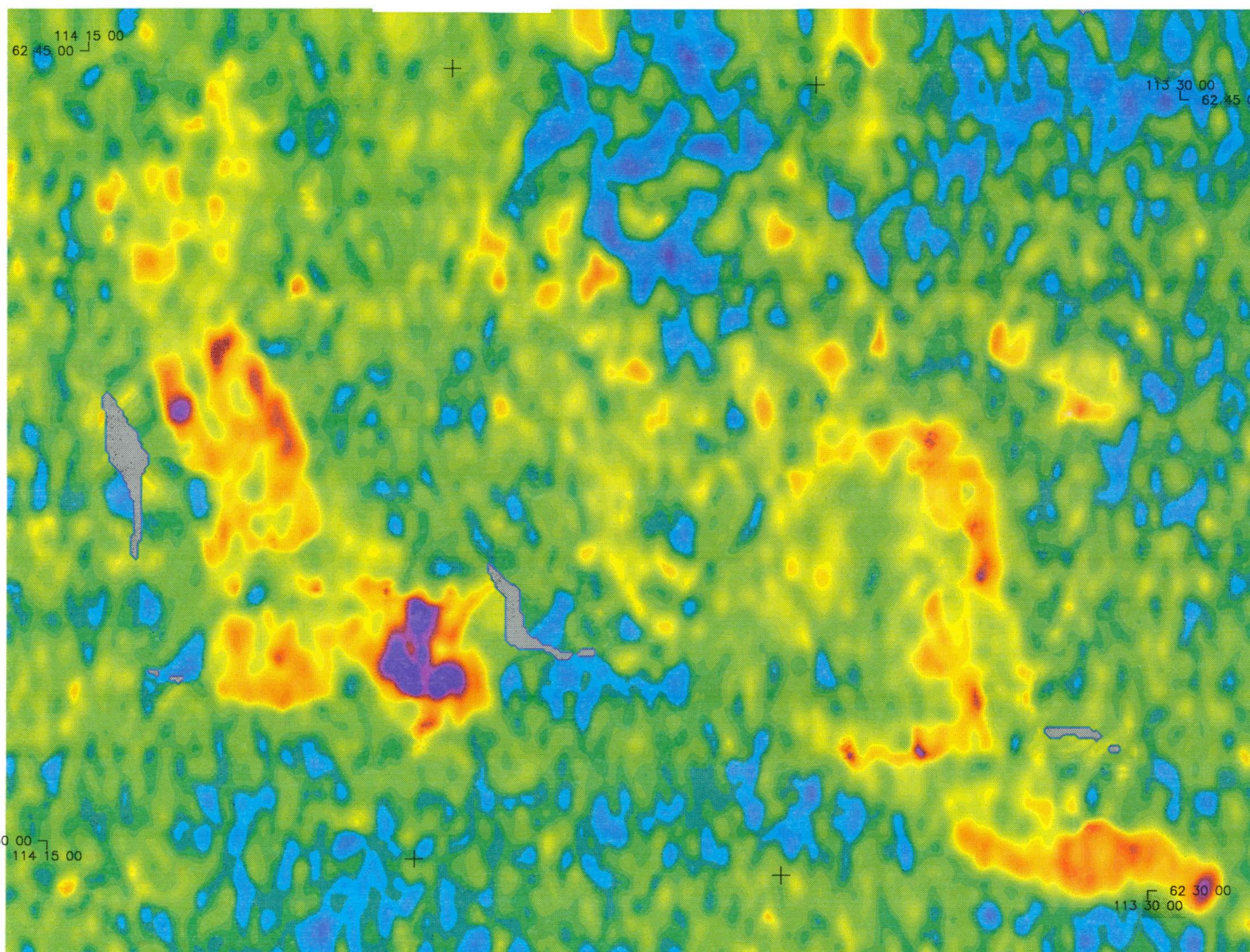
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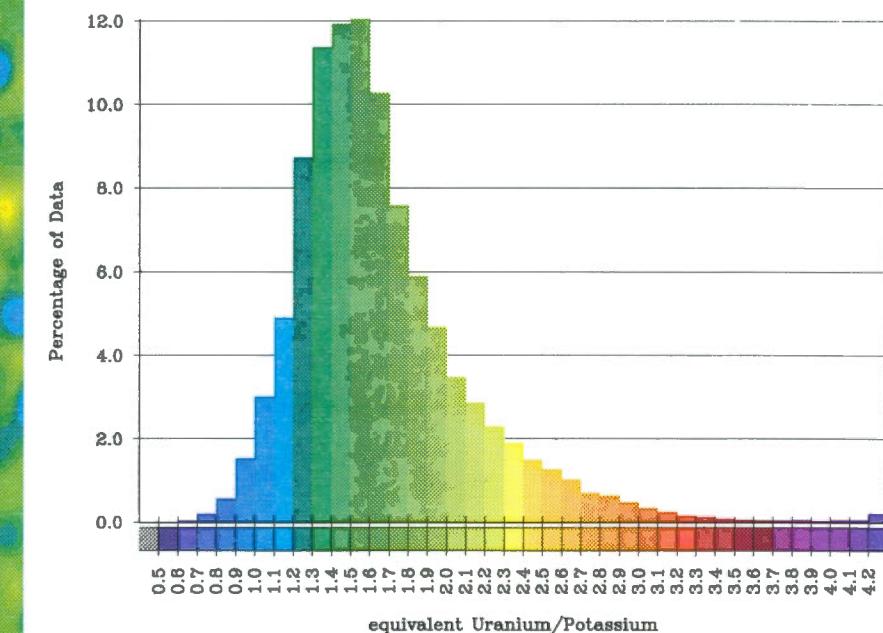
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85 I/12, 85 J/9(E)
Parts of 85 I/11,5,6,13,14, 85 J/8
EQUIVALENT URANIUM/POTASSIUM



Scale = 1:150 000
Line Spacing = 500 metres

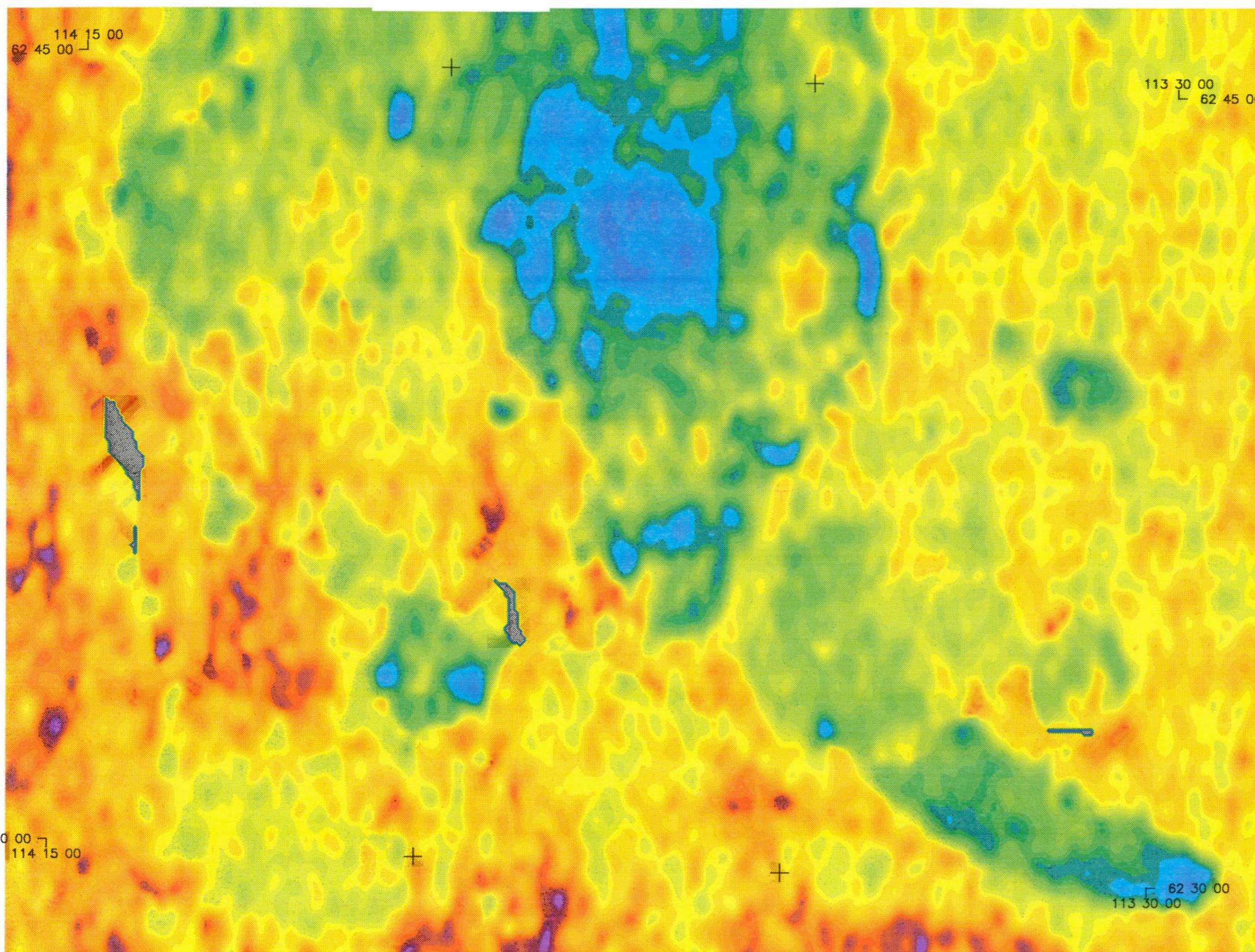
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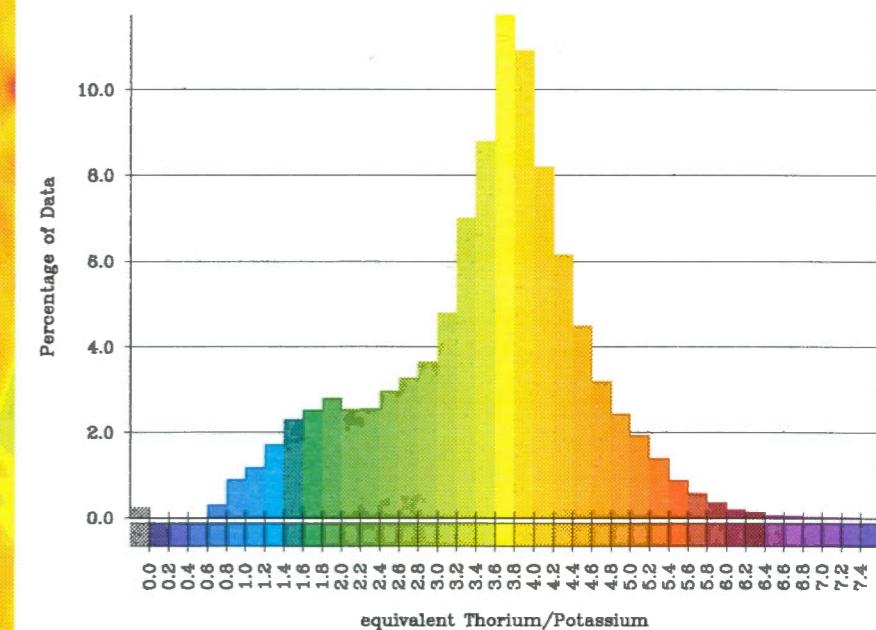
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1988
85 I/12, 85 J/9(E)
Parts of 85 I/11,5,6,13,14, 85 J/8
EQUIVALENT THORIUM/POTASSIUM



Scale = 1:150 000
Line Spacing = 500 metres

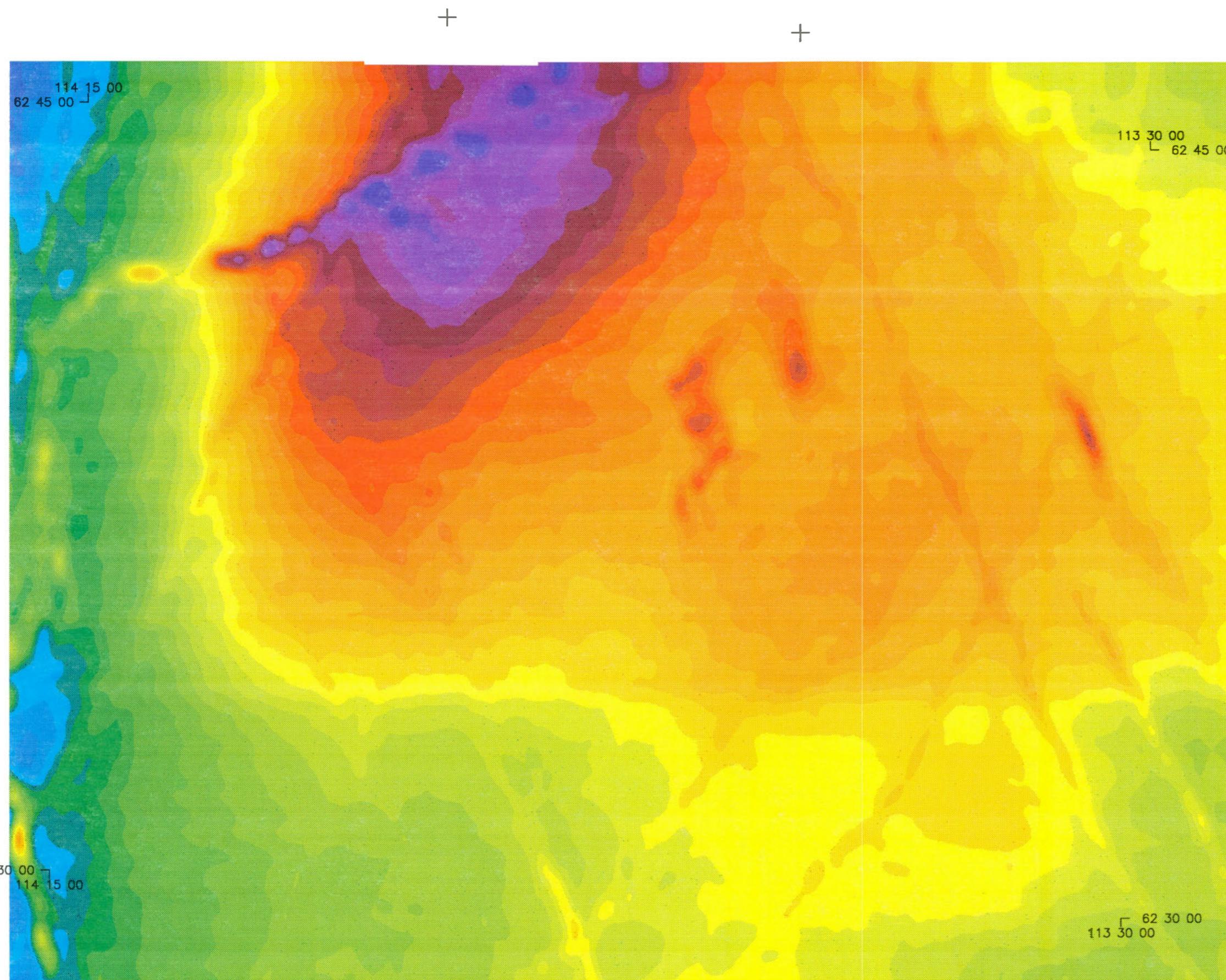
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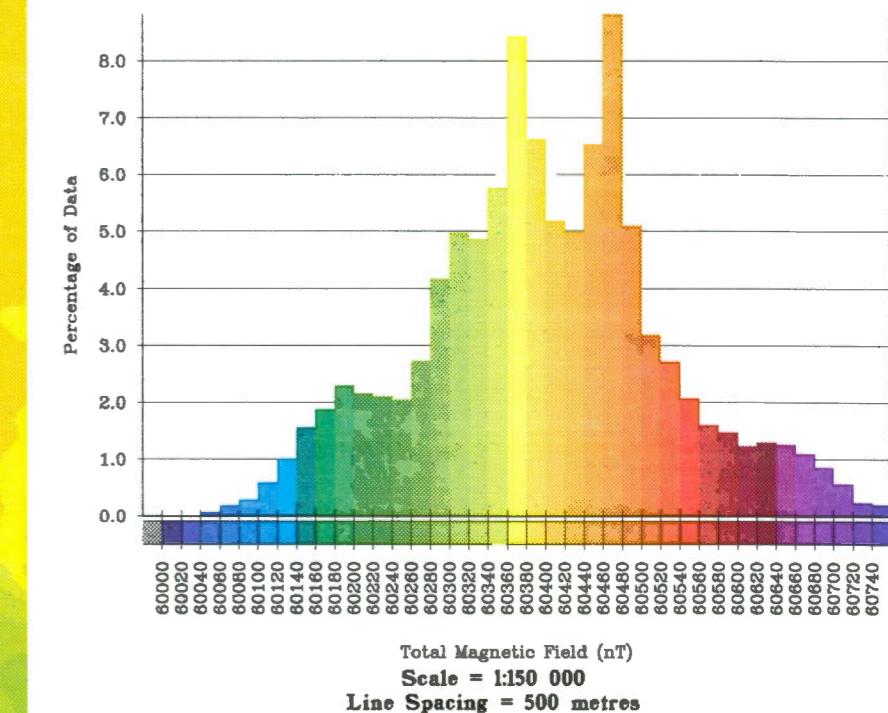
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 1988
 85 I/12, 85 J/9(E)
 Parts of 85 I/11, 5, 6, 13, 14, 85 J/8
TOTAL MAGNETIC FIELD (NT)



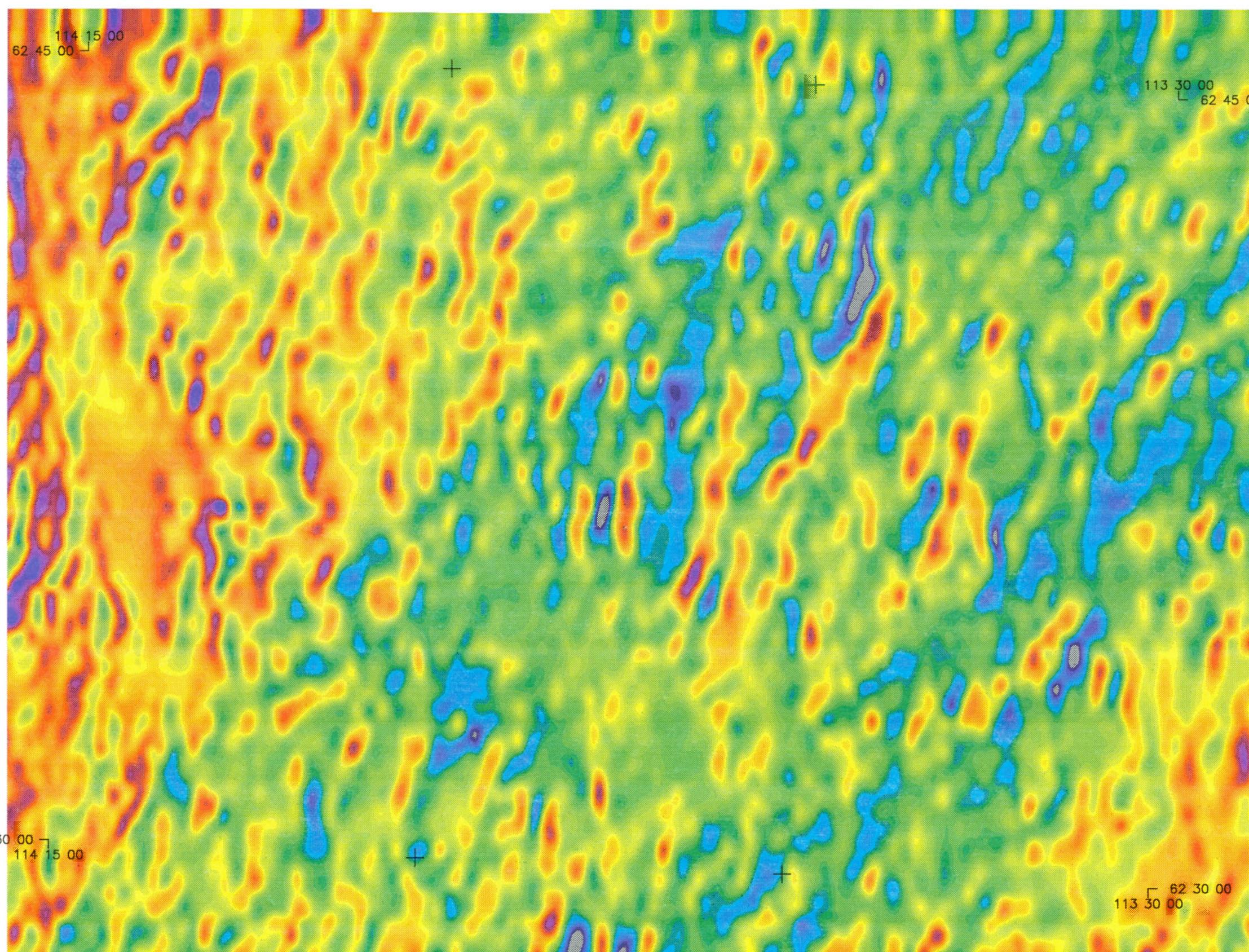
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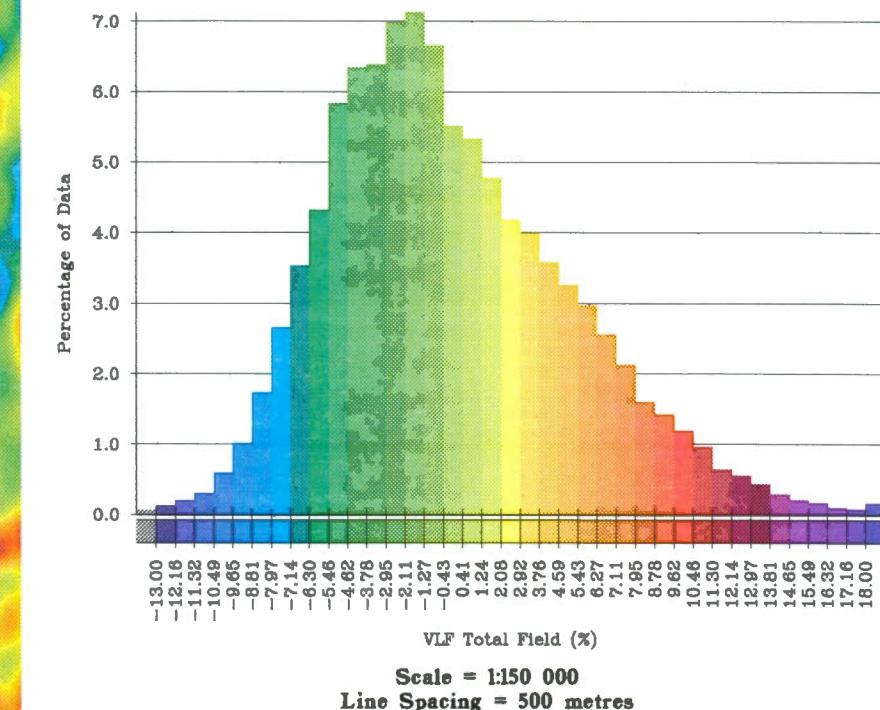
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VLF TOTAL FIELD (%)



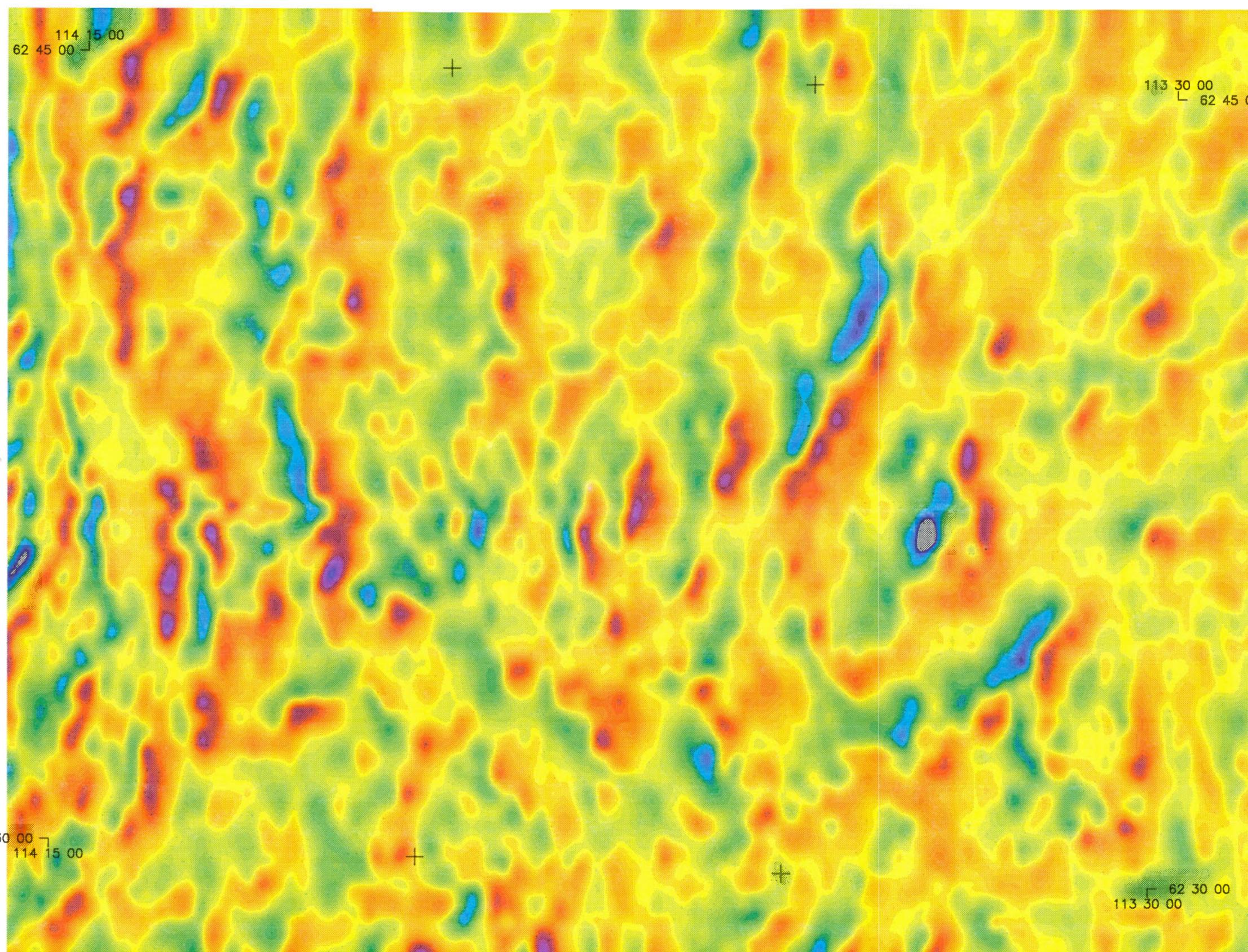
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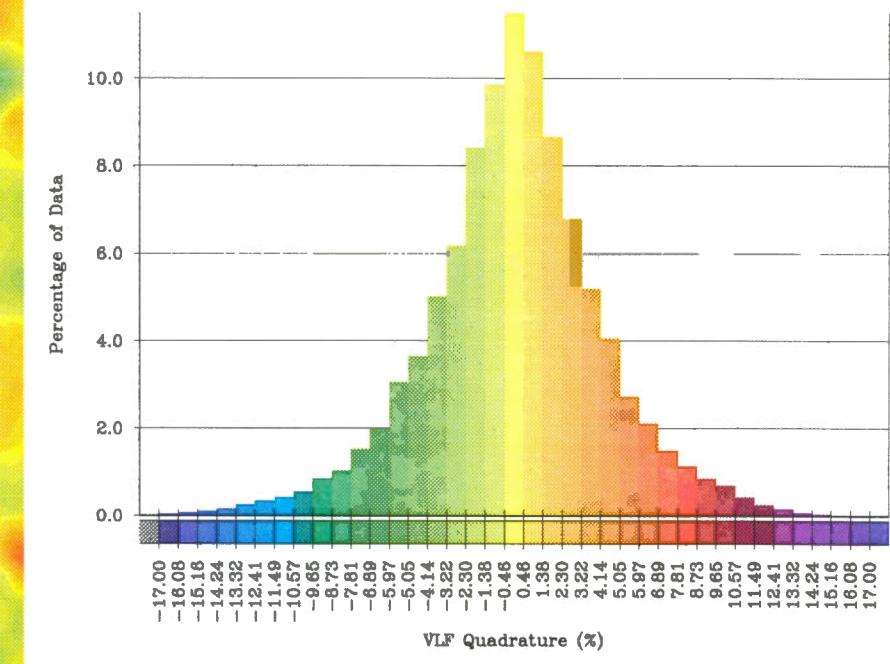
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Prosperous Lake - Hidden Lake Area, N.W.T.
1988
85 I/12, 85 J/9(E)
Parts of 85 I/11,5,6,13,14, 85 J/8
VLF QUADRATURE (%)



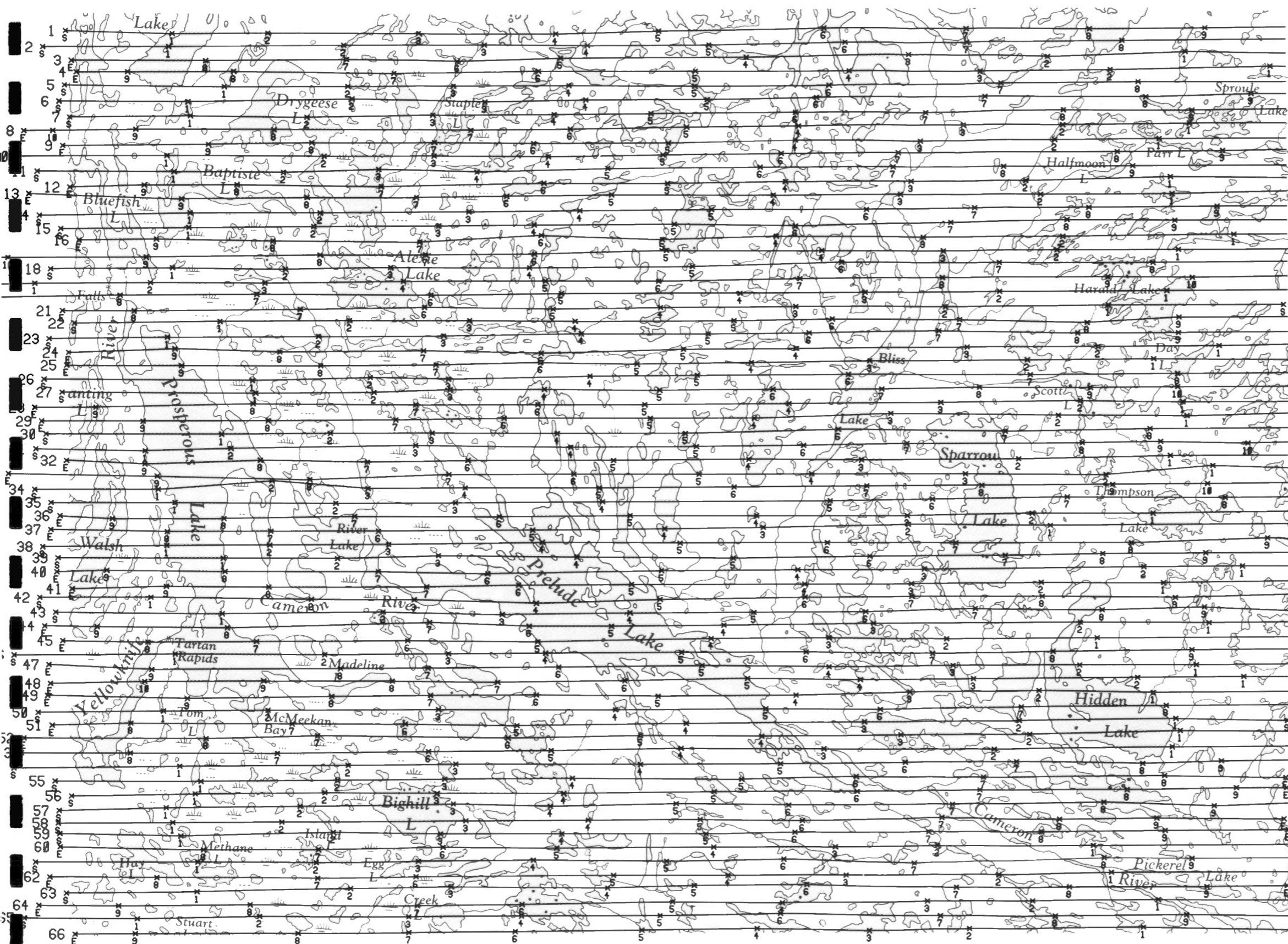
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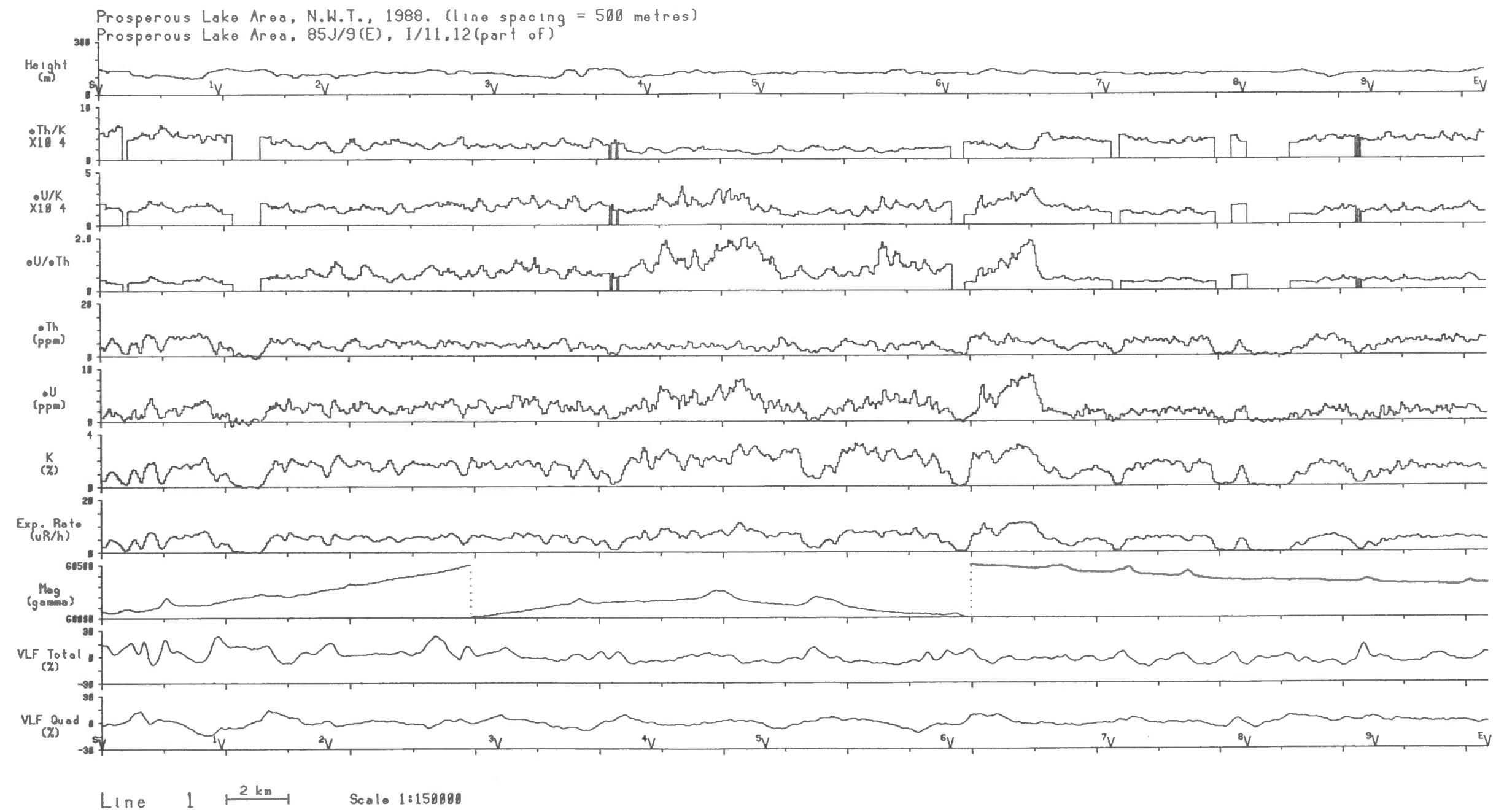


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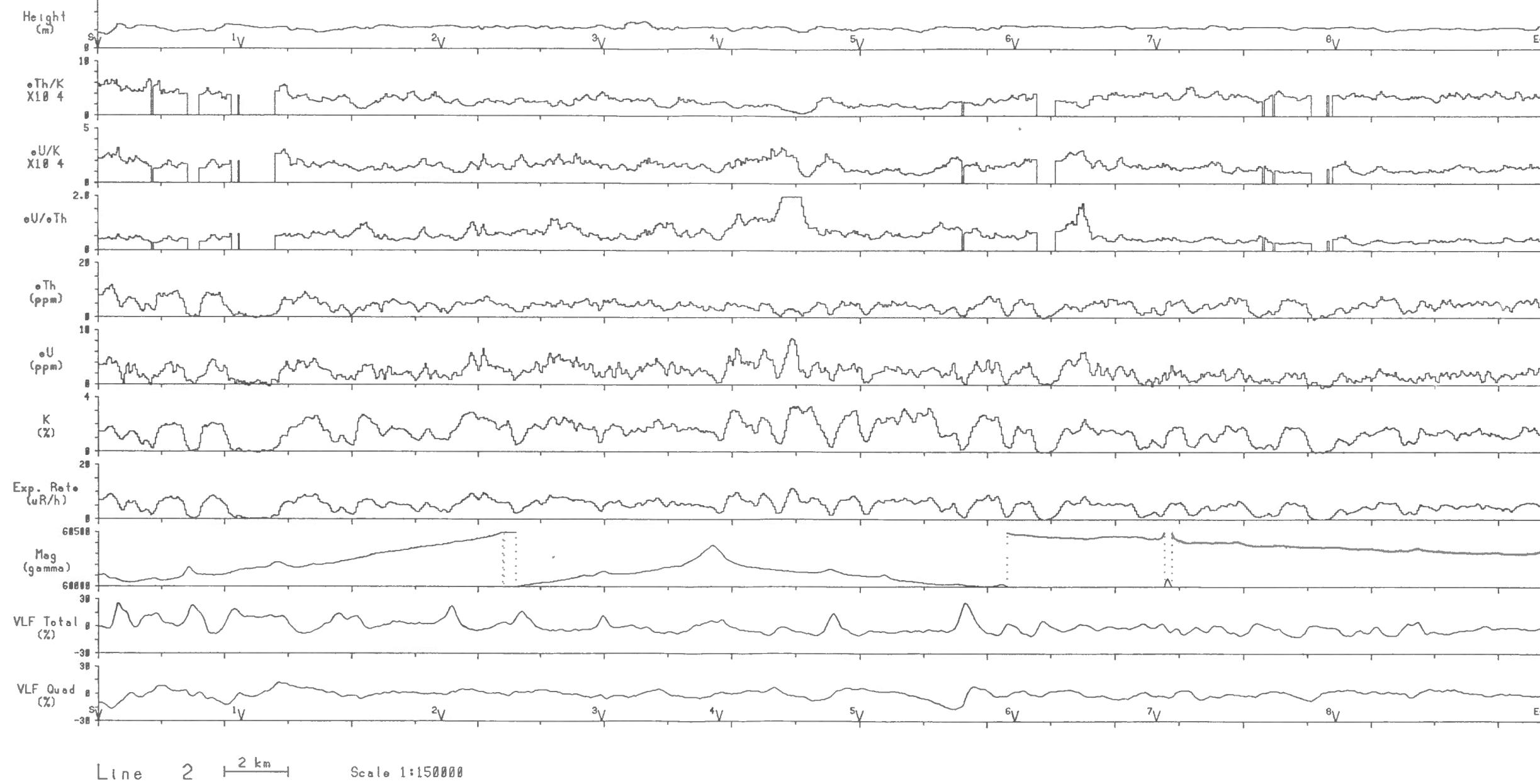
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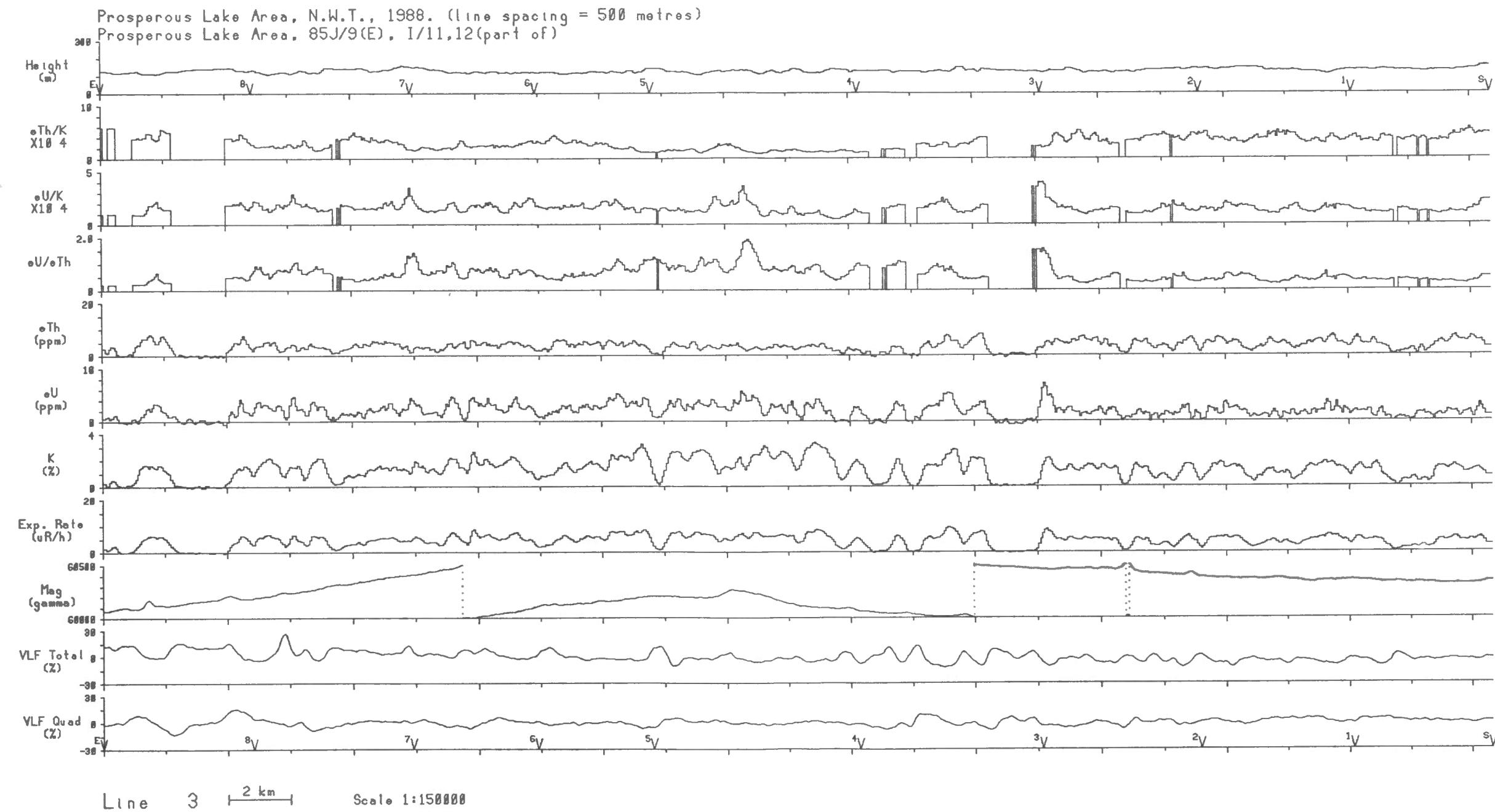


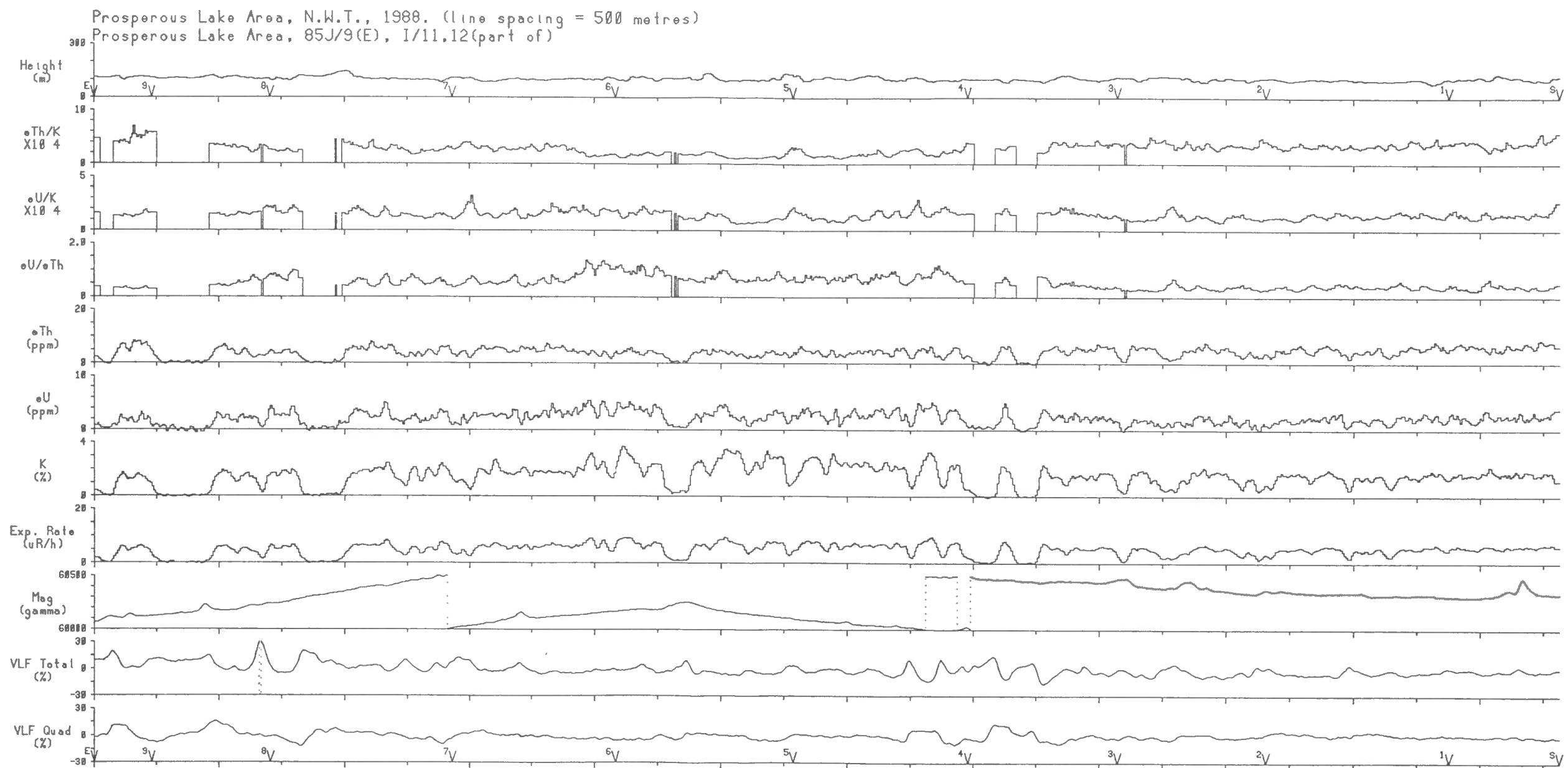
Prosperous Lake Area, N.W.T., 1988. (line spacing = 500 metres)
Prosperous Lake Area, 85J/9(E), I/11.12(part of)



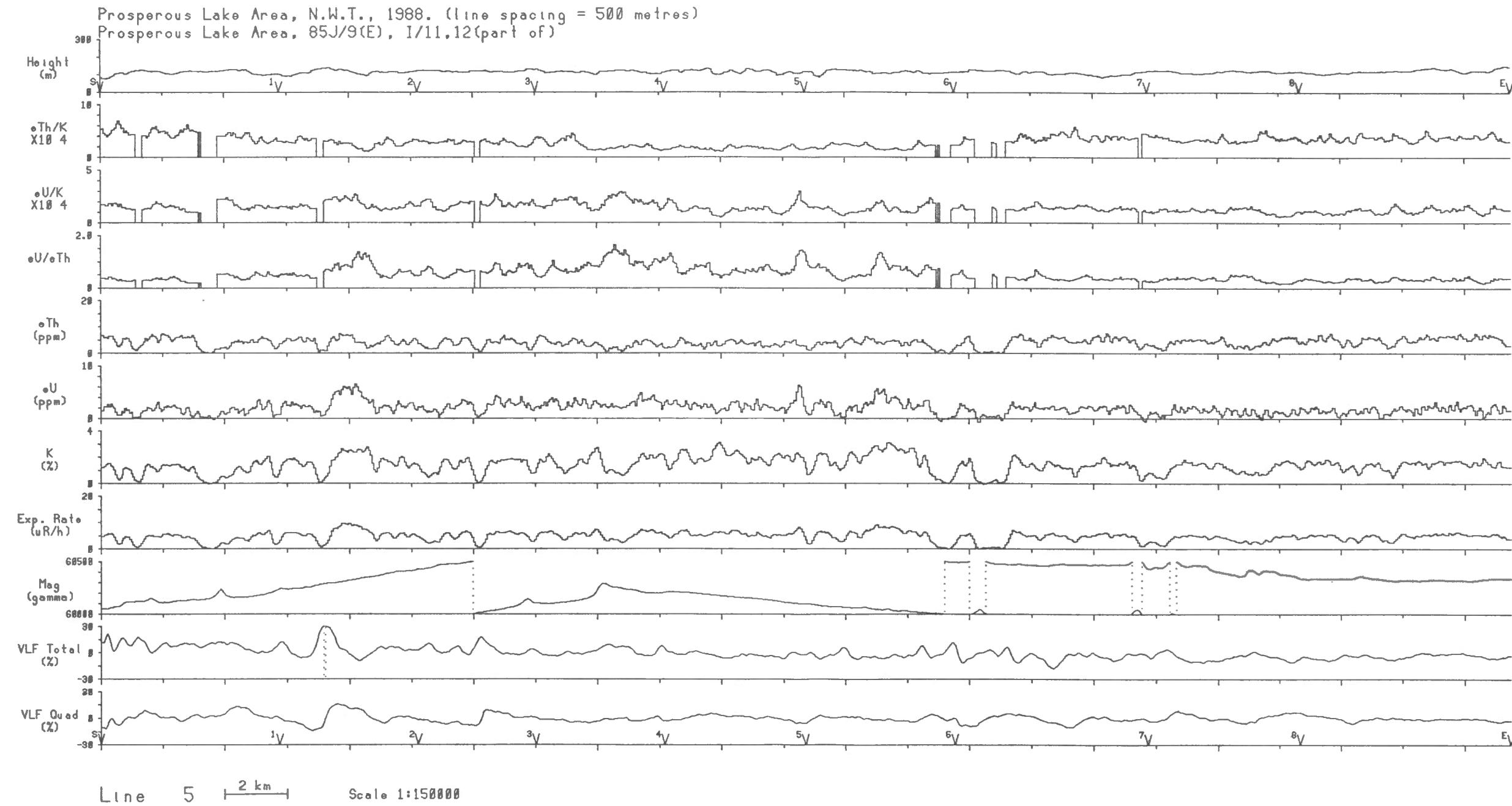
Line 2 2 km

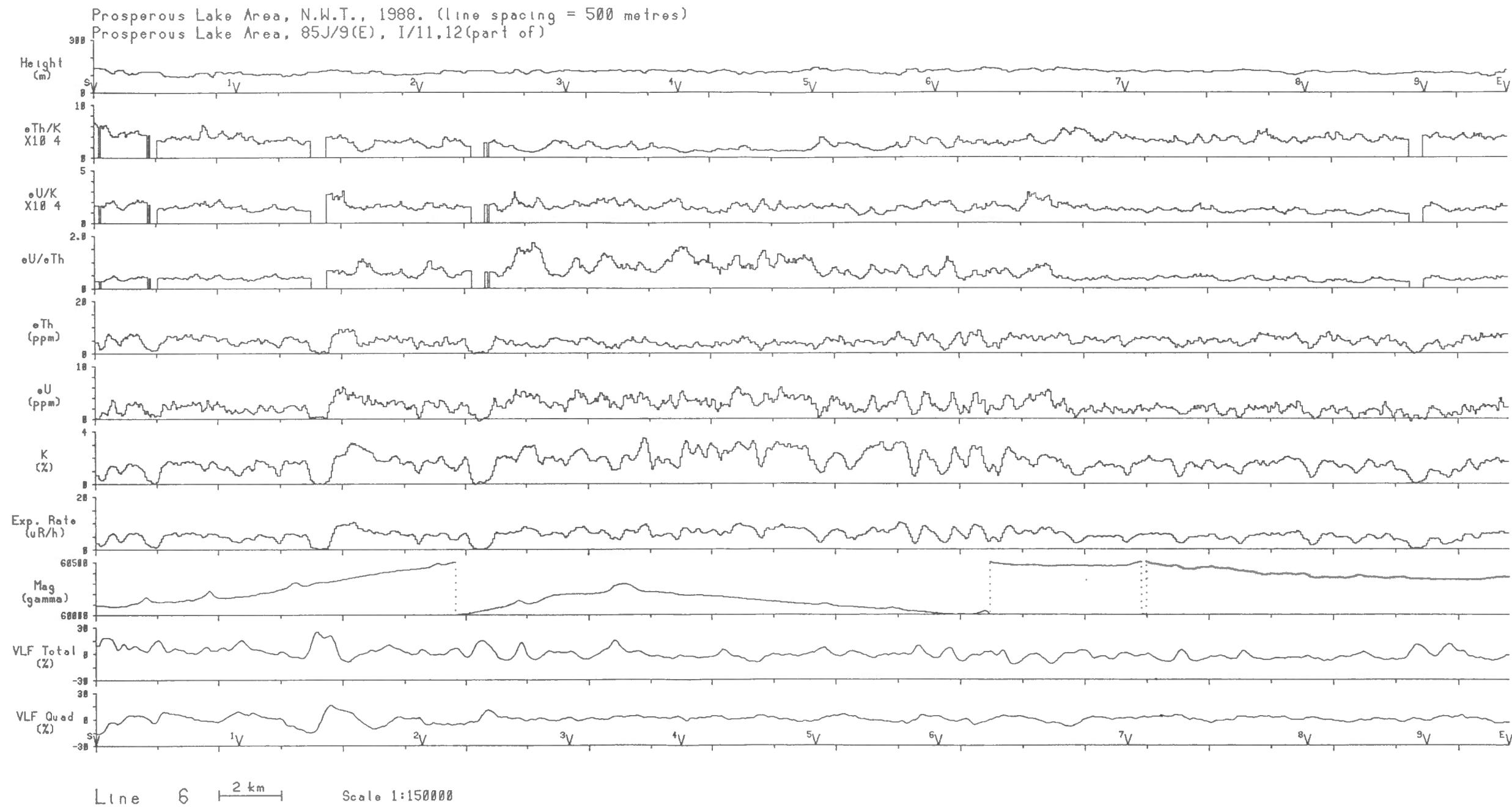
Scale 1:150000

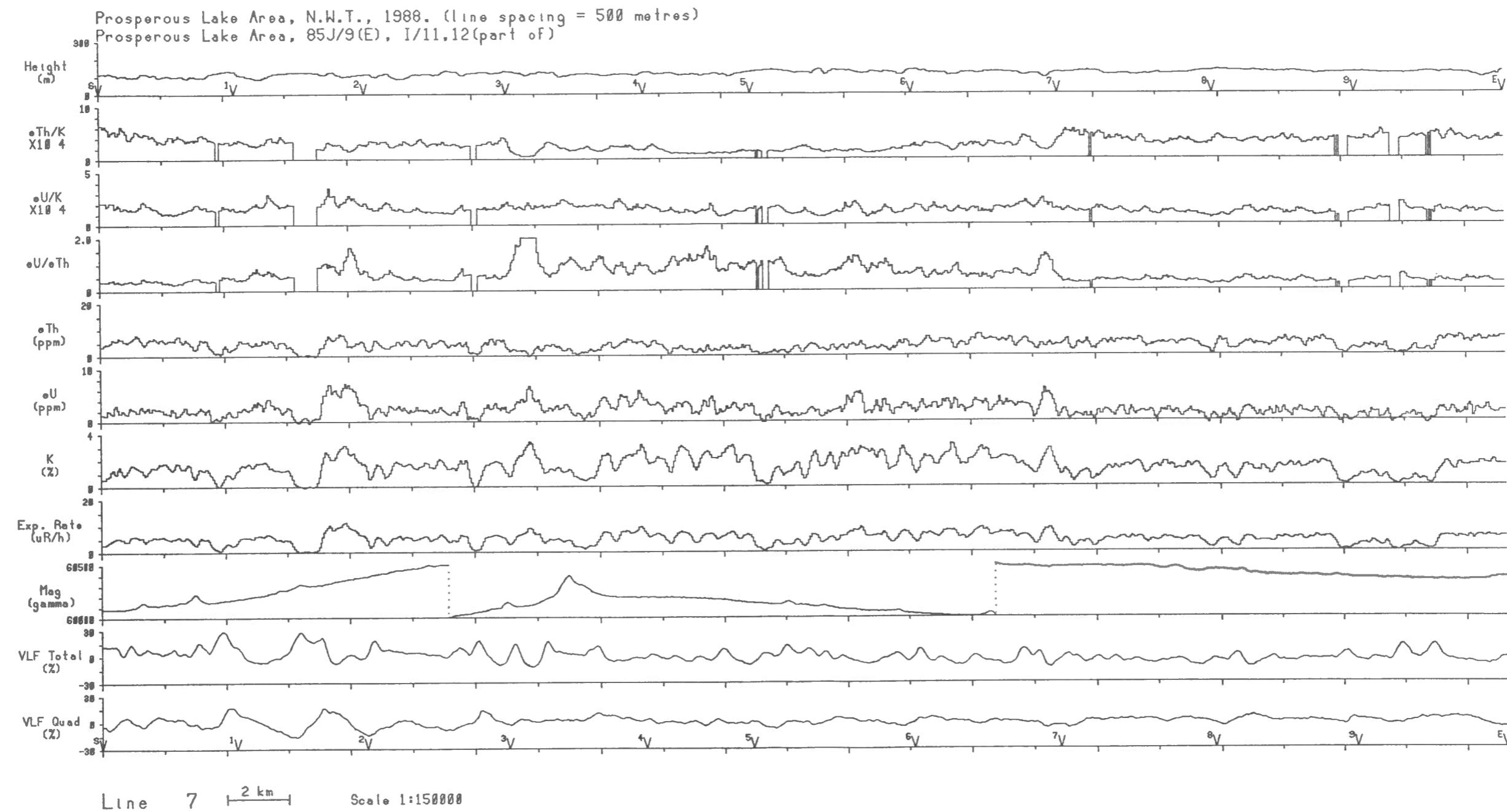


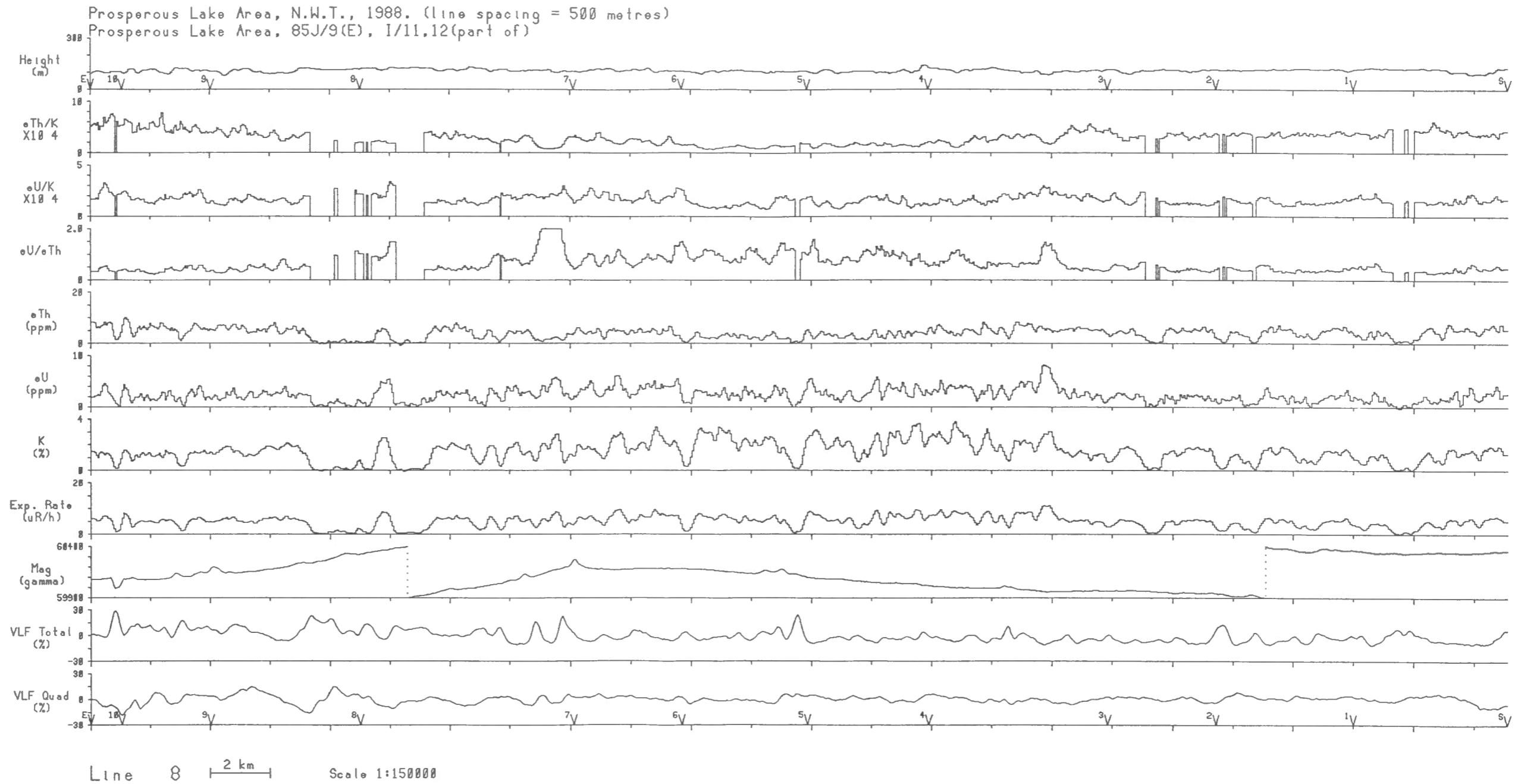


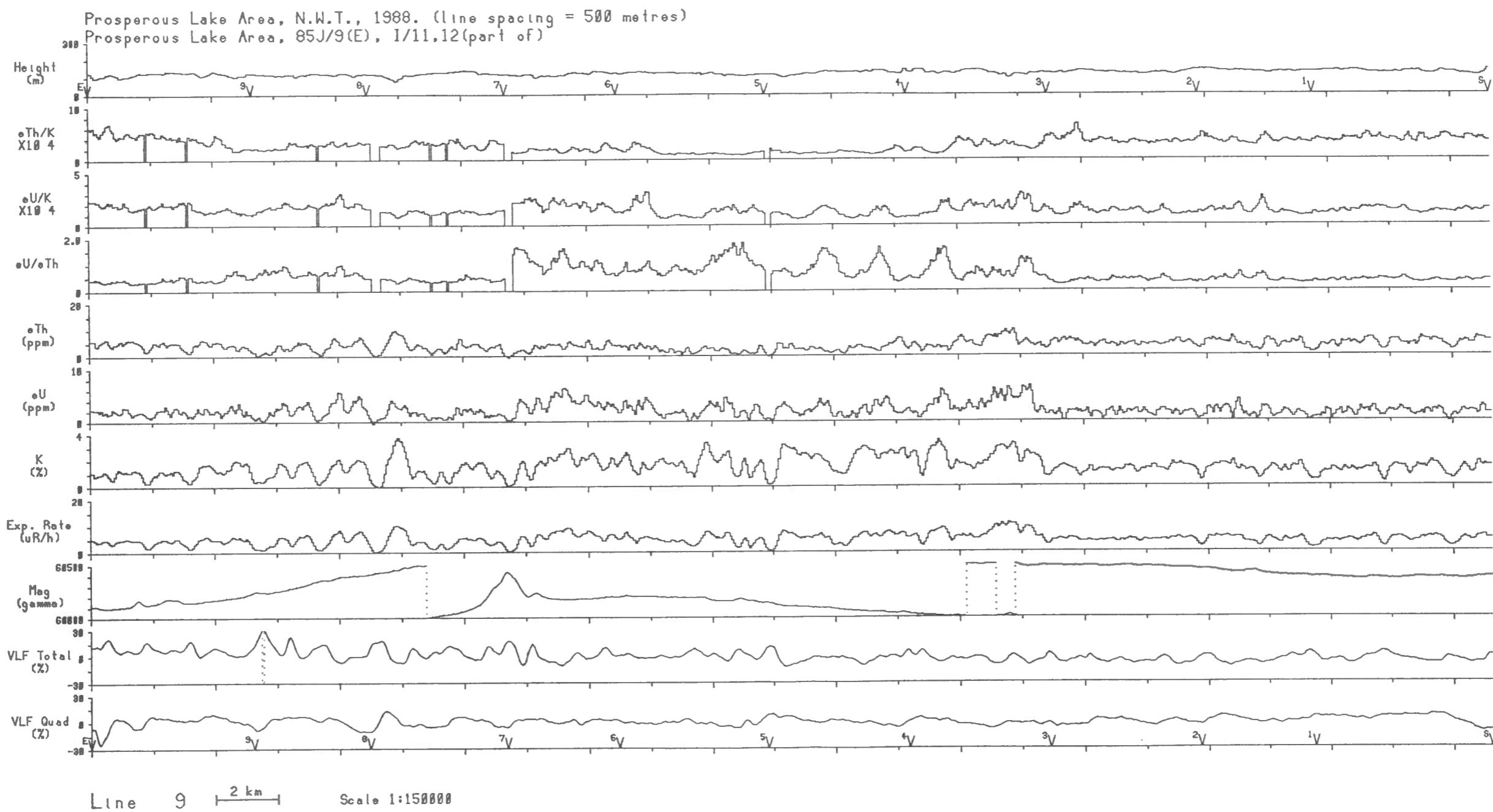
Line 4 2 km Scale 1:150000

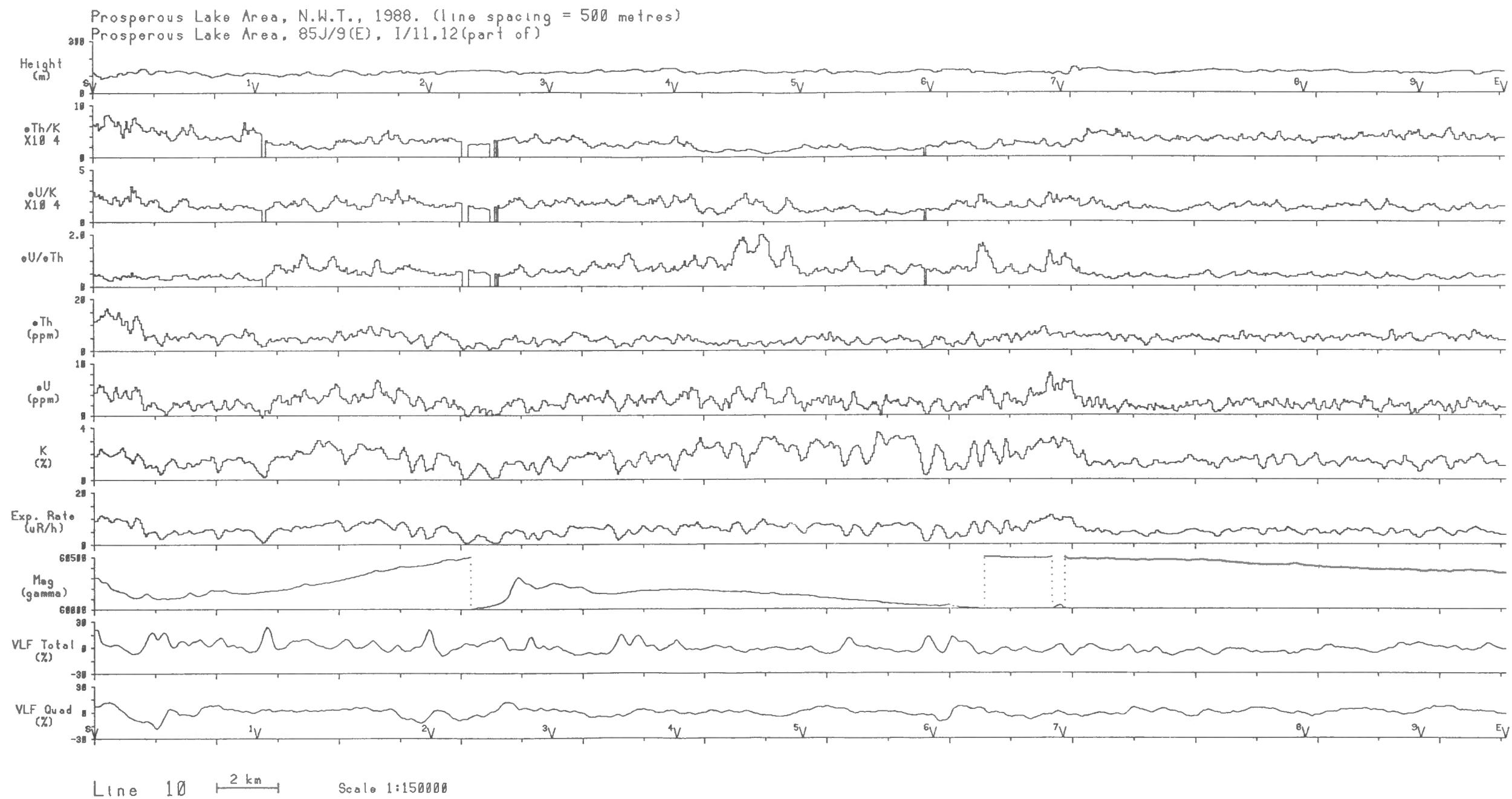


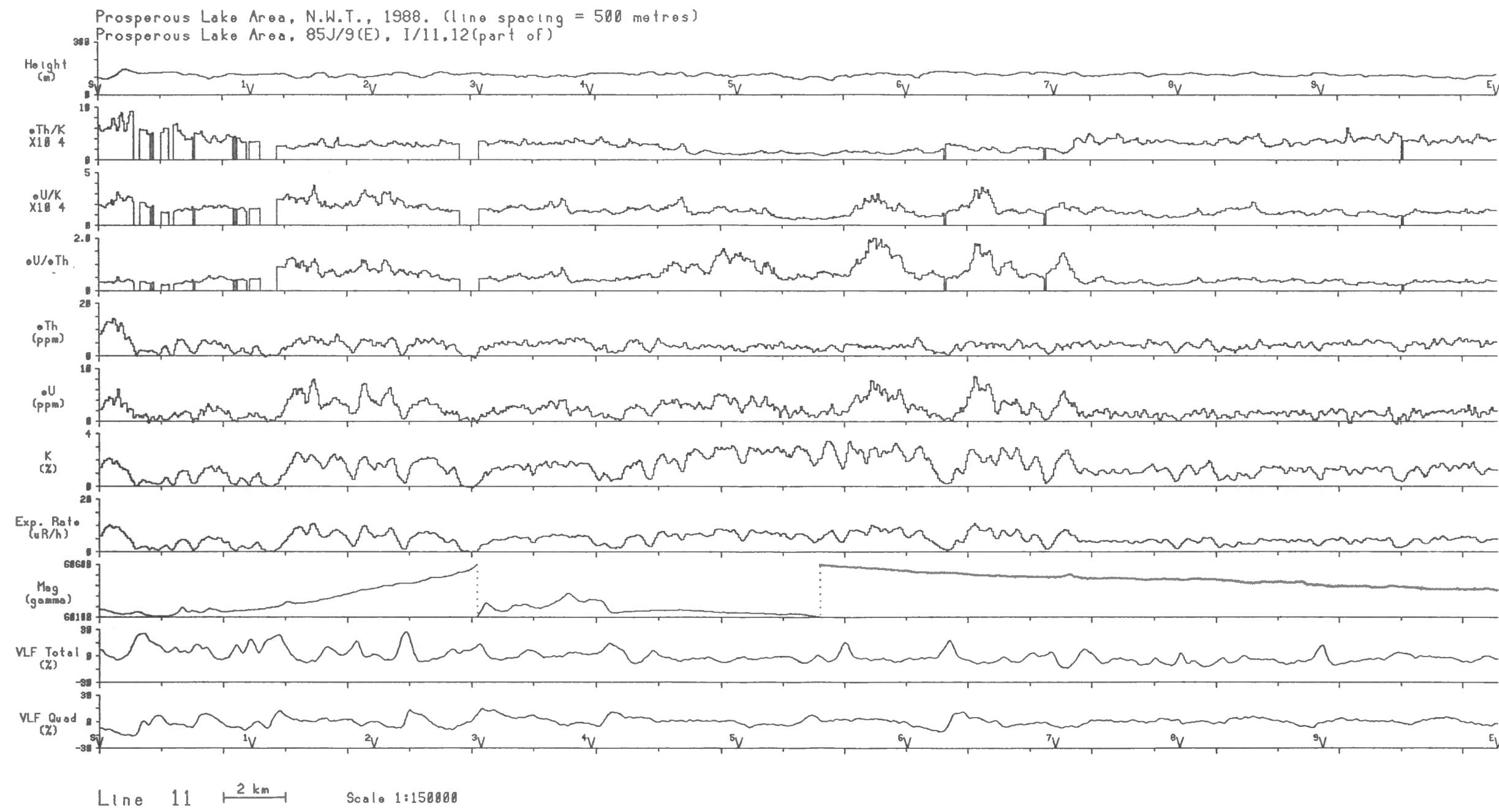




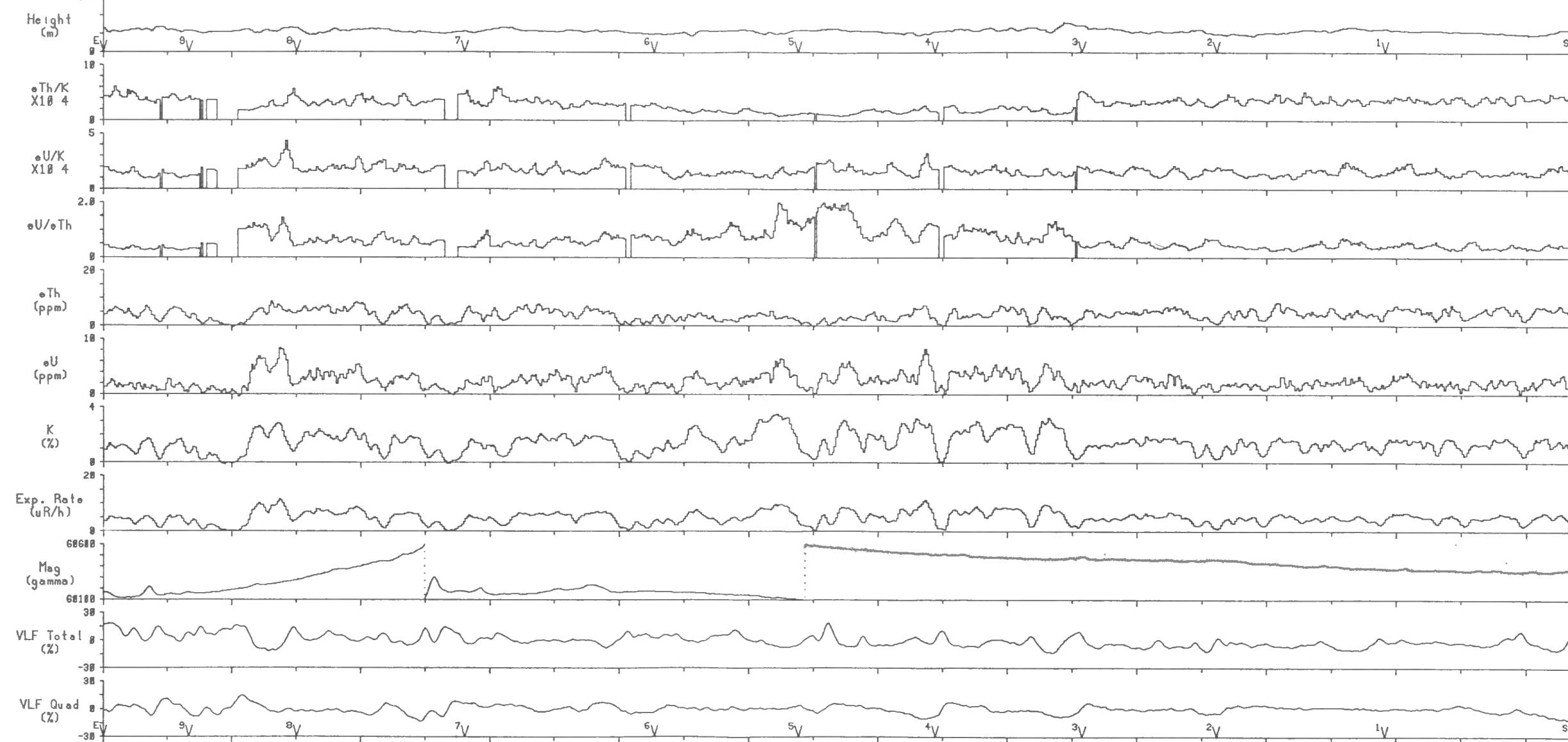






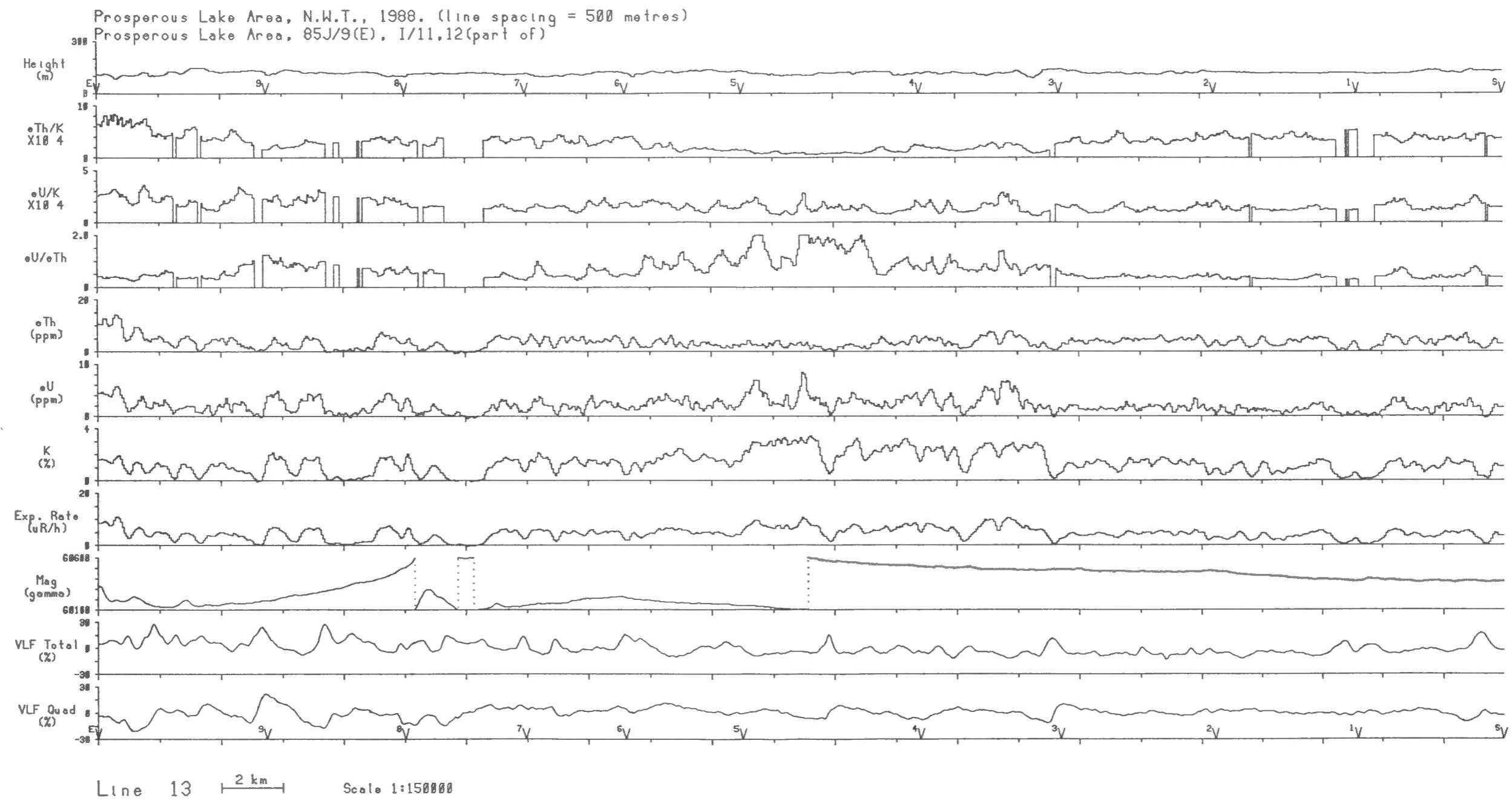


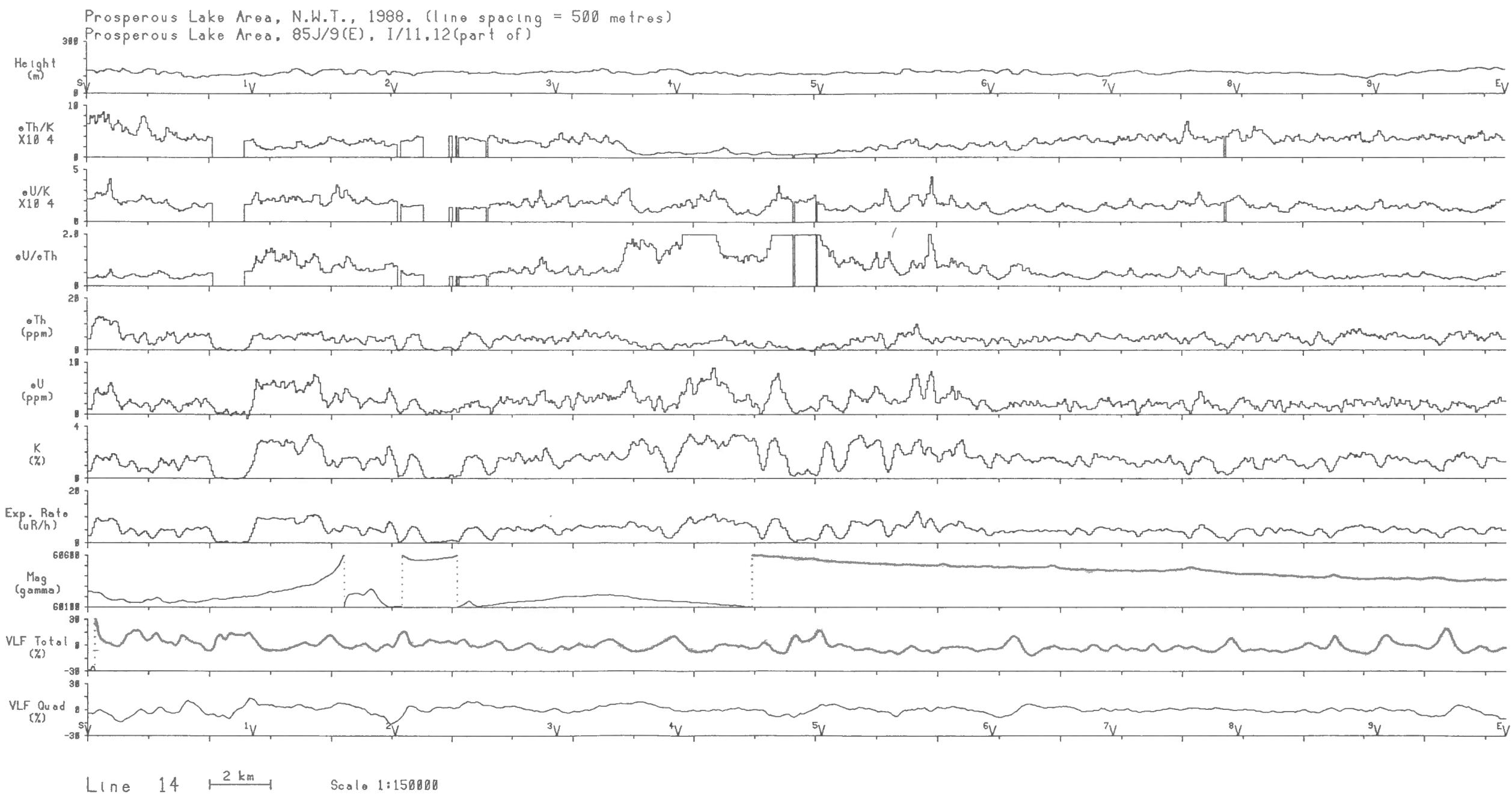
Prosperous Lake Area, N.W.T., 1988. (line spacing = 500 metres)
Prosperous Lake Area, 85J/9(E), I/11,12(part of)



Line 12 2 km

Scale 1:150000

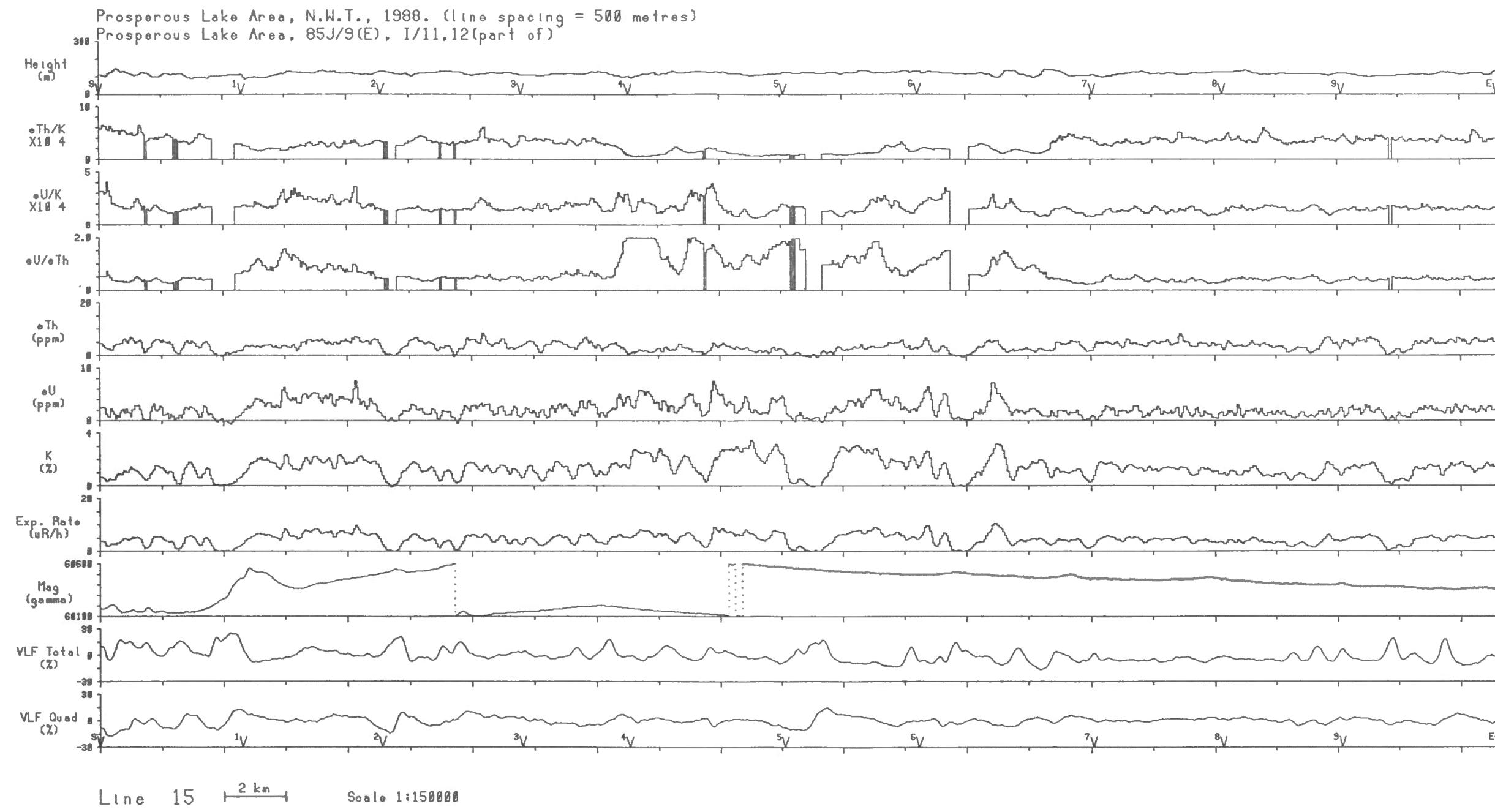




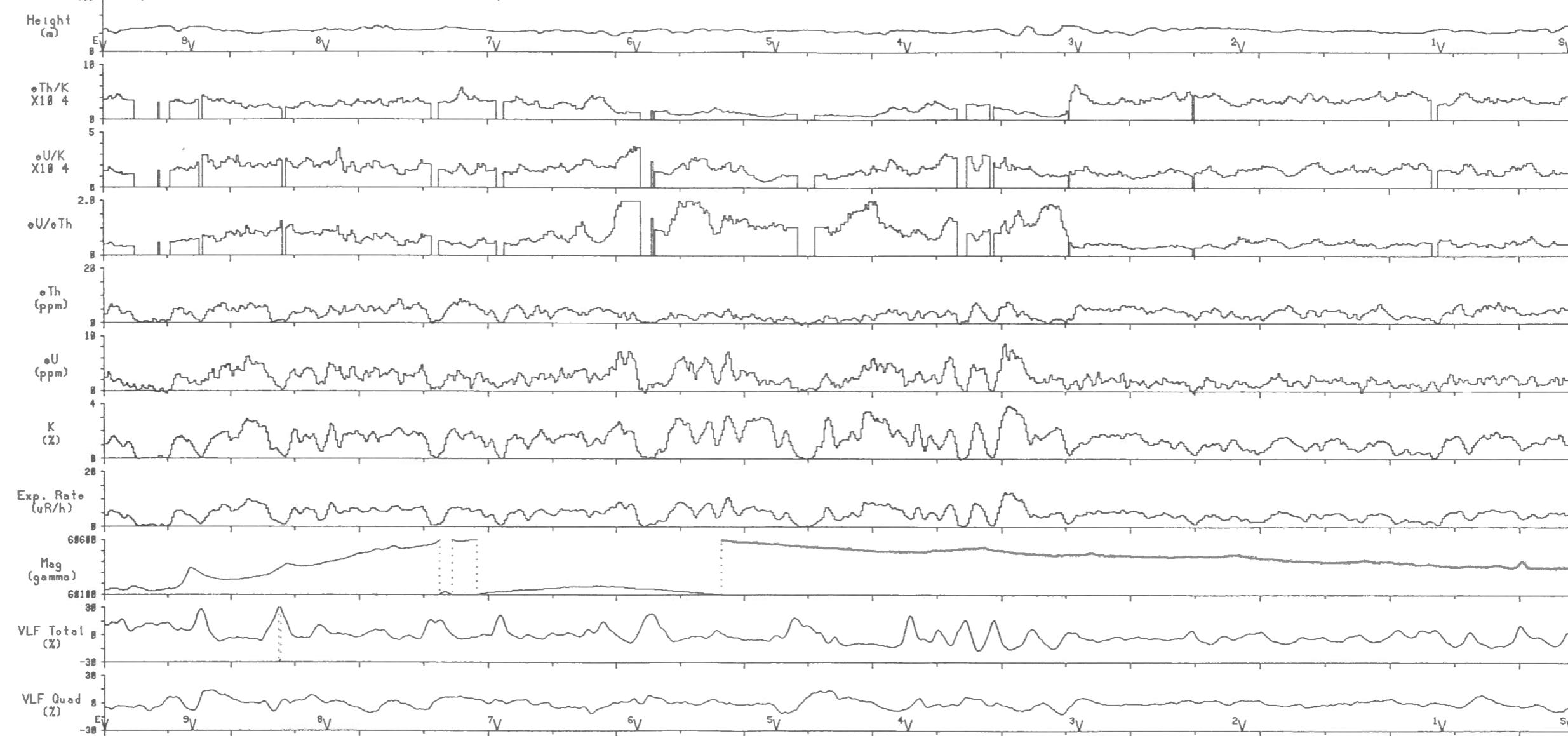
Line 14

2 km

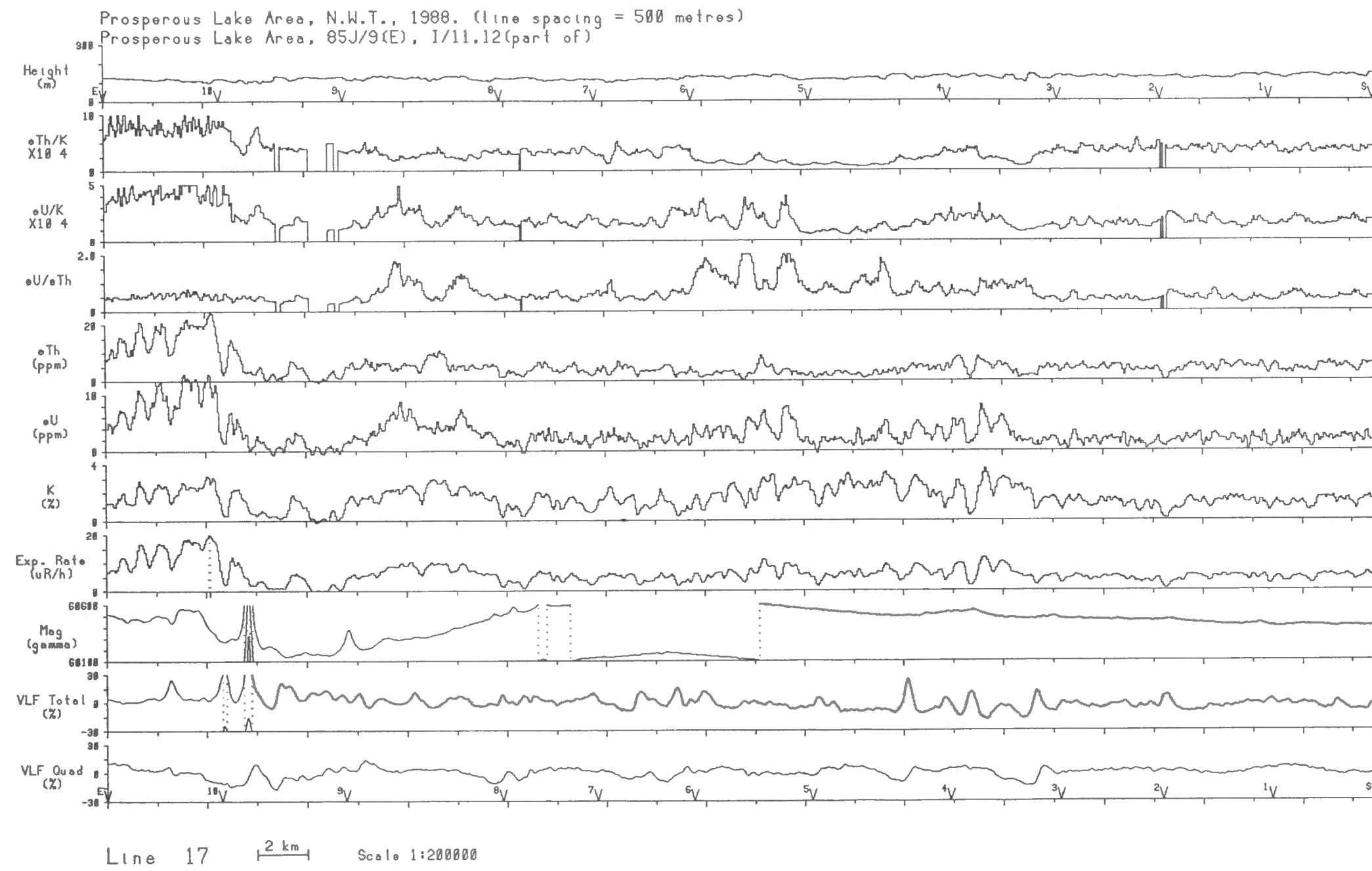
Scale 1:150000

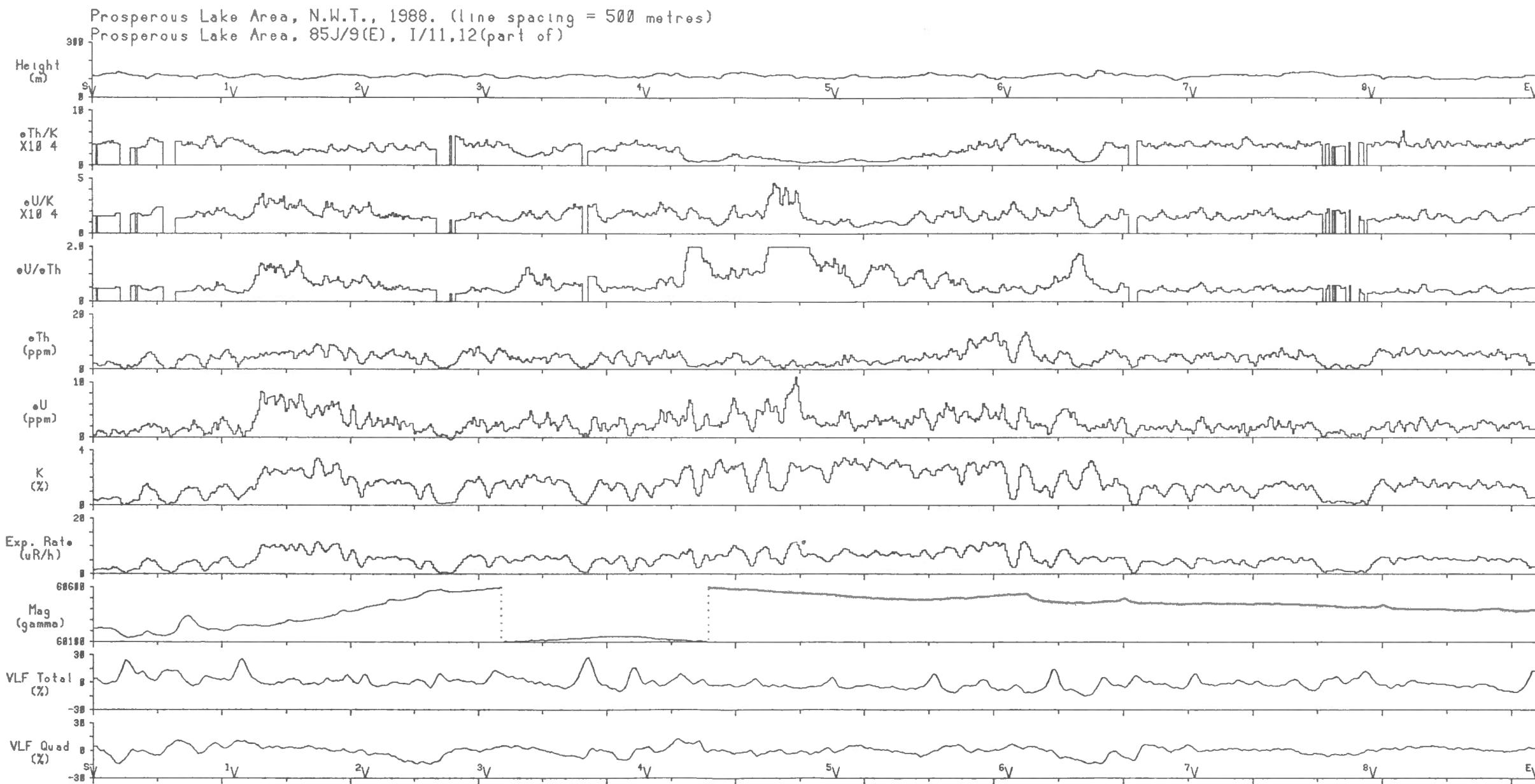


Prosperous Lake Area, N.W.T., 1988. (line spacing = 500 metres)
Prosperous Lake Area, 85J/9(E), I/11,12(part of)



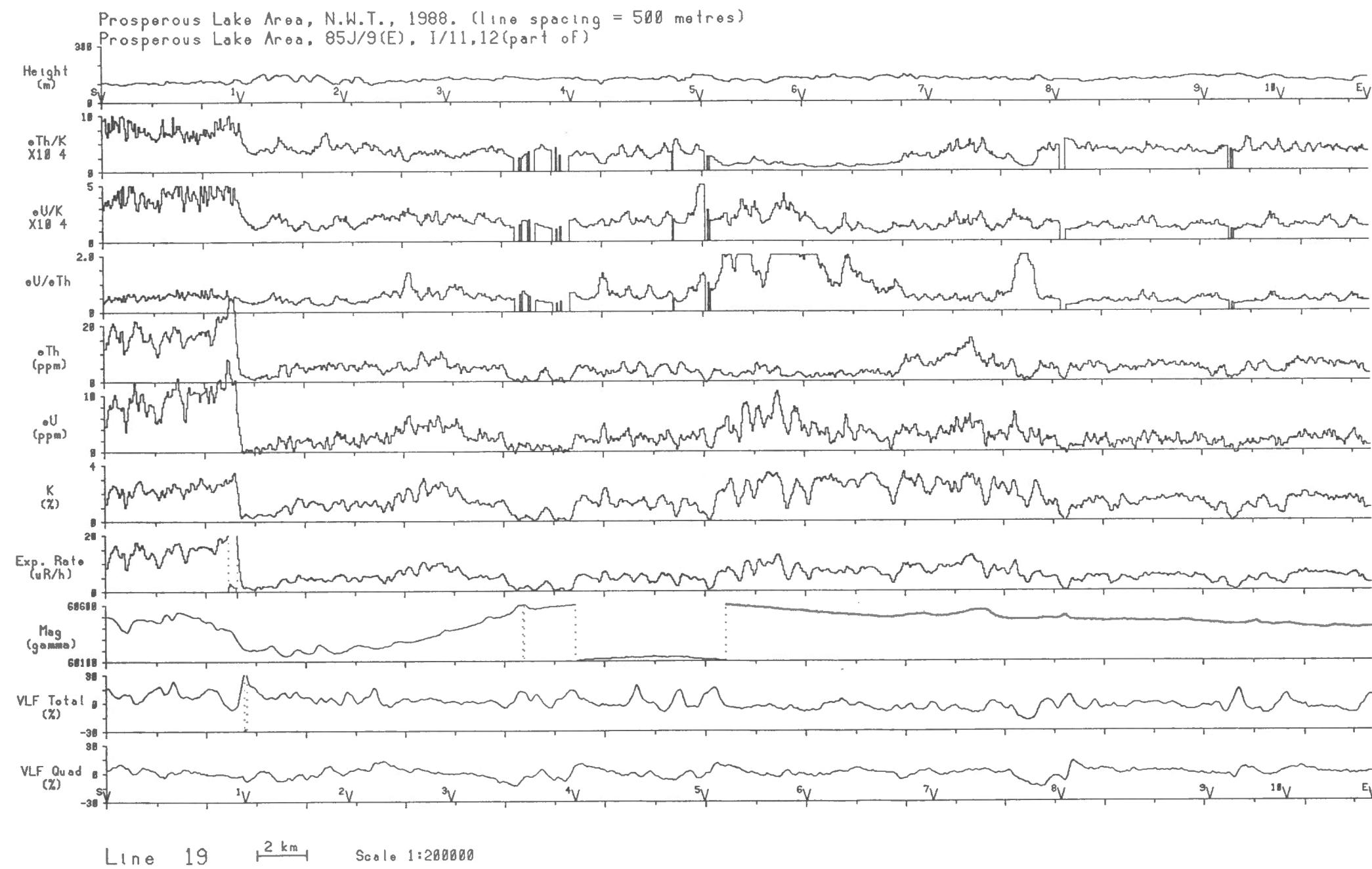
Line 16 2 km Scale 1:150000



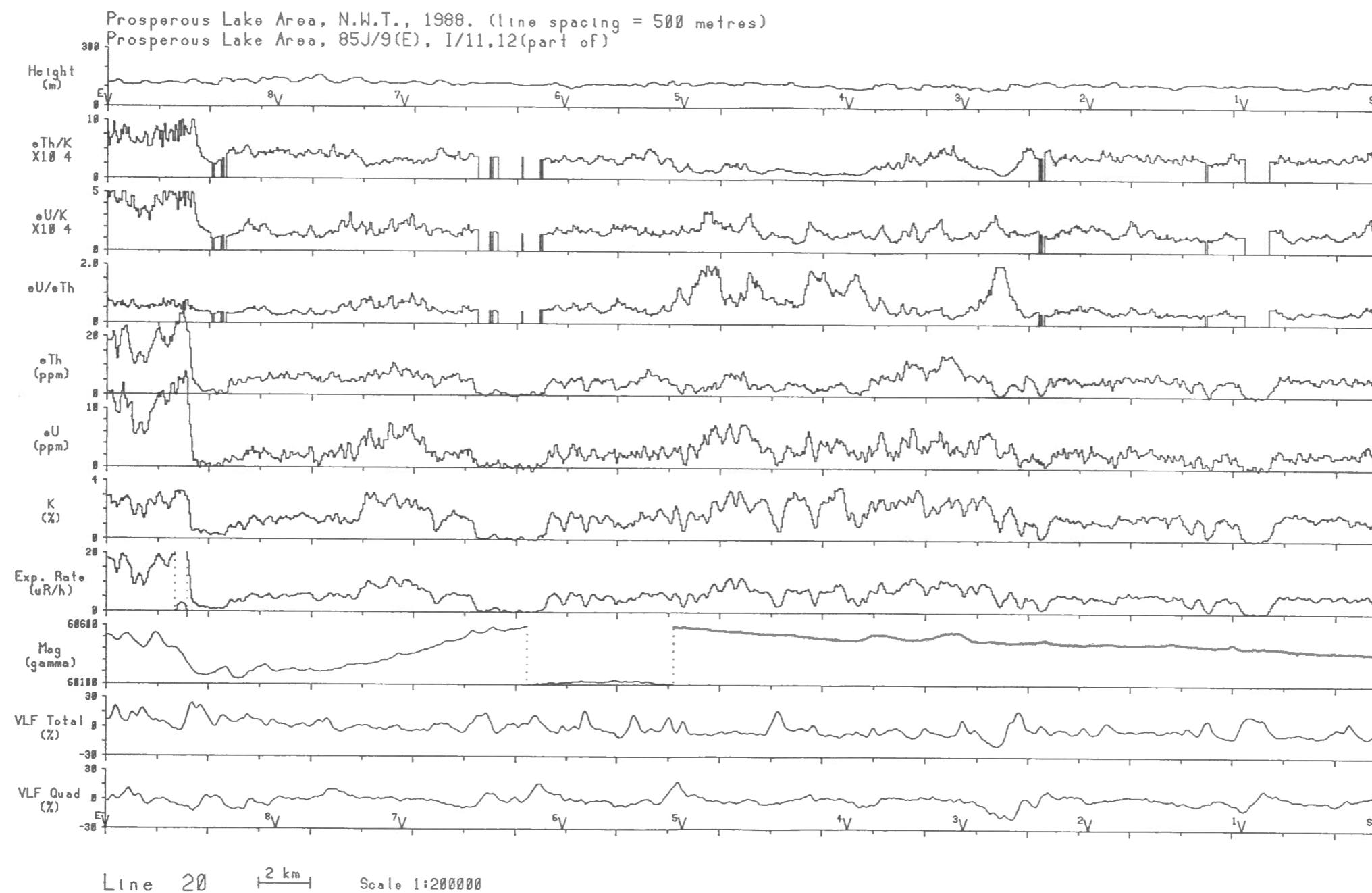


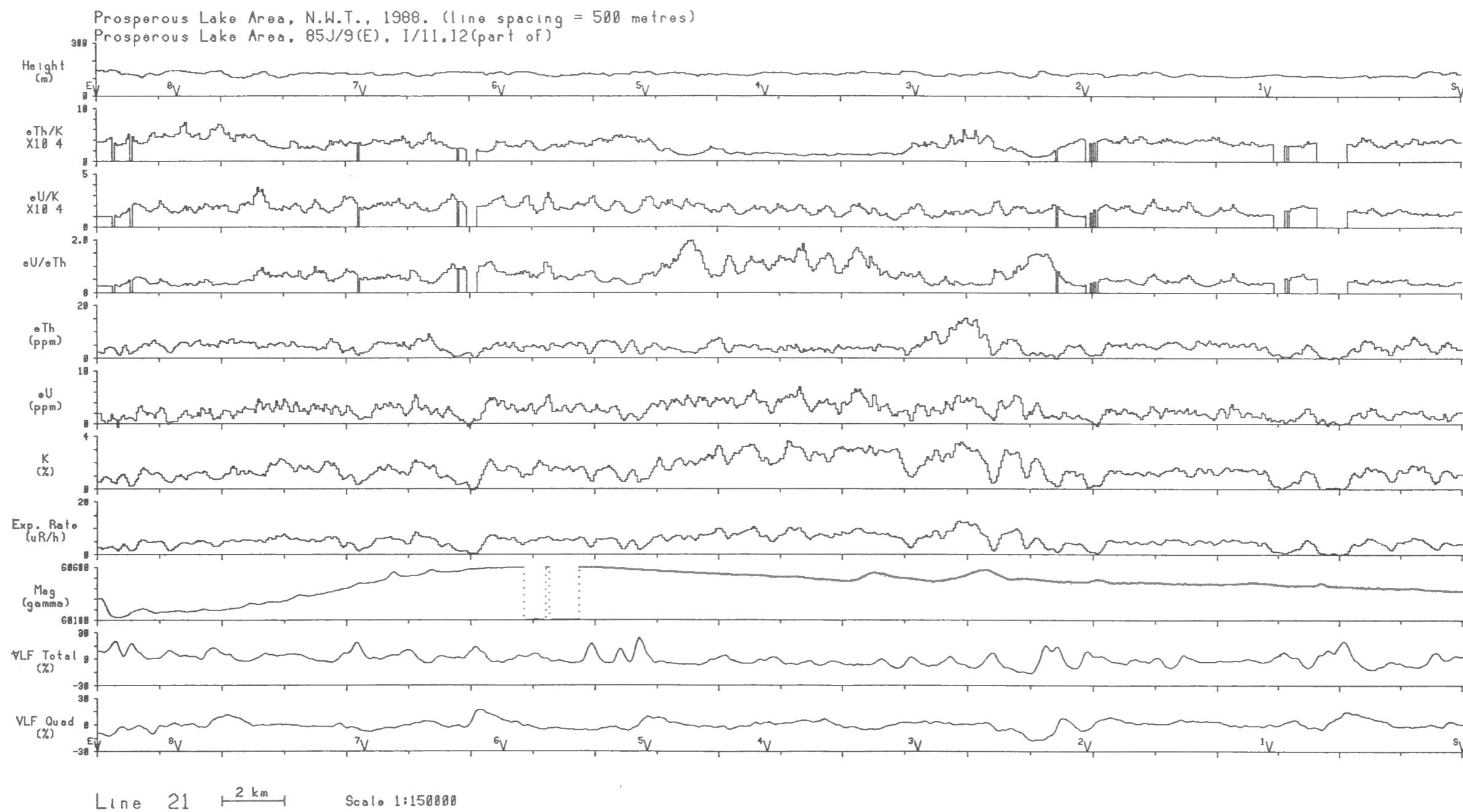
Line 18 2 km

Scale 1:150000

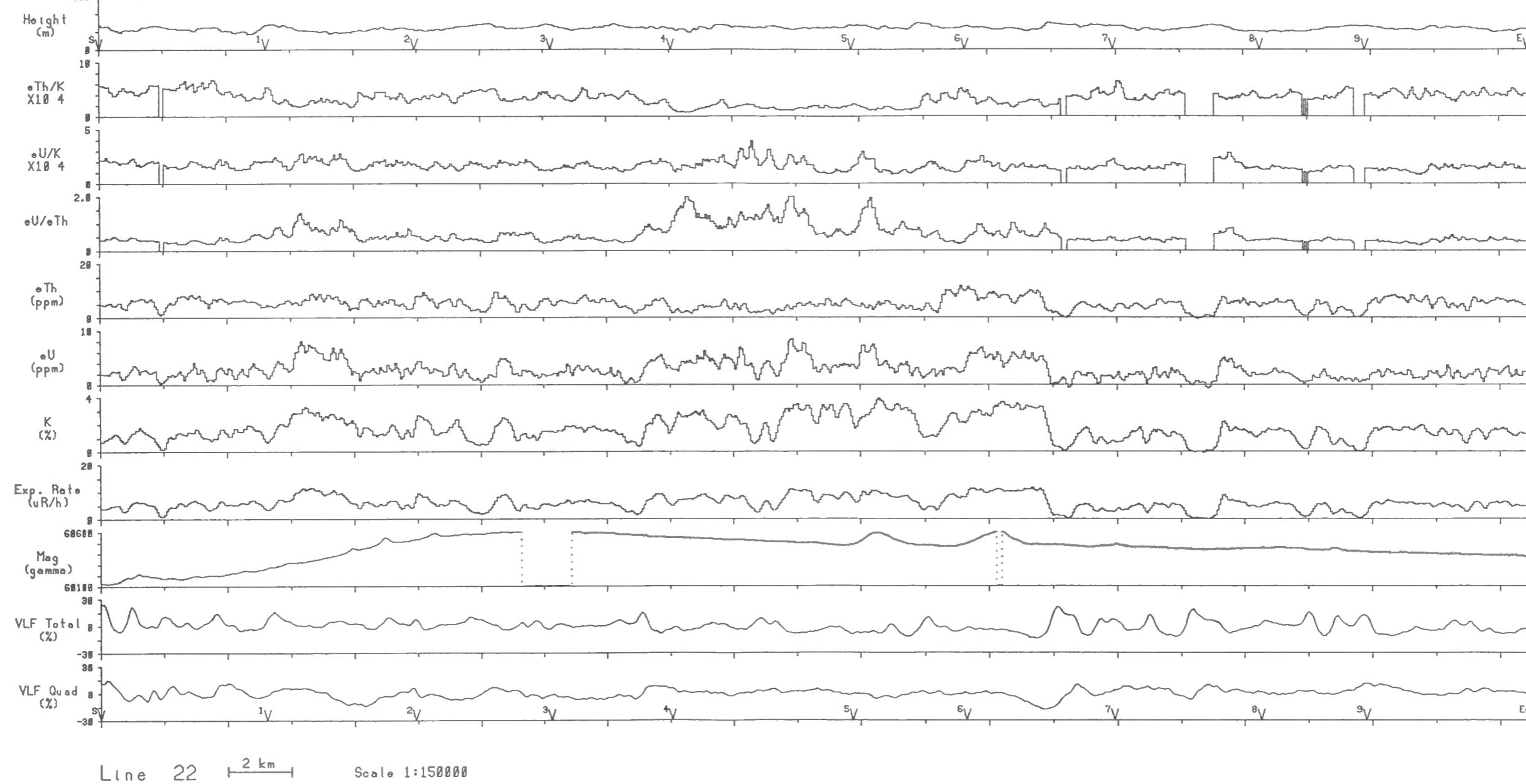


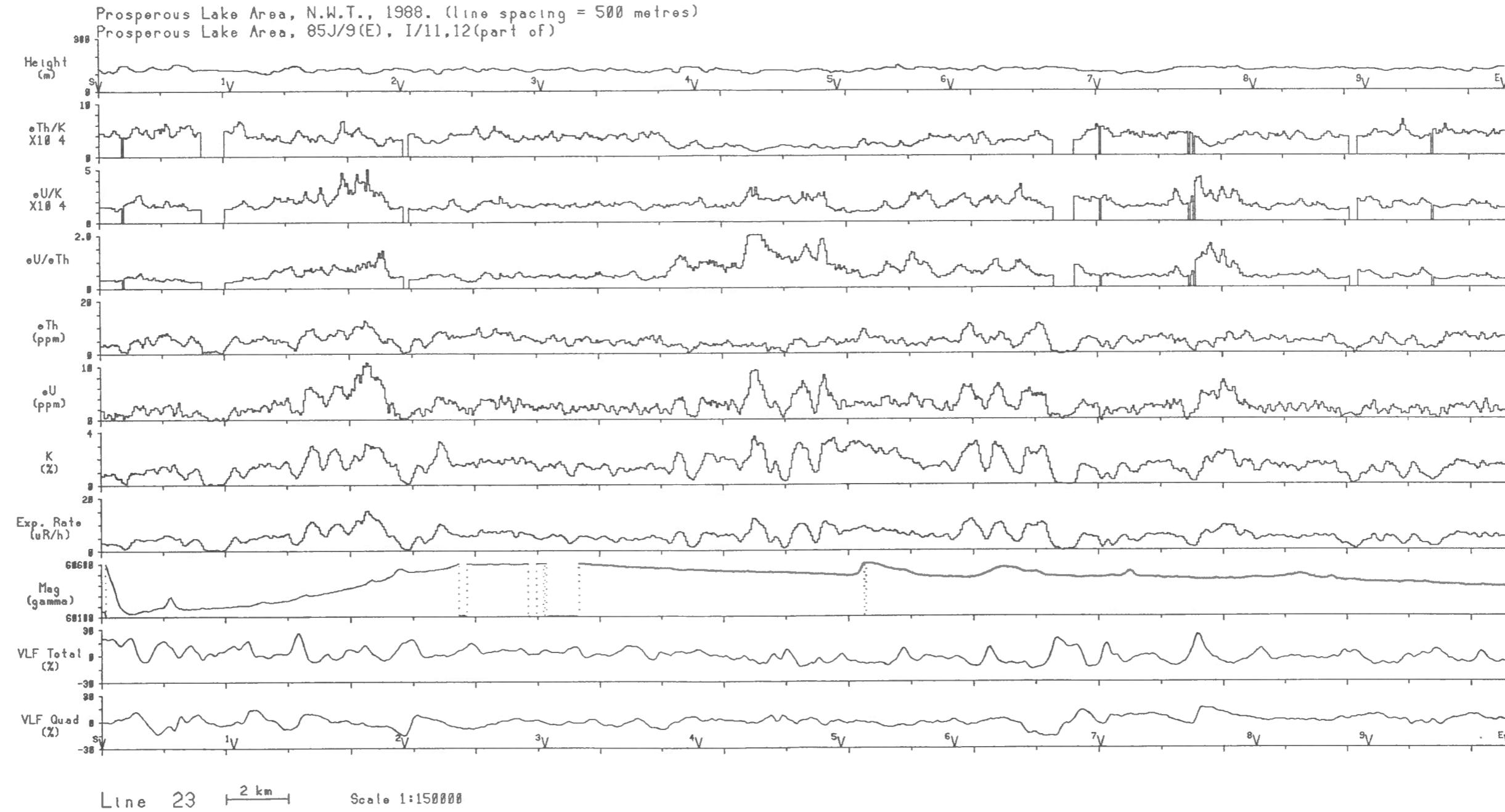
Line 19 2 km Scale 1:200000

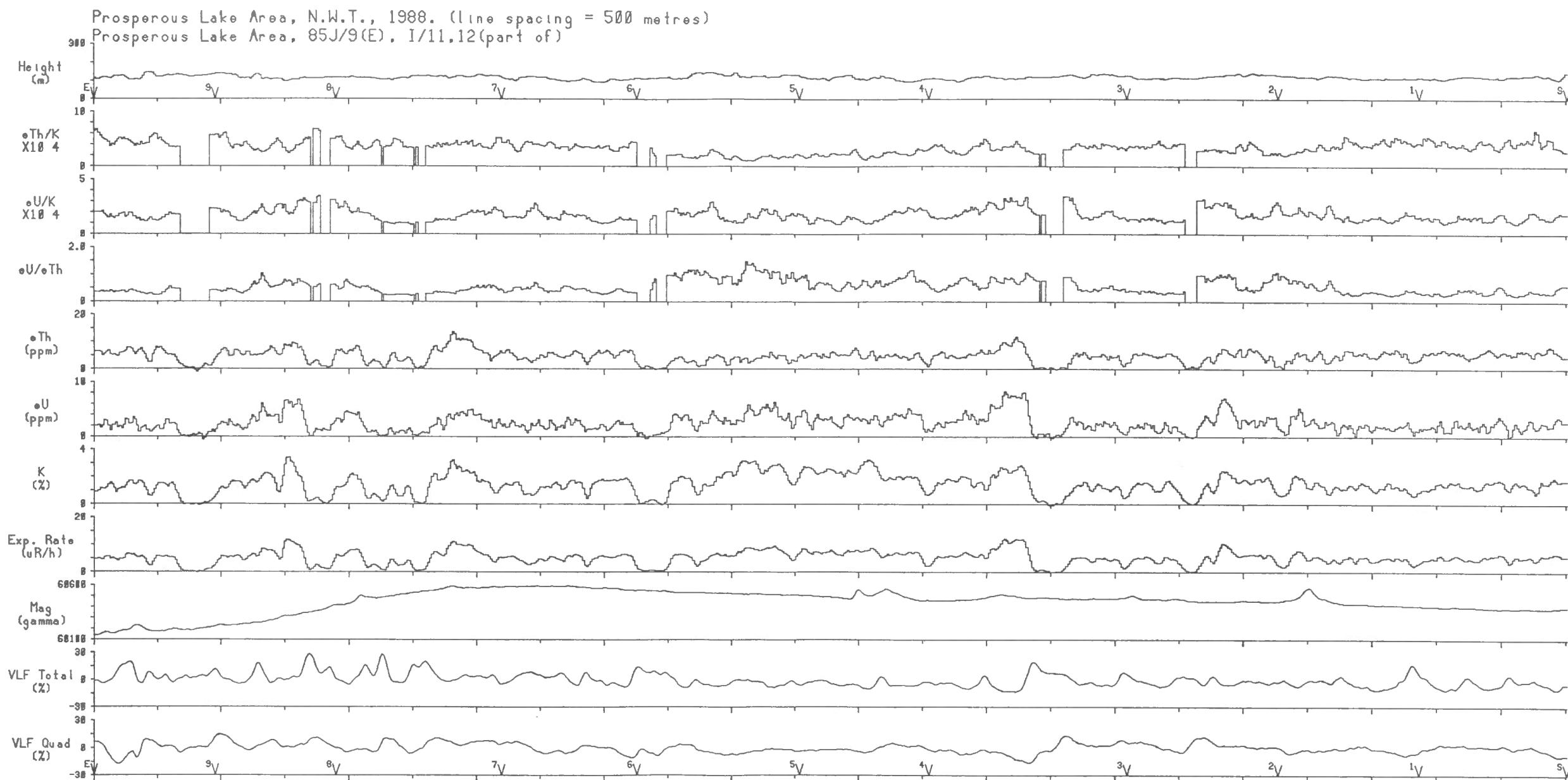




Prosperous Lake Area, N.W.T., 1988. (line spacing = 500 metres)
Prosperous Lake Area, 85J/9(E), I/11,12(part of)



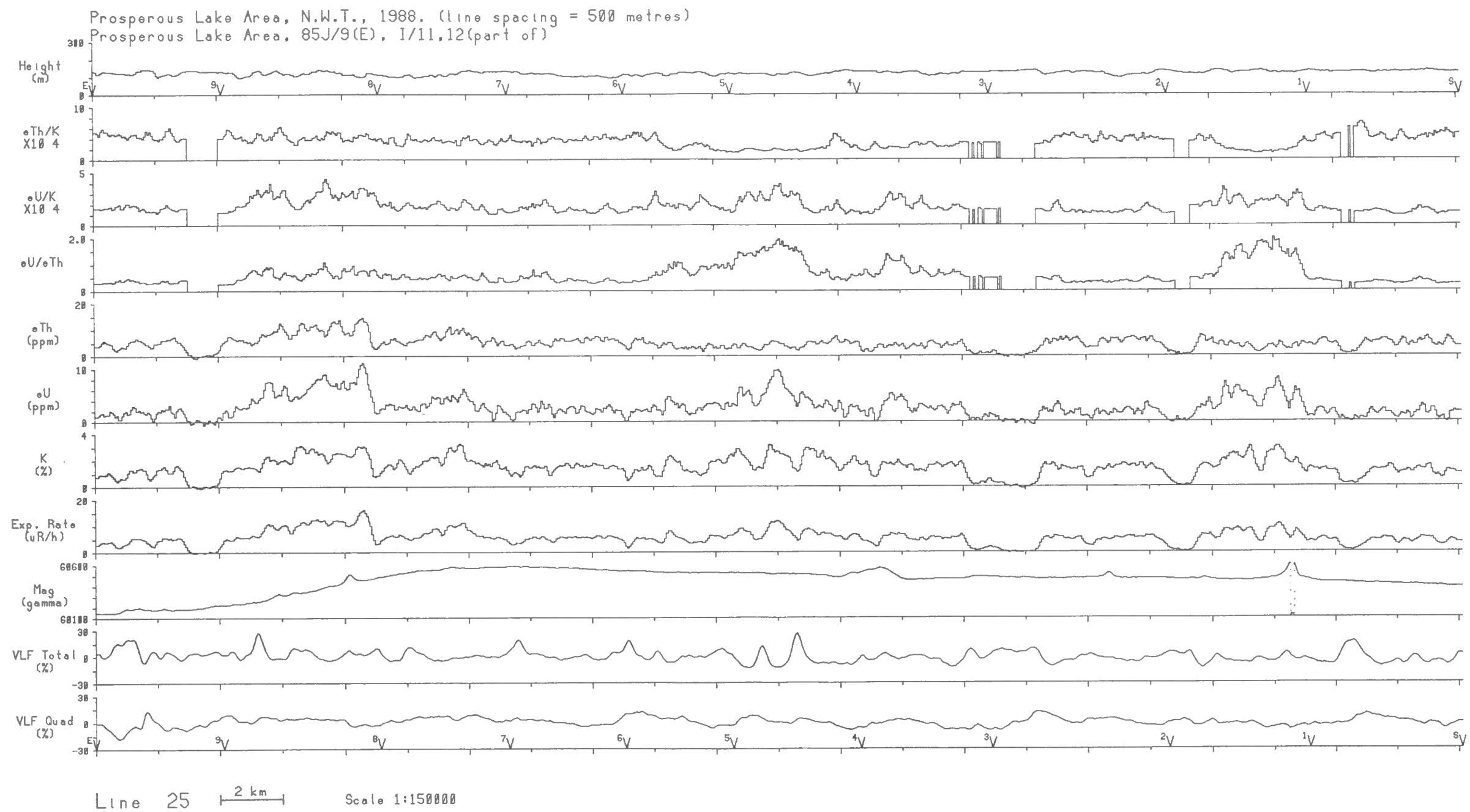


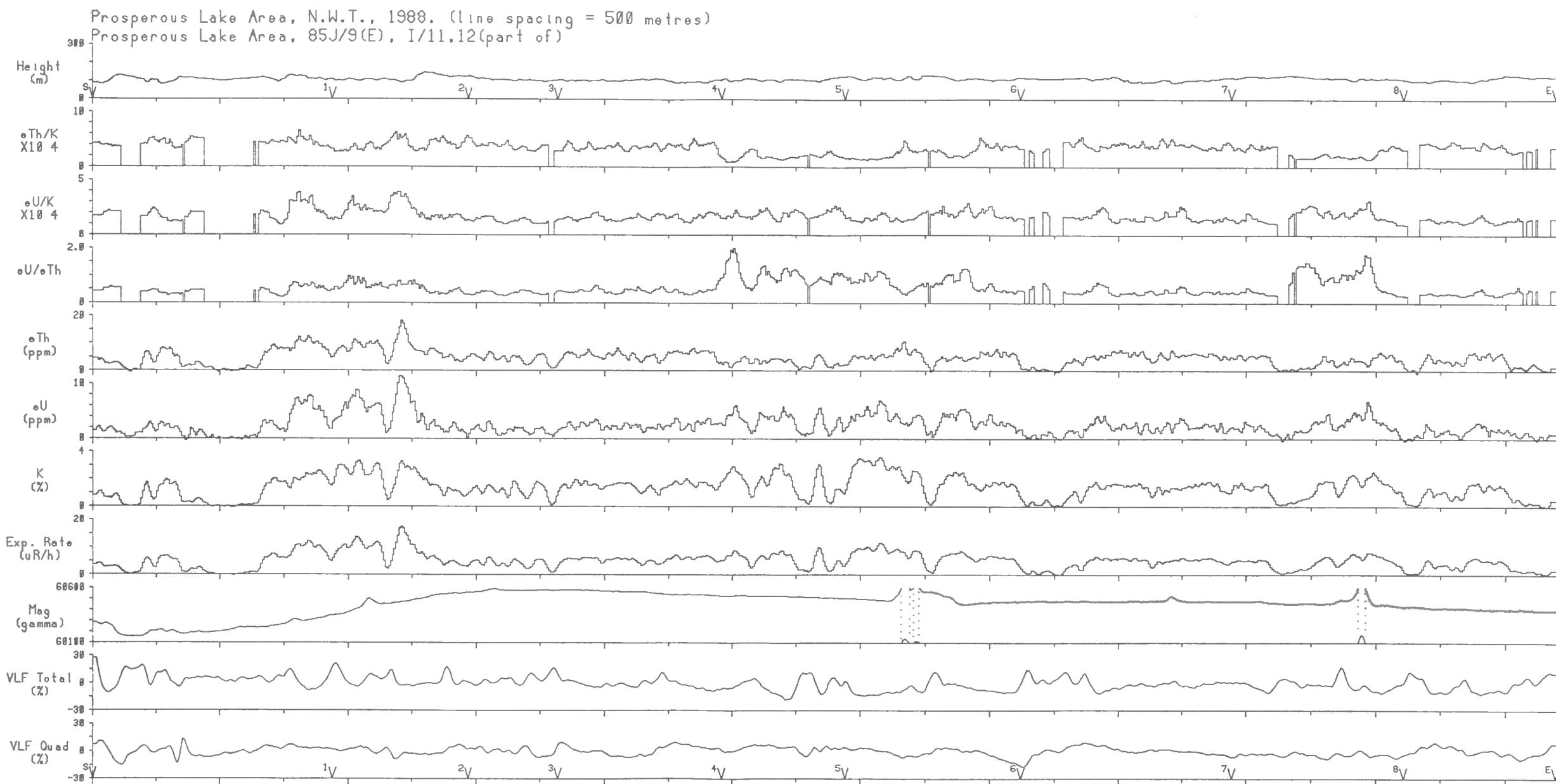


Line 24

2 km

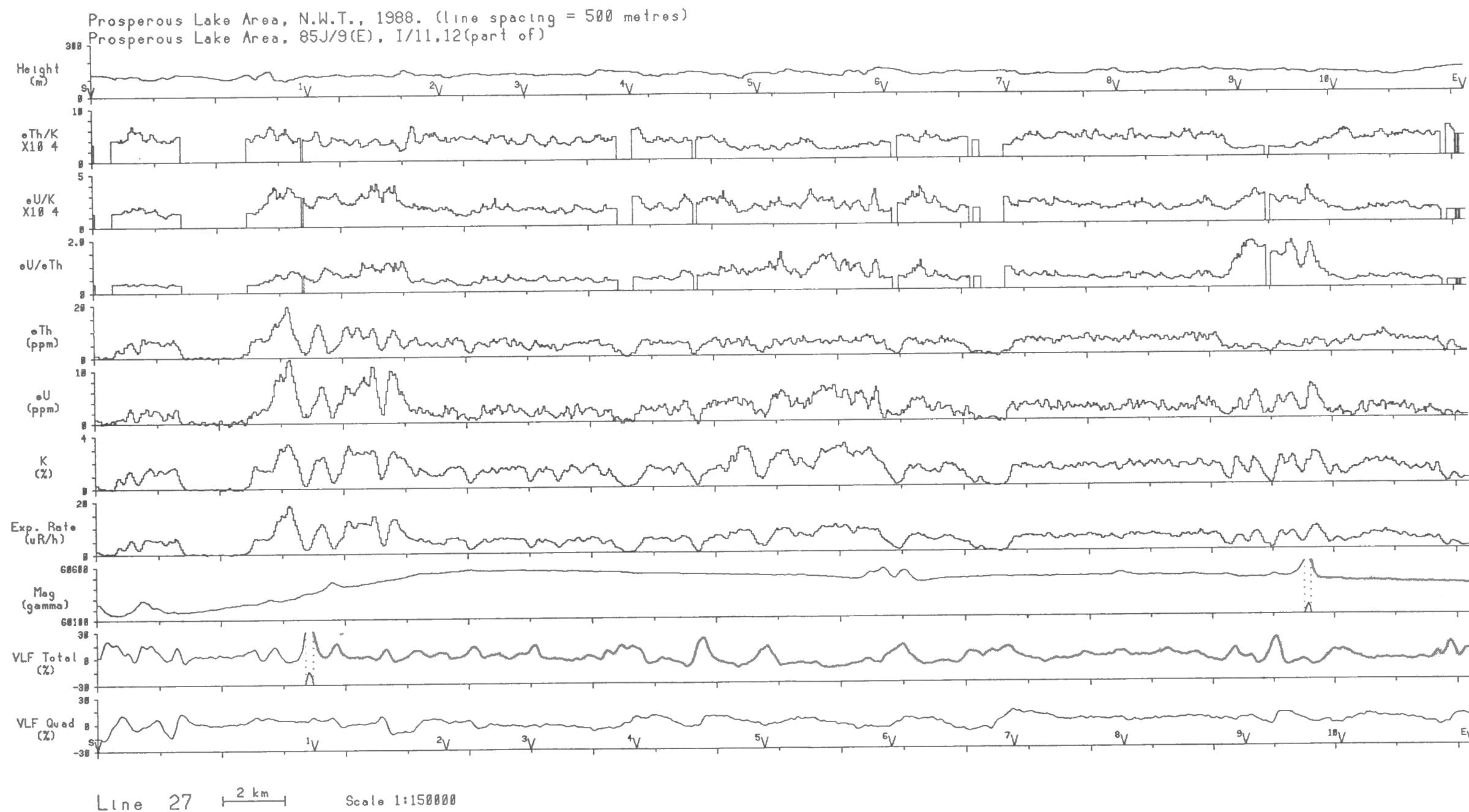
Scale 1:150000

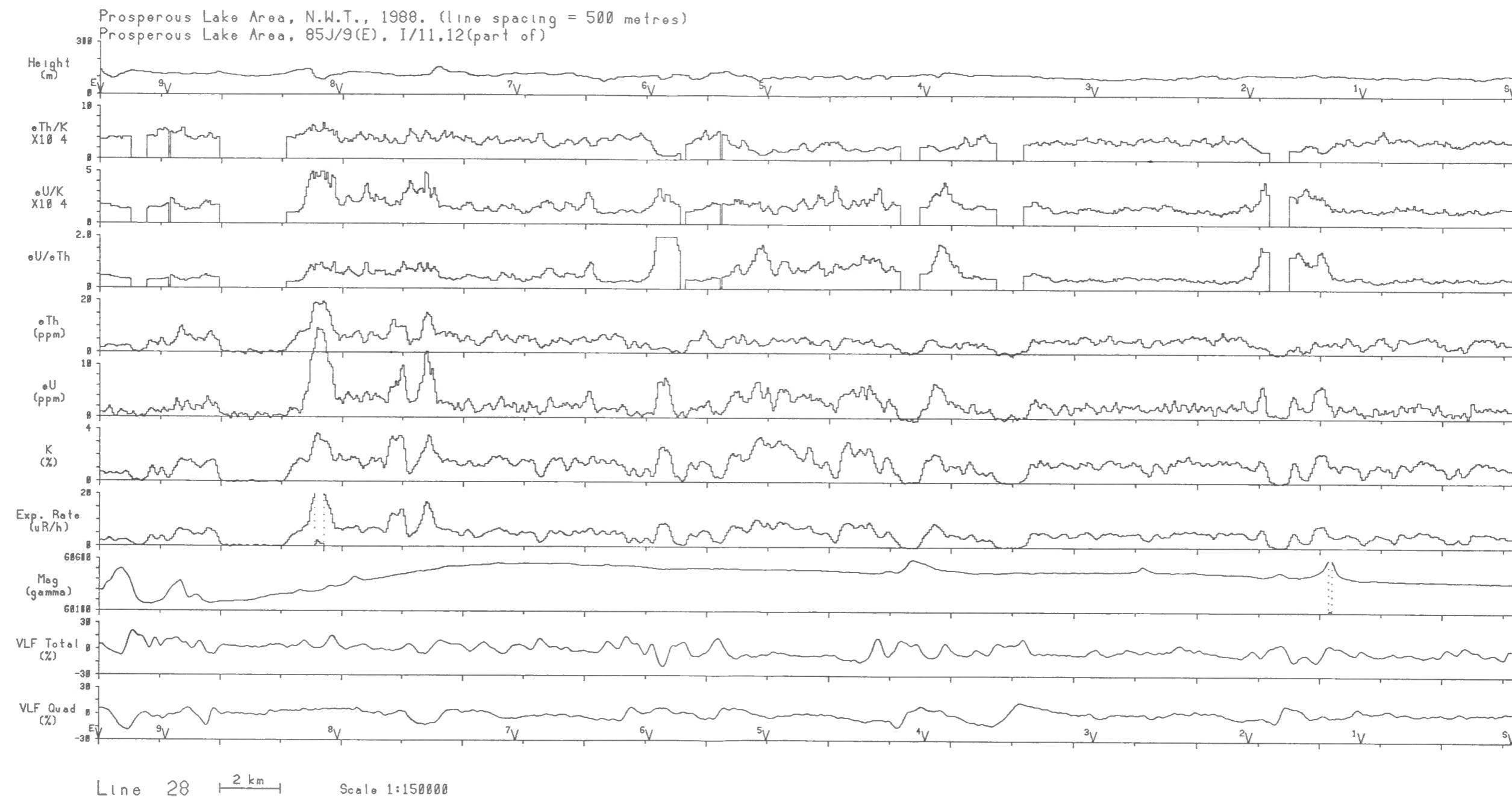


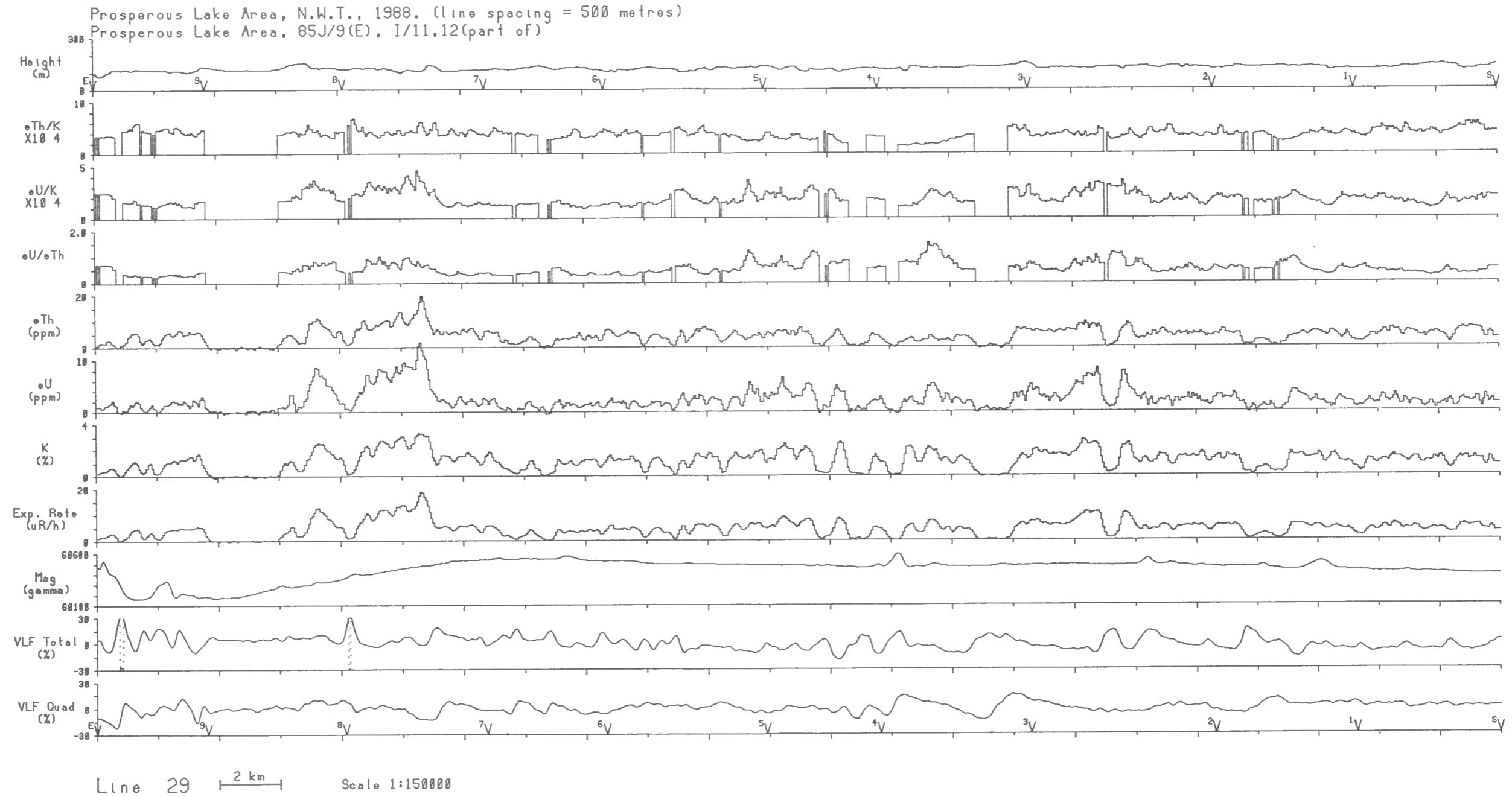


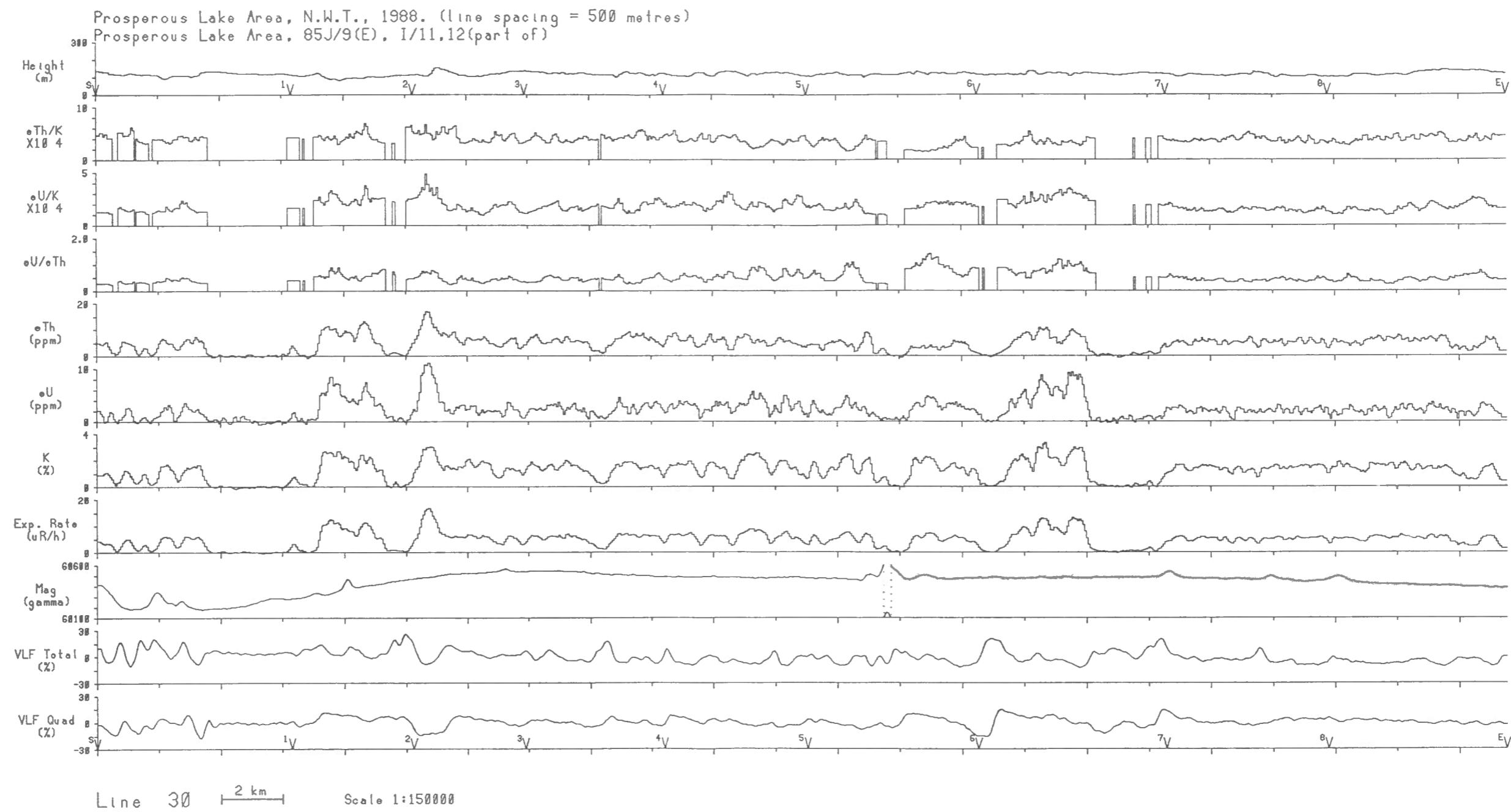
Line 26 2 km

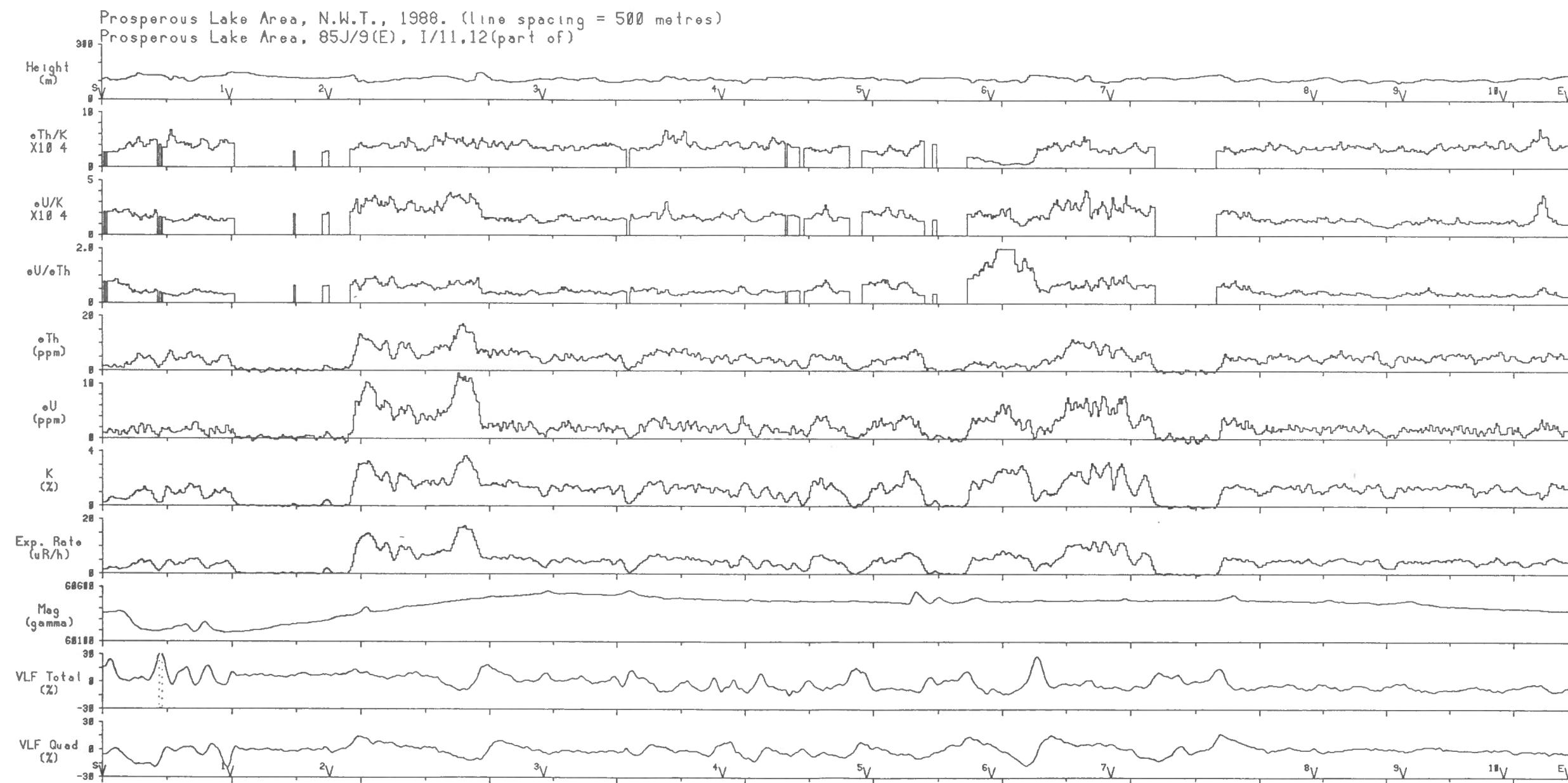
Scale 1:150000



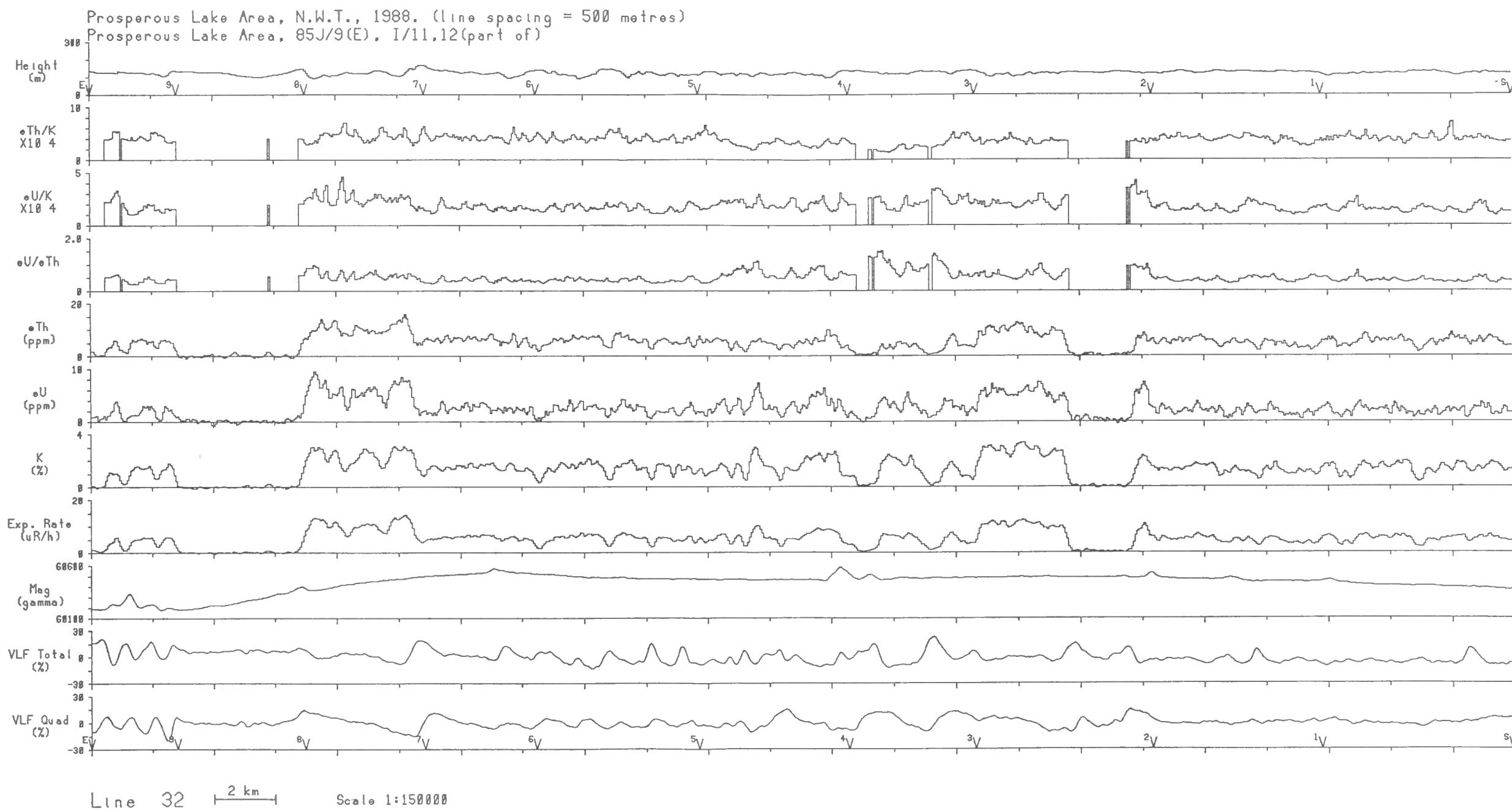




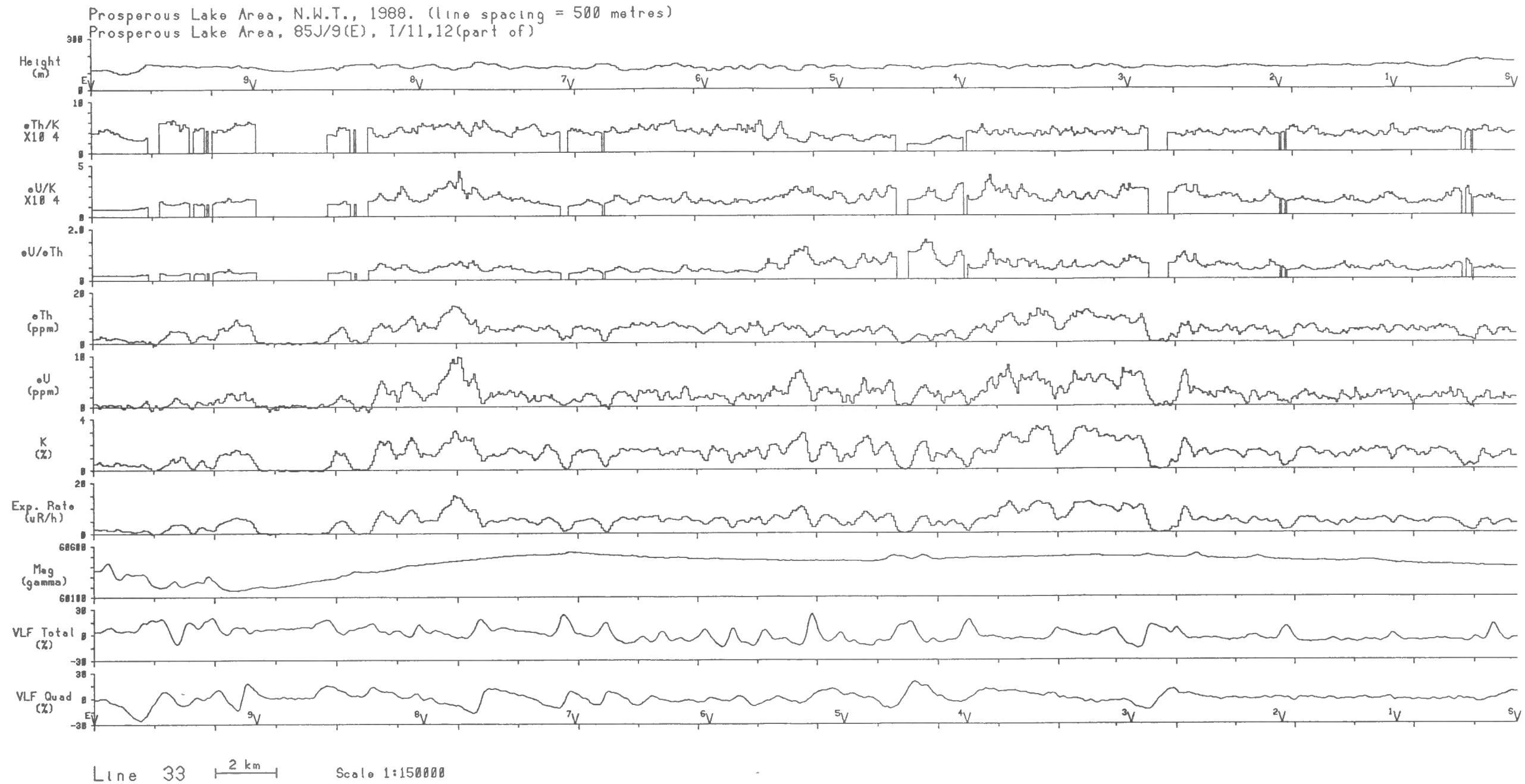




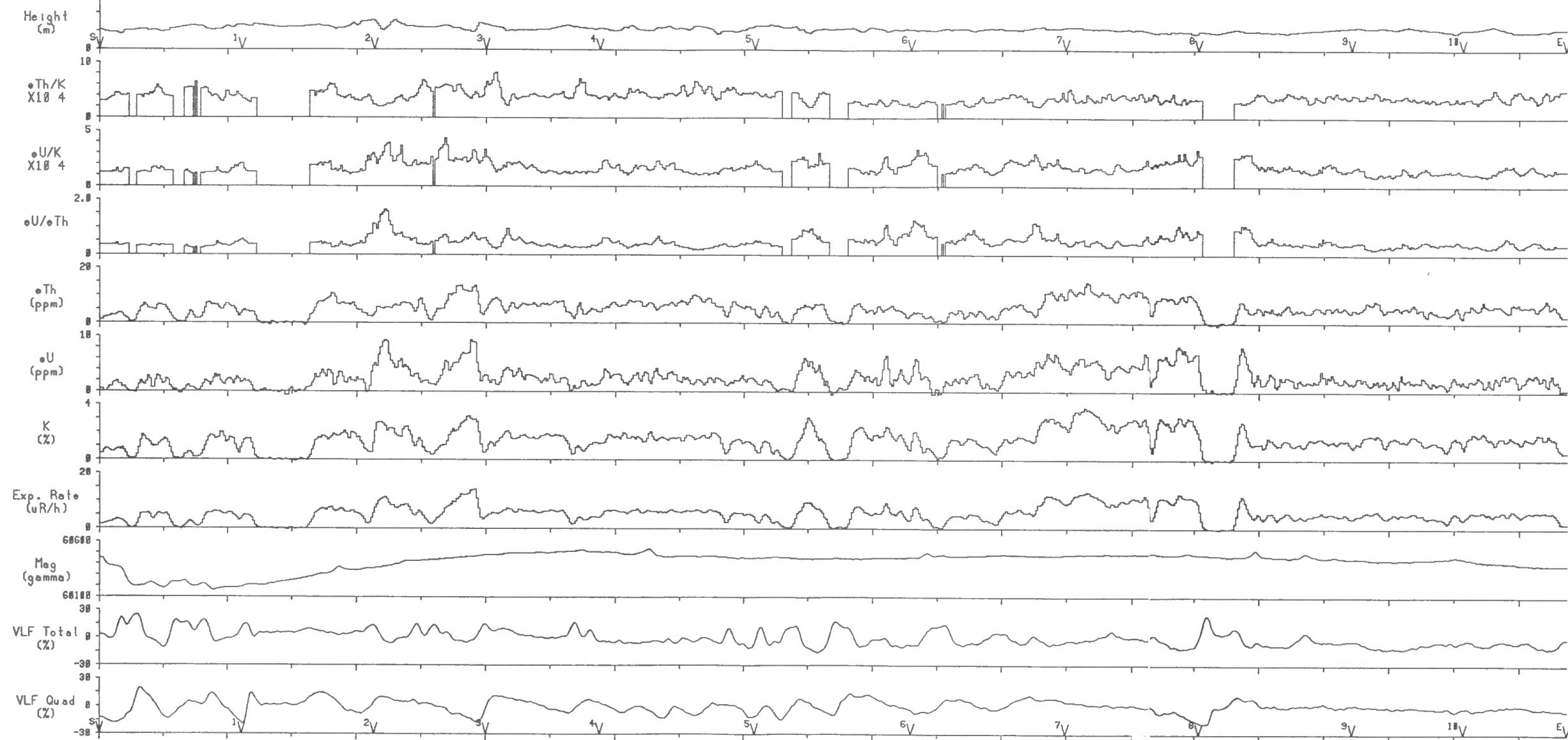
Line 31 2 km Scale 1:150000



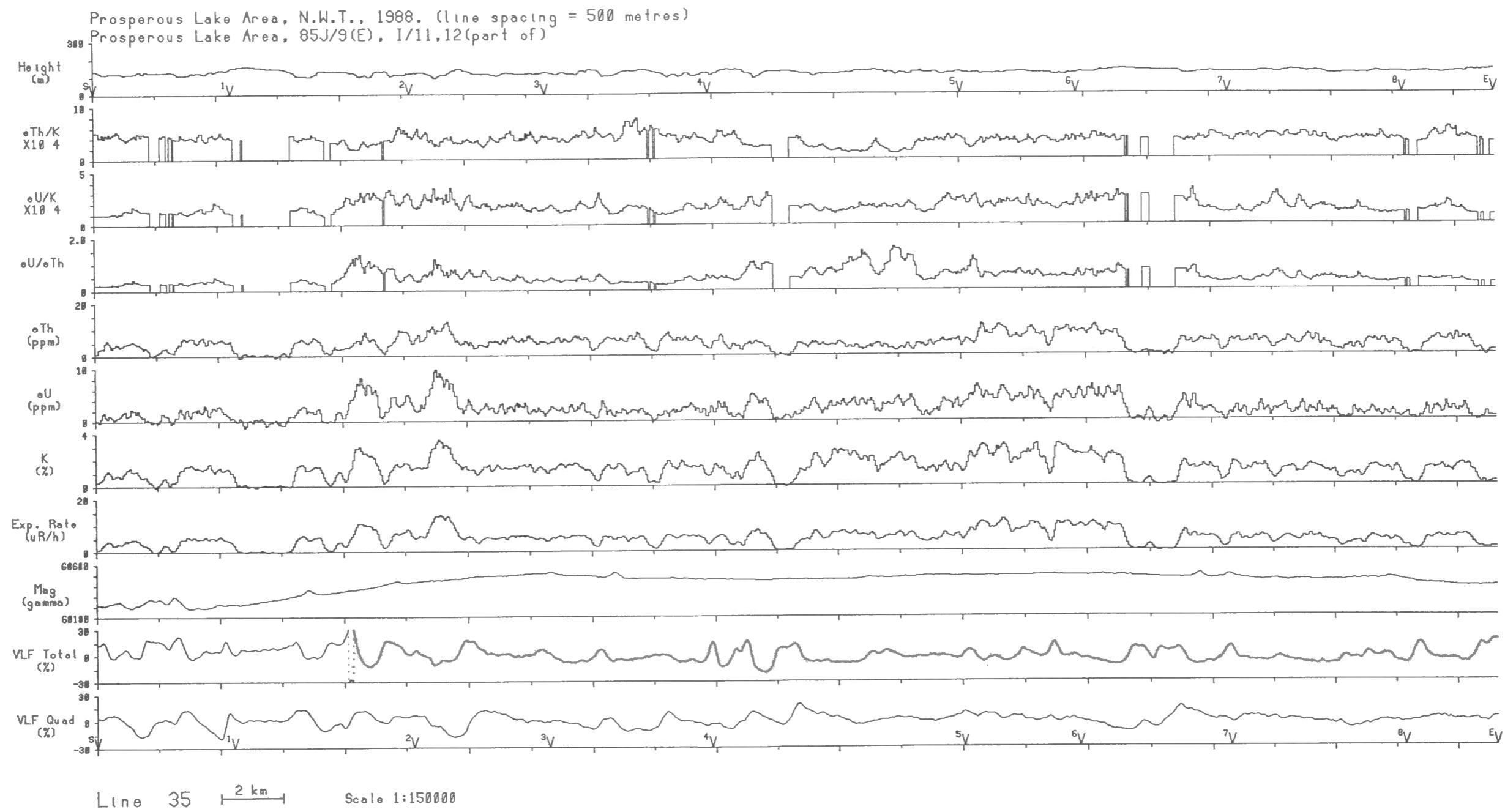
Line 32 2 km Scale 1:150000

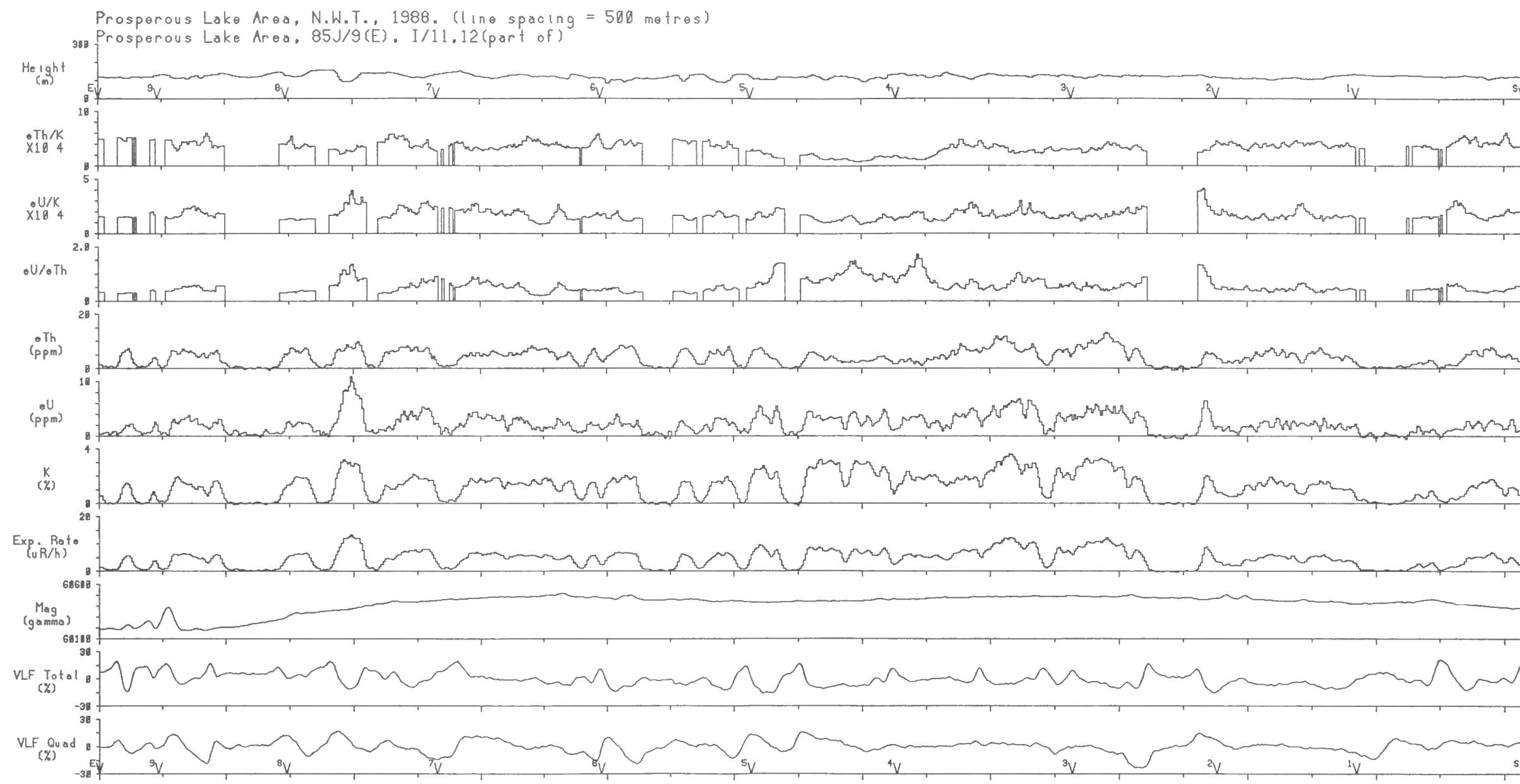


Prosperous Lake Area, N.W.T., 1988. (line spacing = 500 metres)
Prosperous Lake Area, 85J/9(E), I/11,12(part of)

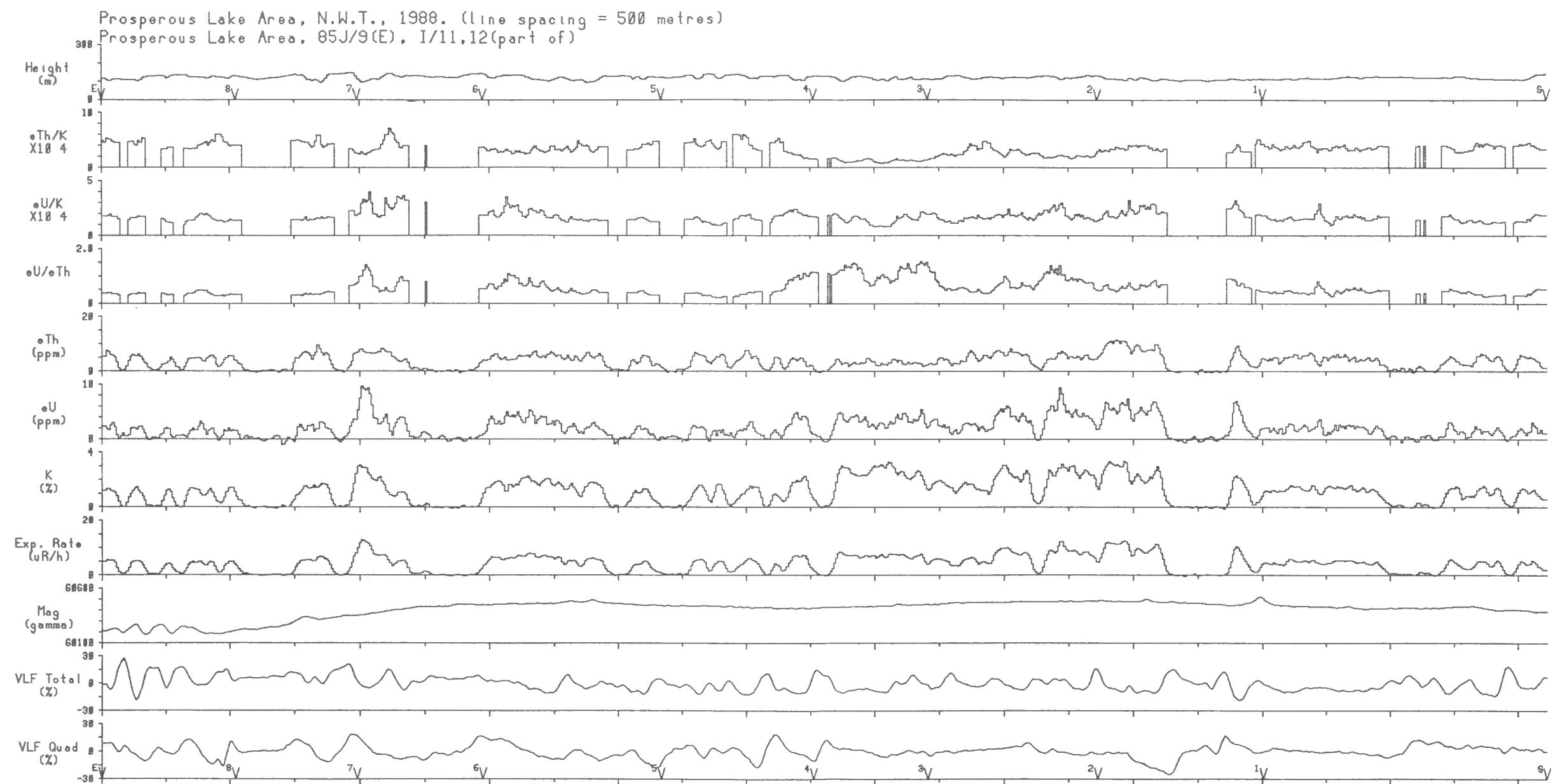


Line 34 2 km Scale 1:150000





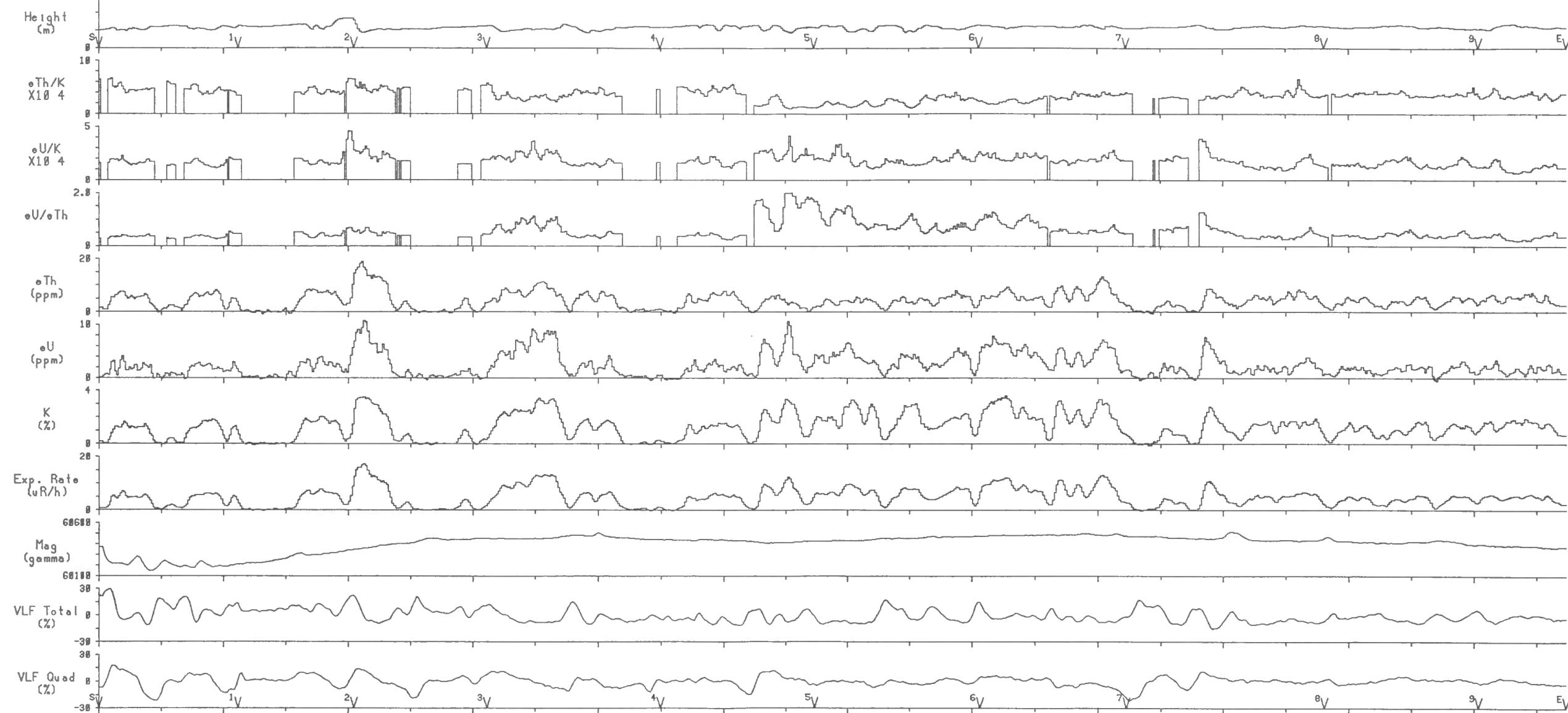
Line 36 Scale 1:150000



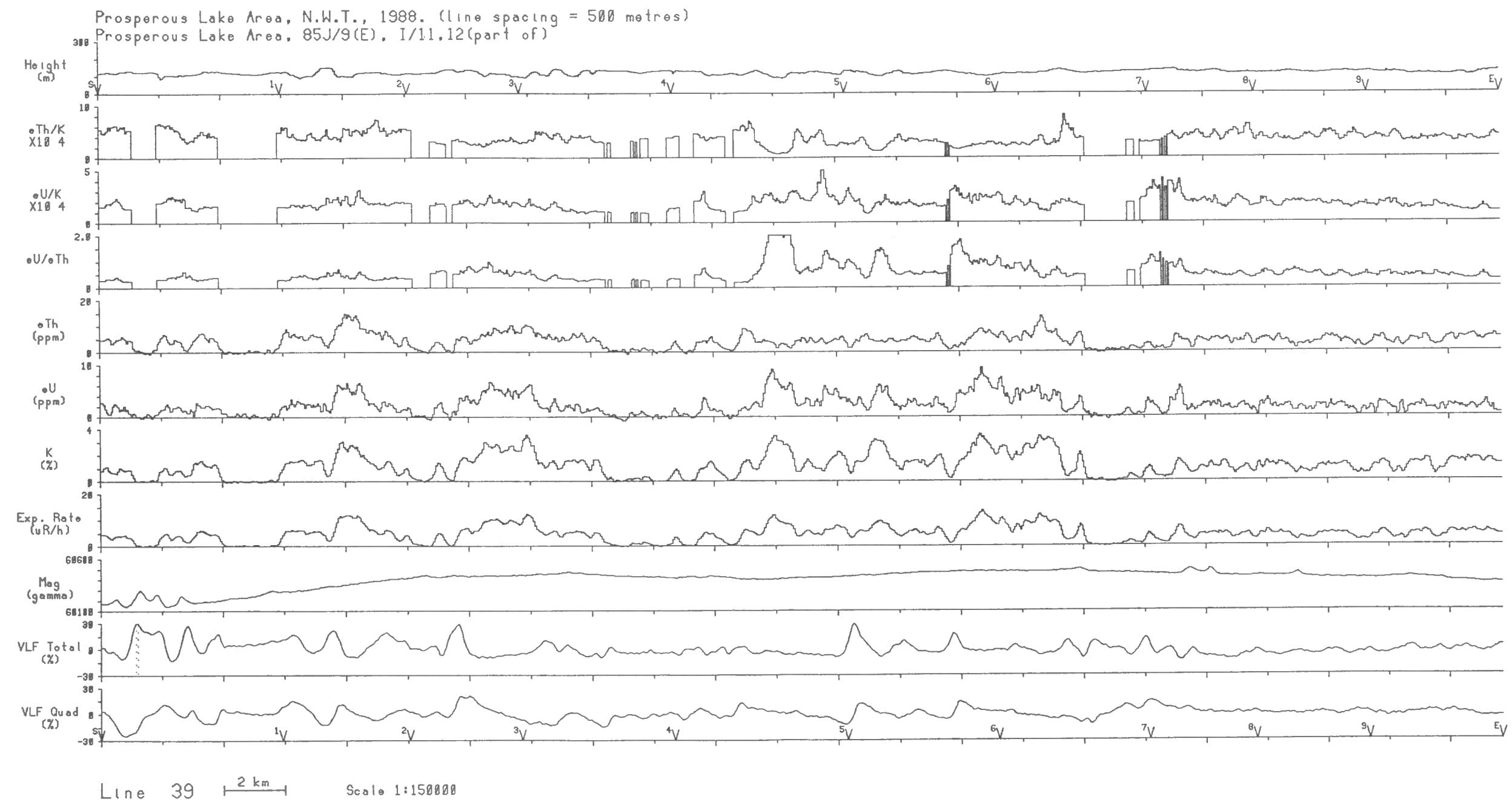
Line 37 2 km

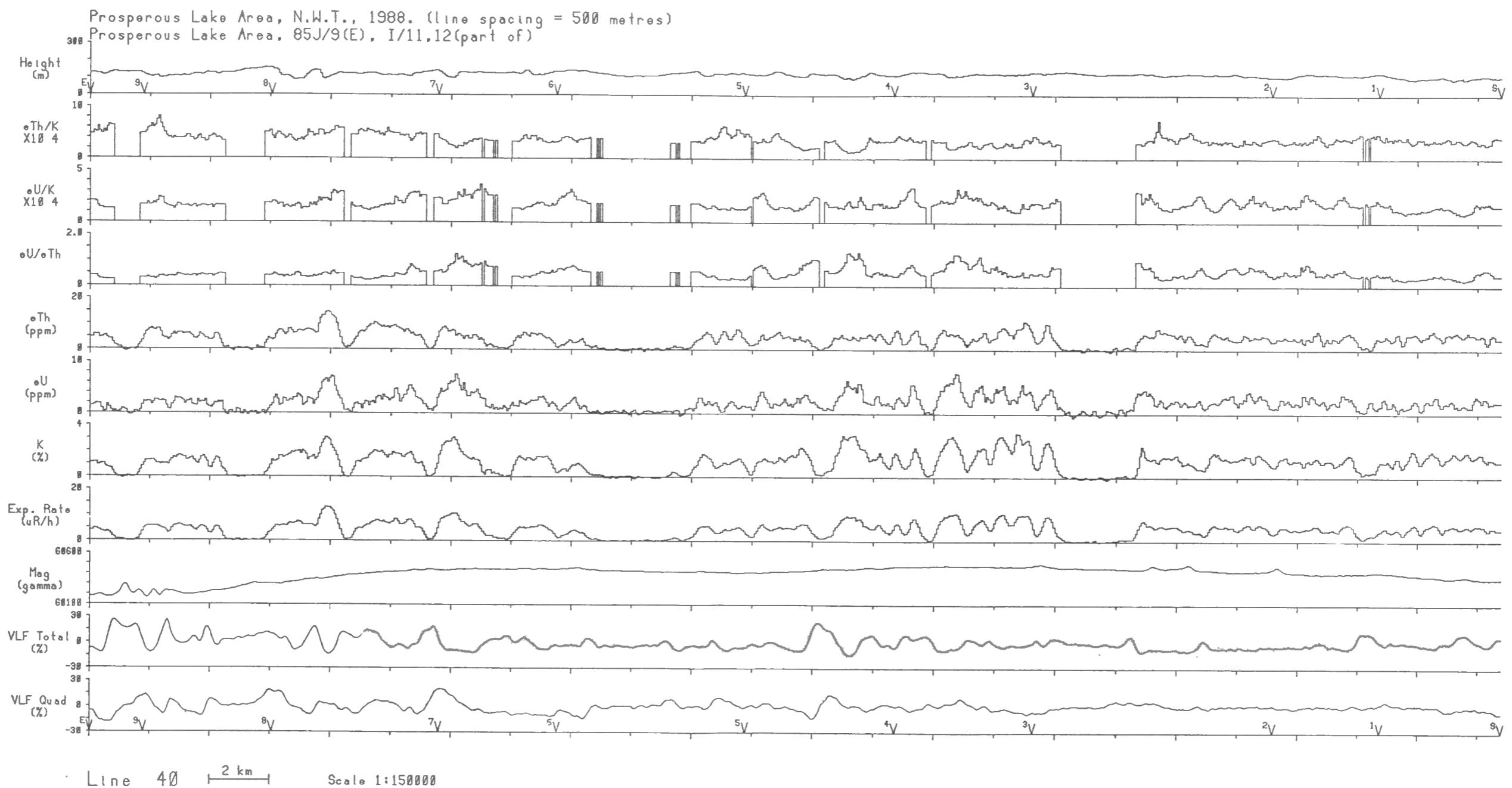
Scale 1:150000

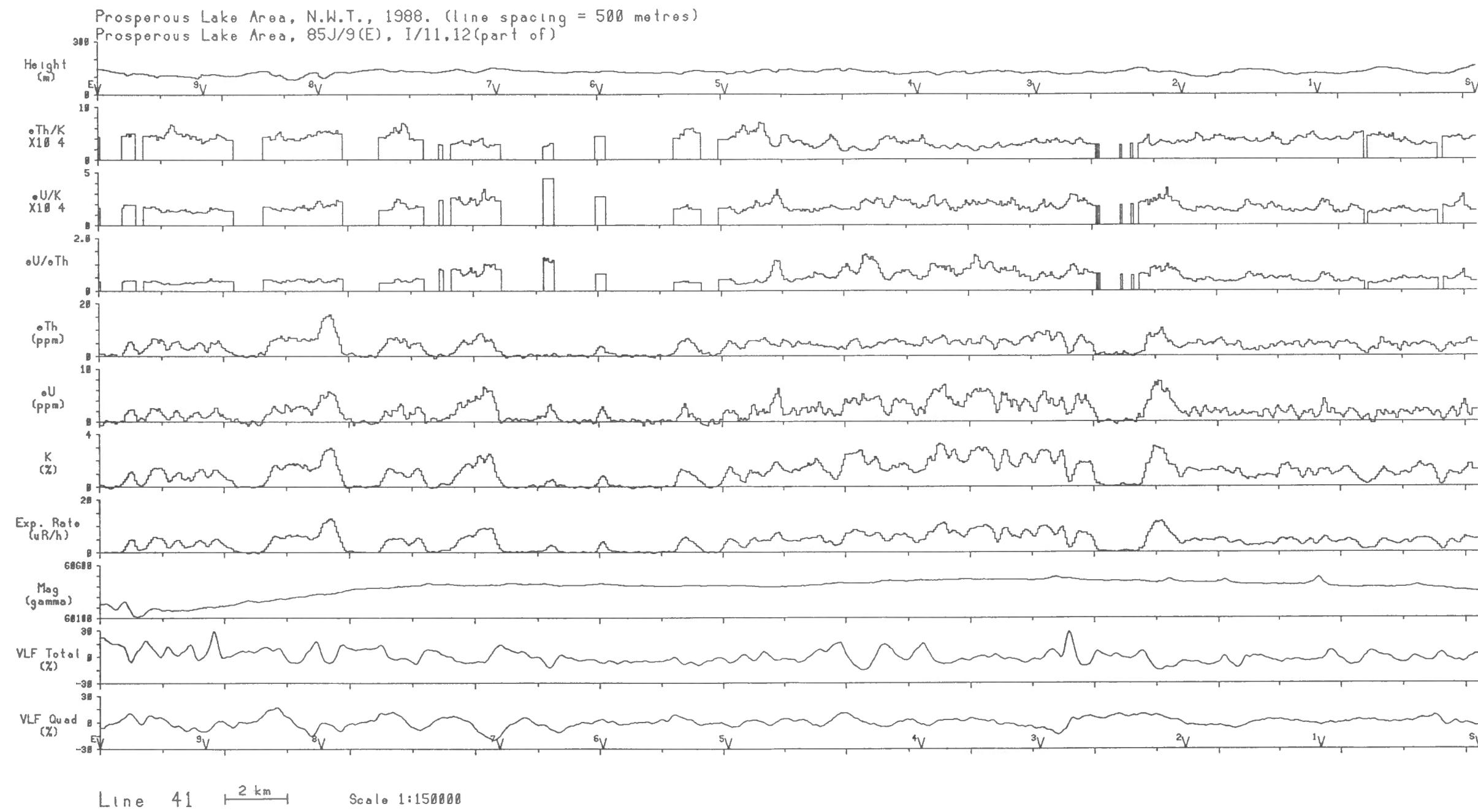
Prosperous Lake Area, N.W.T., 1988. (line spacing = 500 metres)
Prosperous Lake Area, 85J/9(E), I/11,12(part of)

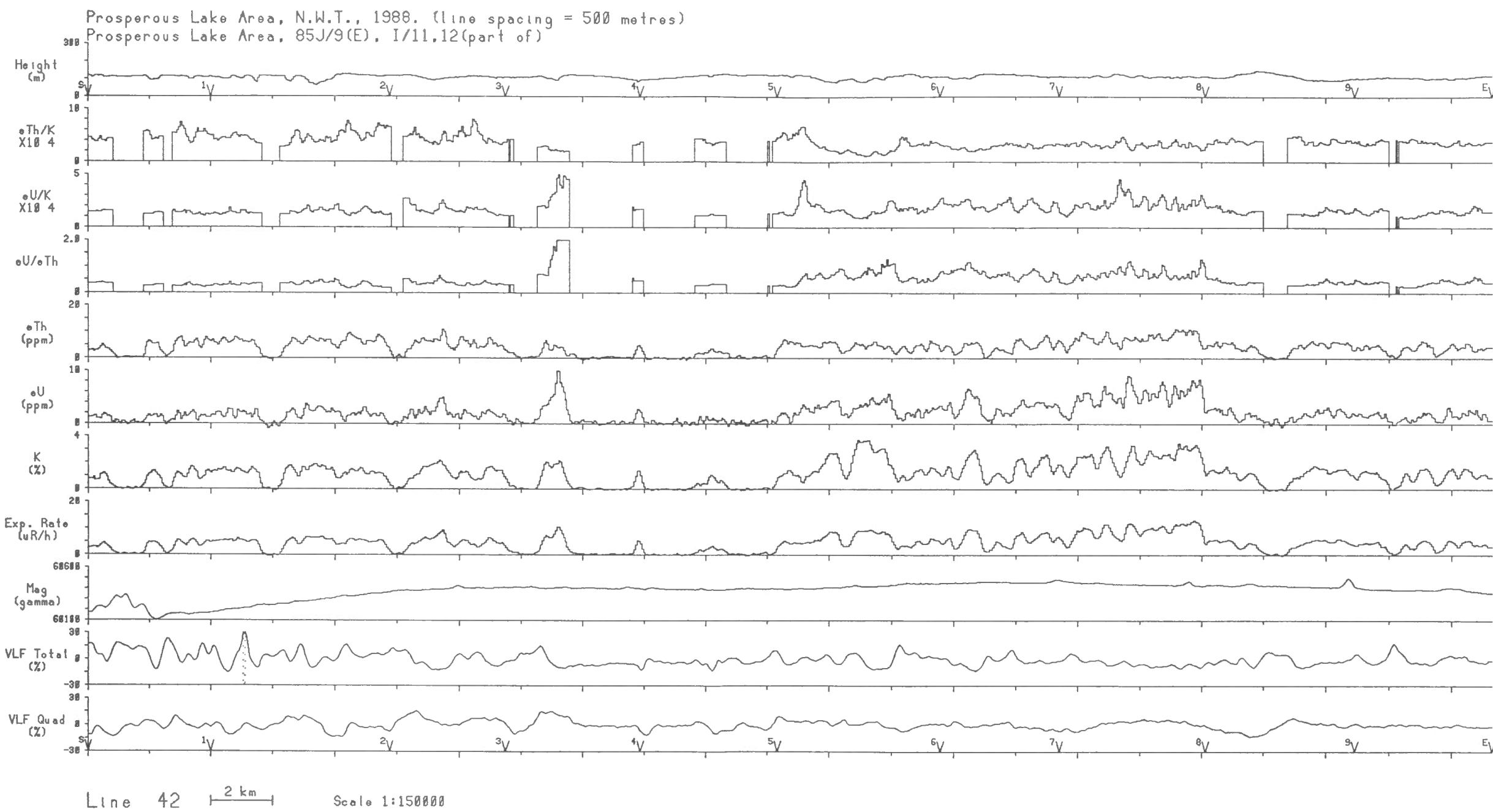


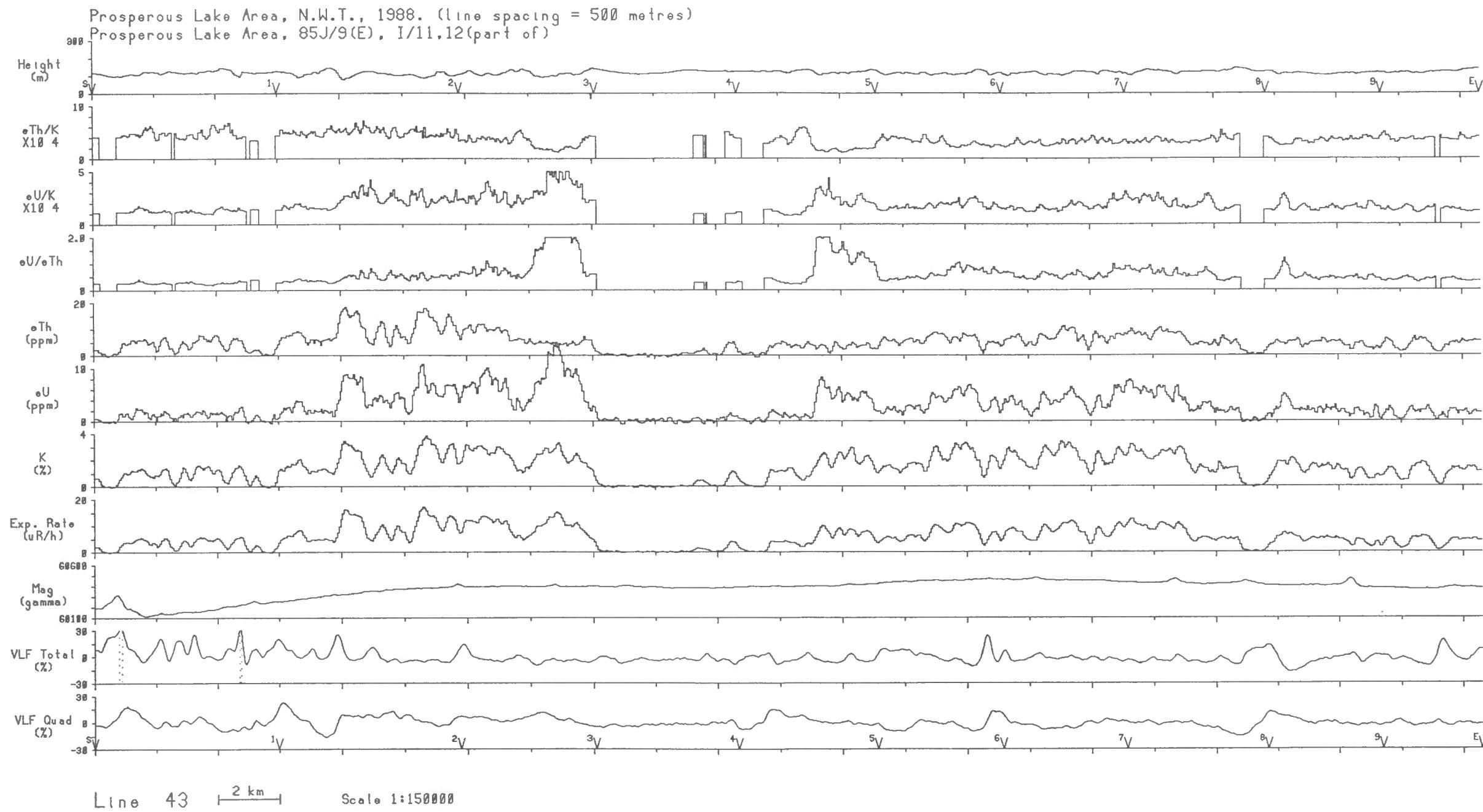
Line 38 2 km Scale 1:150000



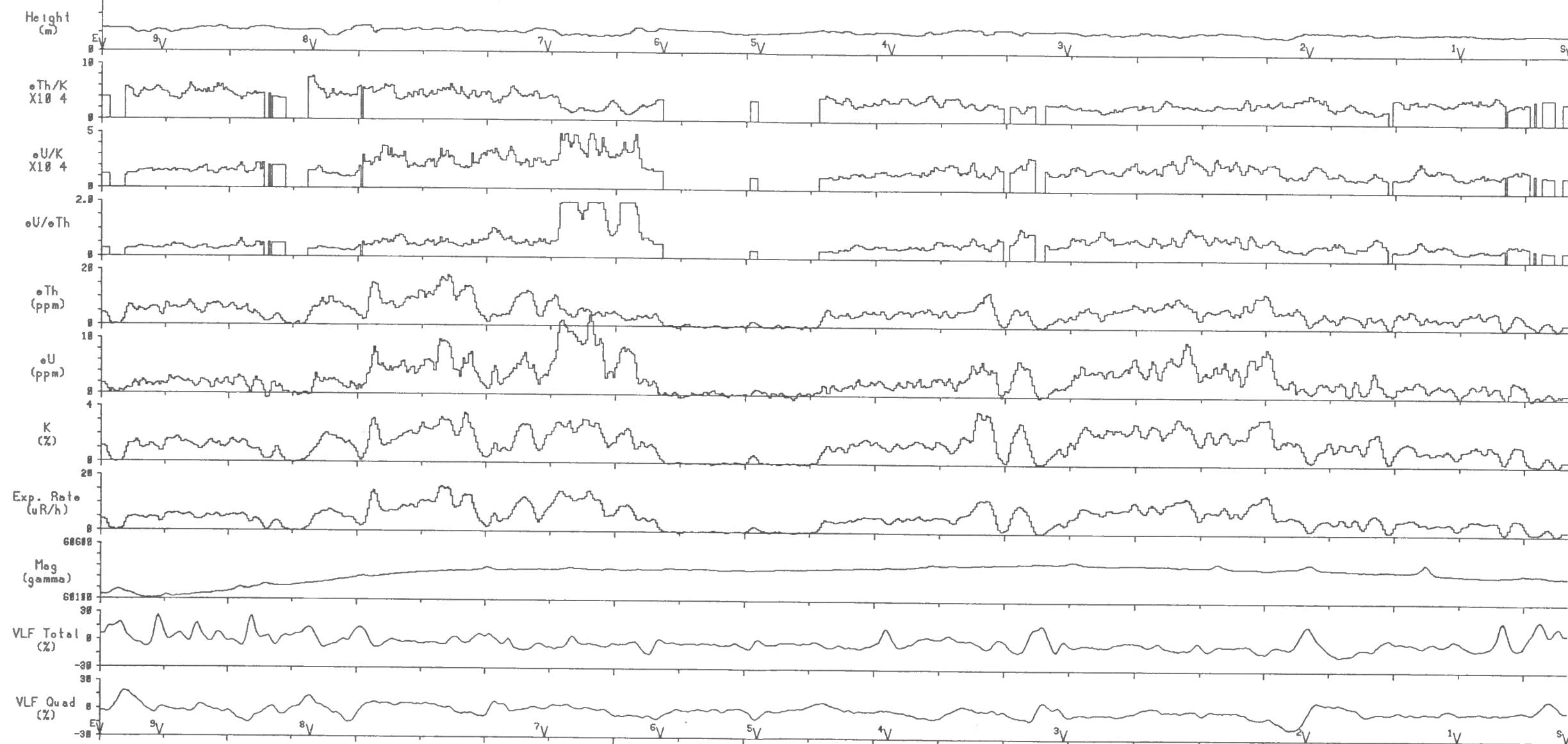




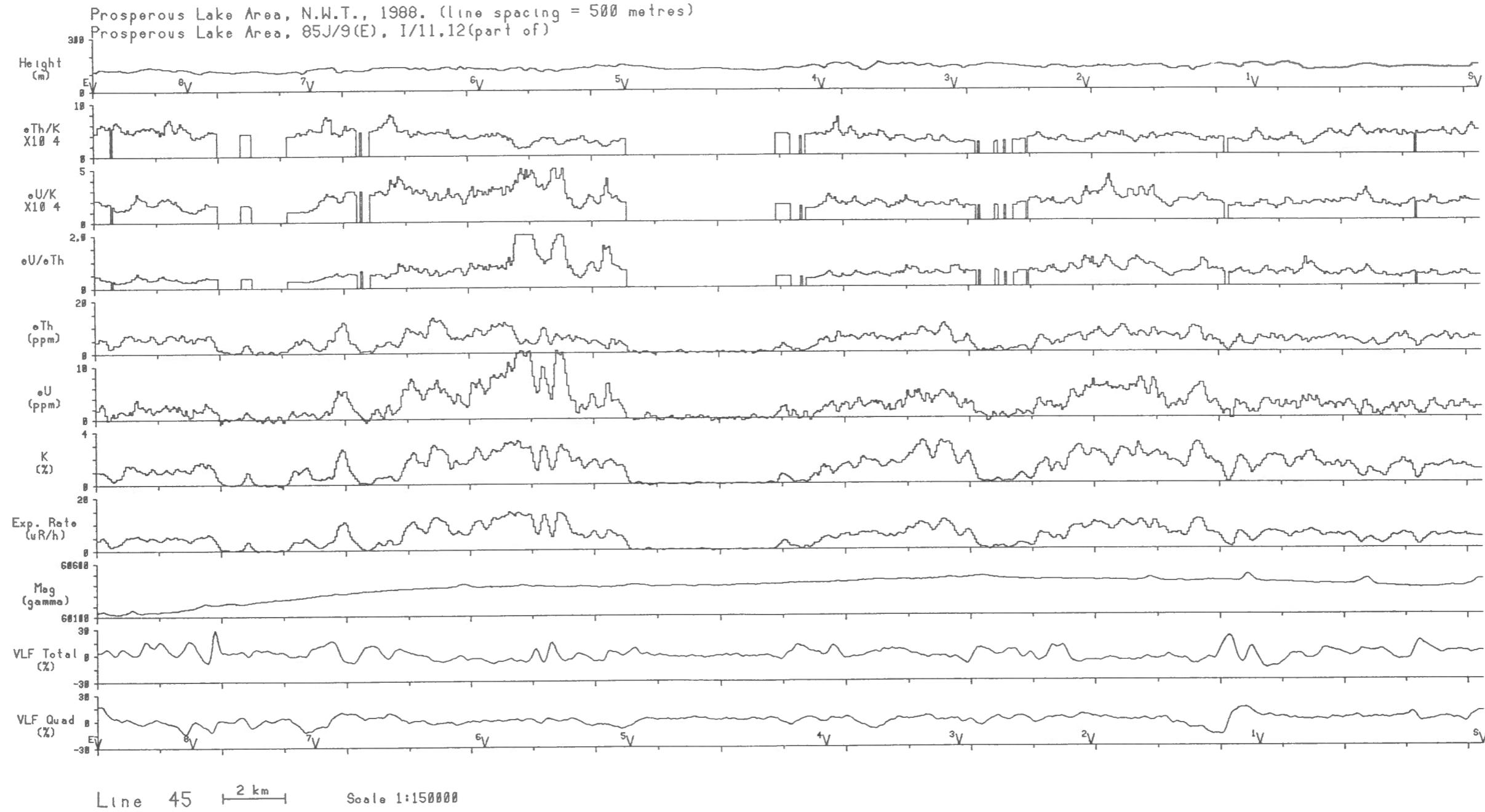




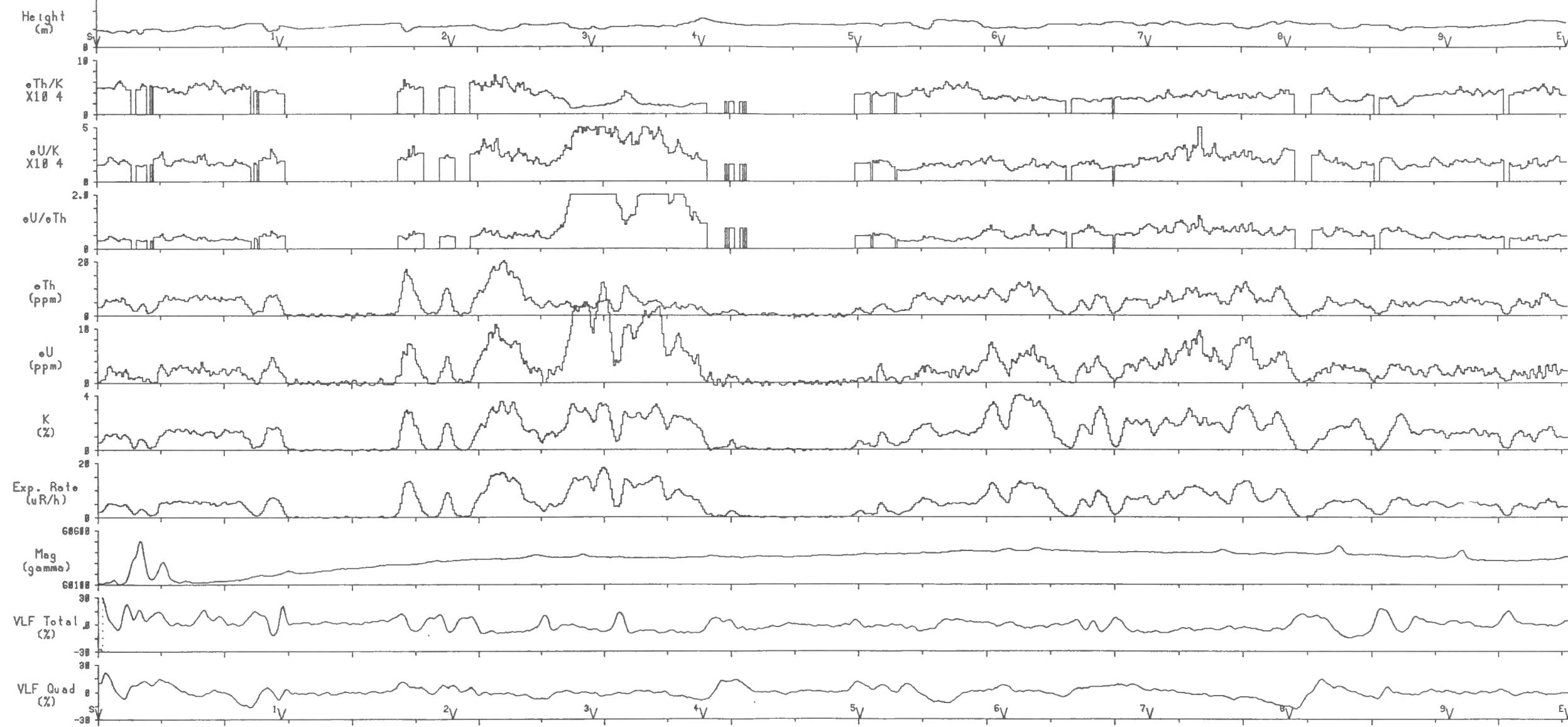
Prosperous Lake Area, N.W.T., 1988. (line spacing = 500 metres)
Prosperous Lake Area, 85J/9(E), I/11,12(part of)



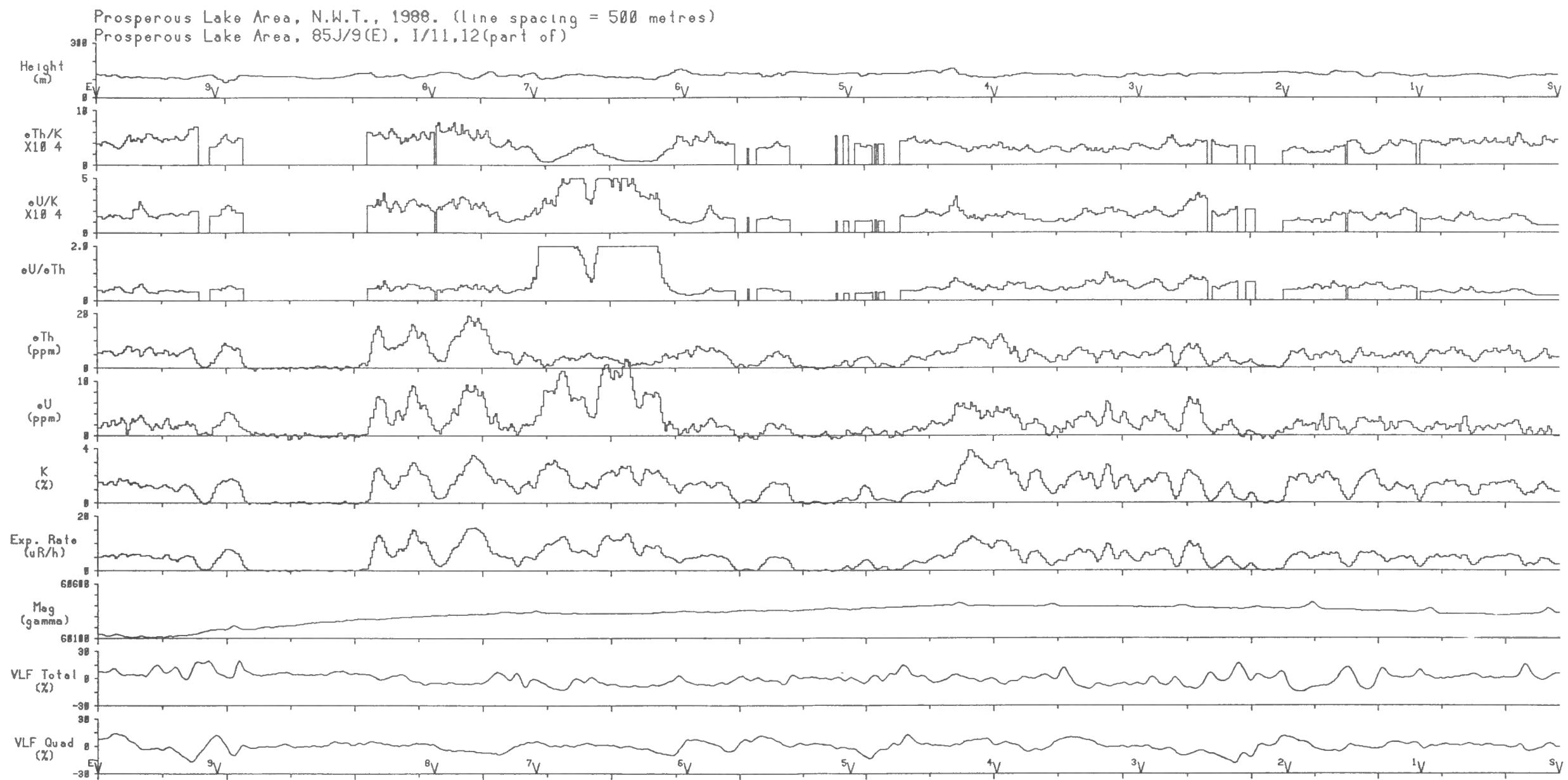
Line 44 2 km Scale 1:150000



Prosperous Lake Area, N.W.T., 1988. (line spacing = 500 metres)
Prosperous Lake Area, 85J/9(E), I/11,12(part of)

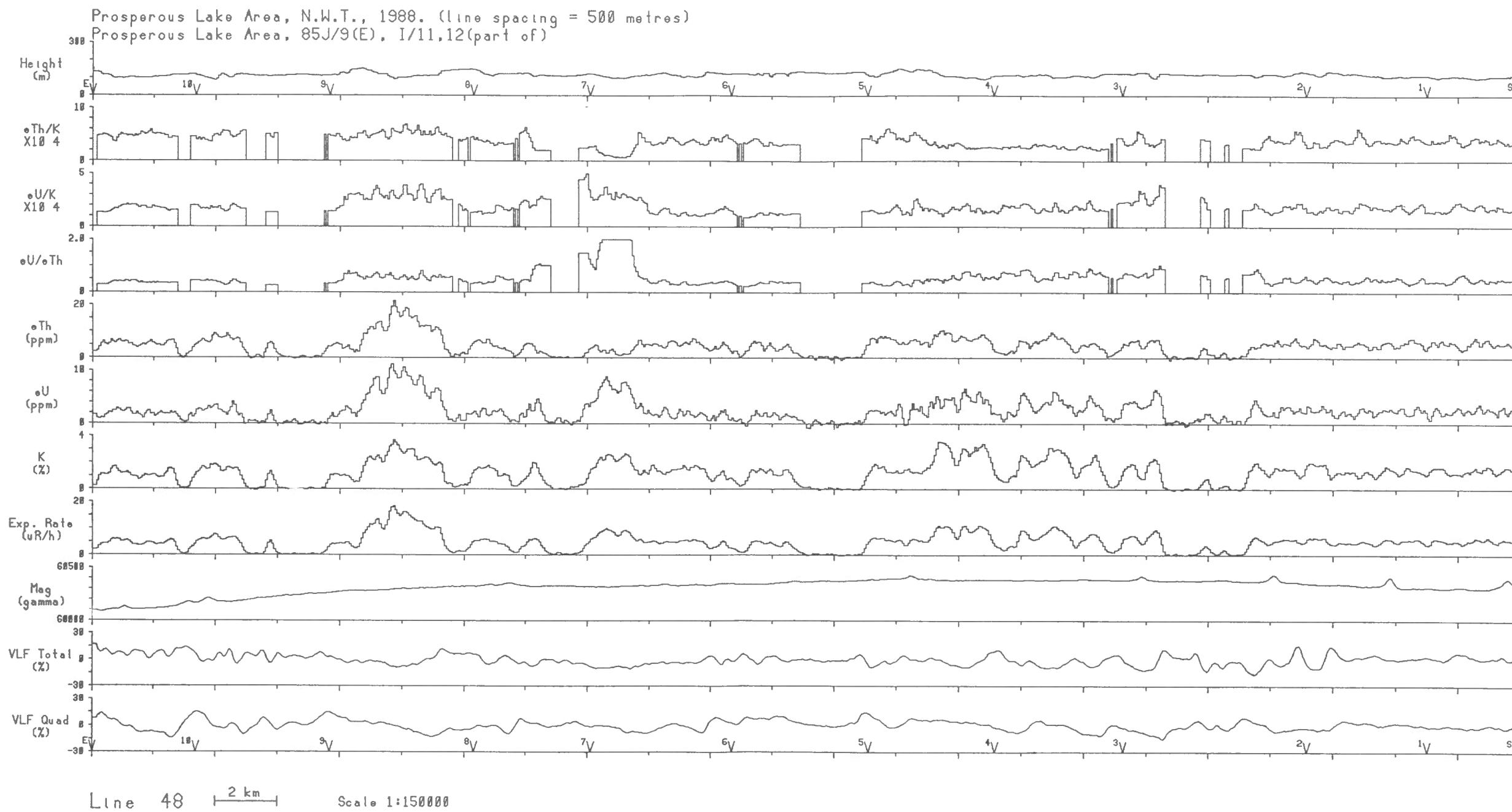


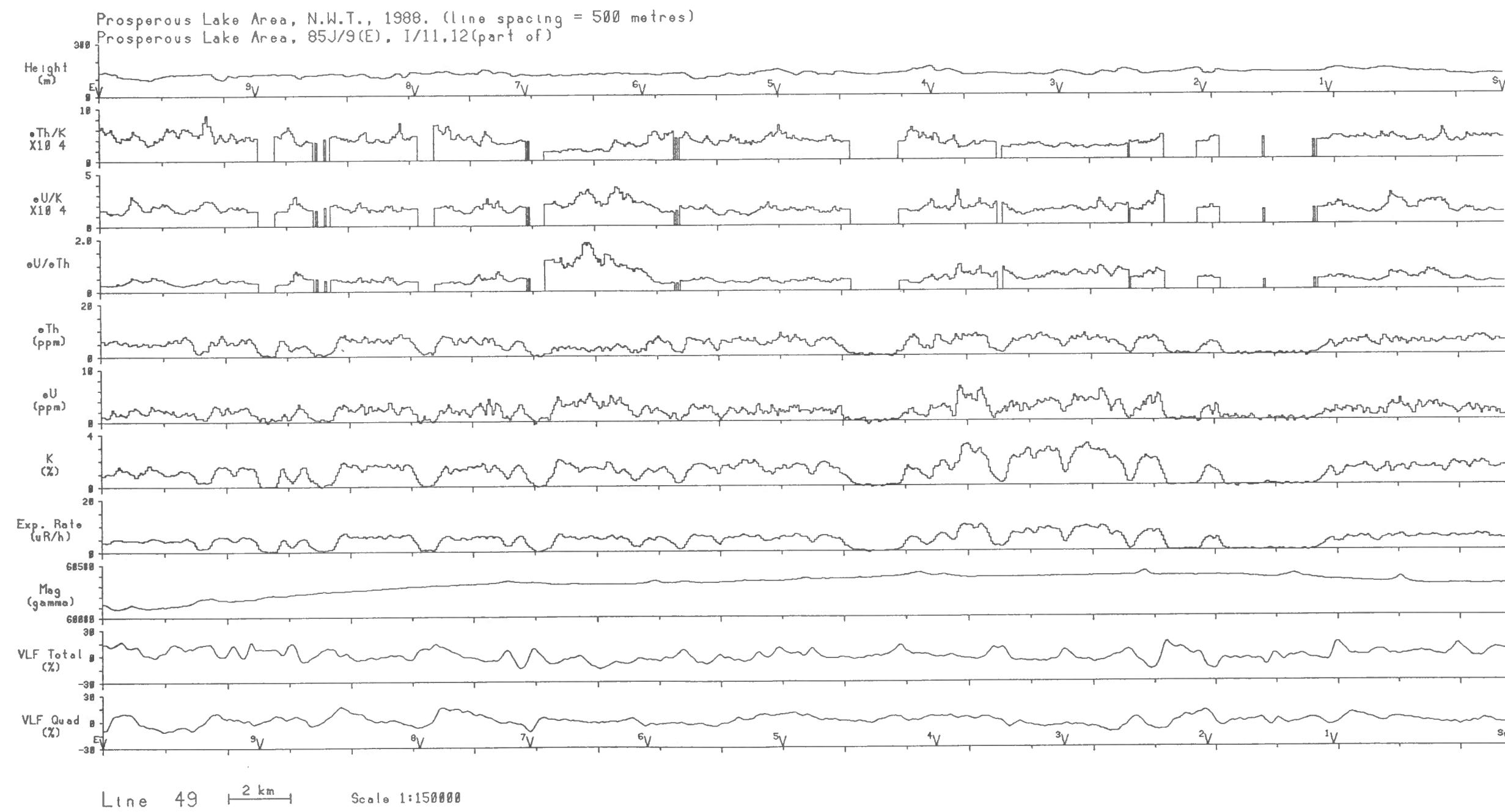
Line 46 2 km Scale 1:150000

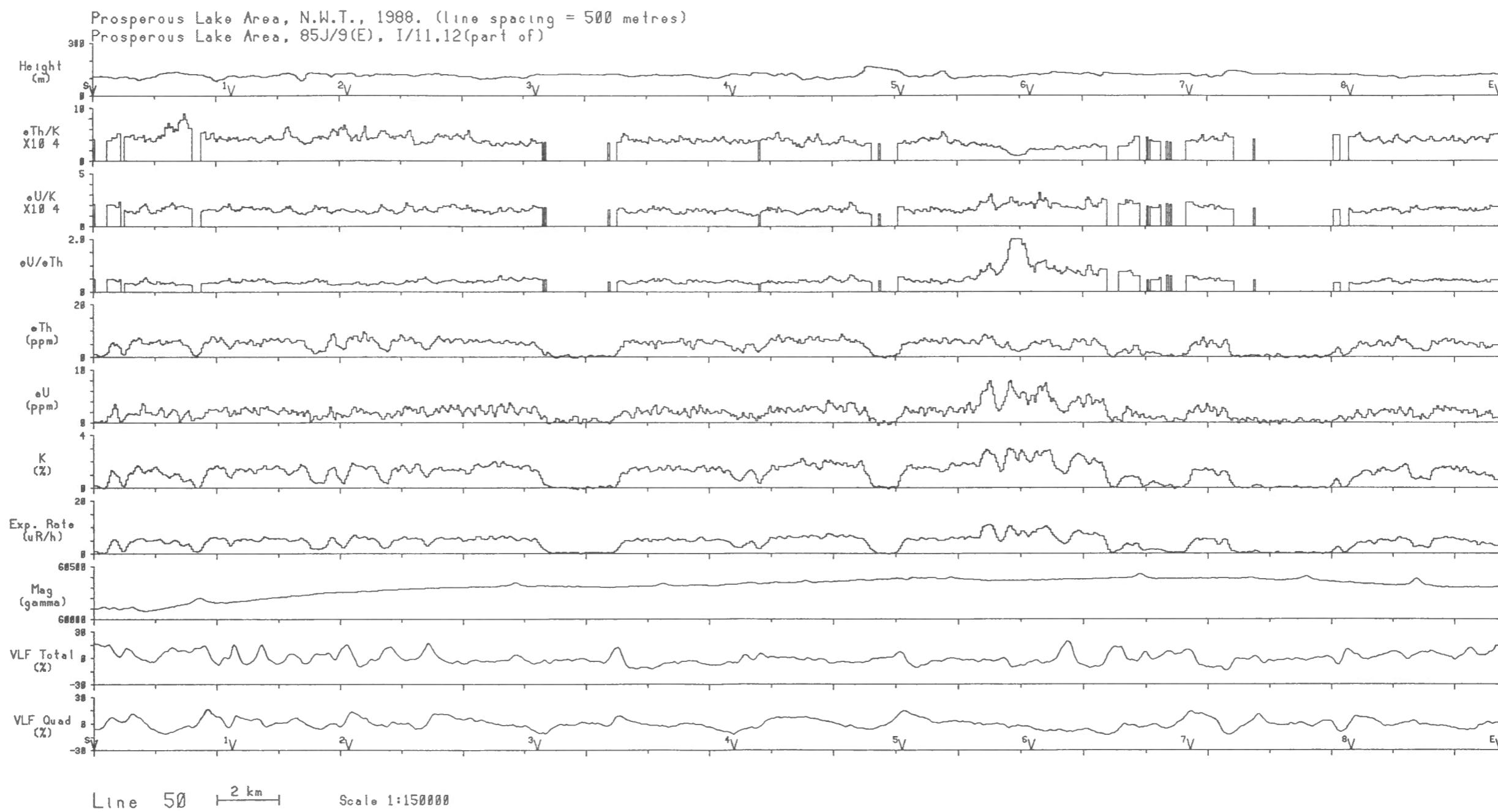


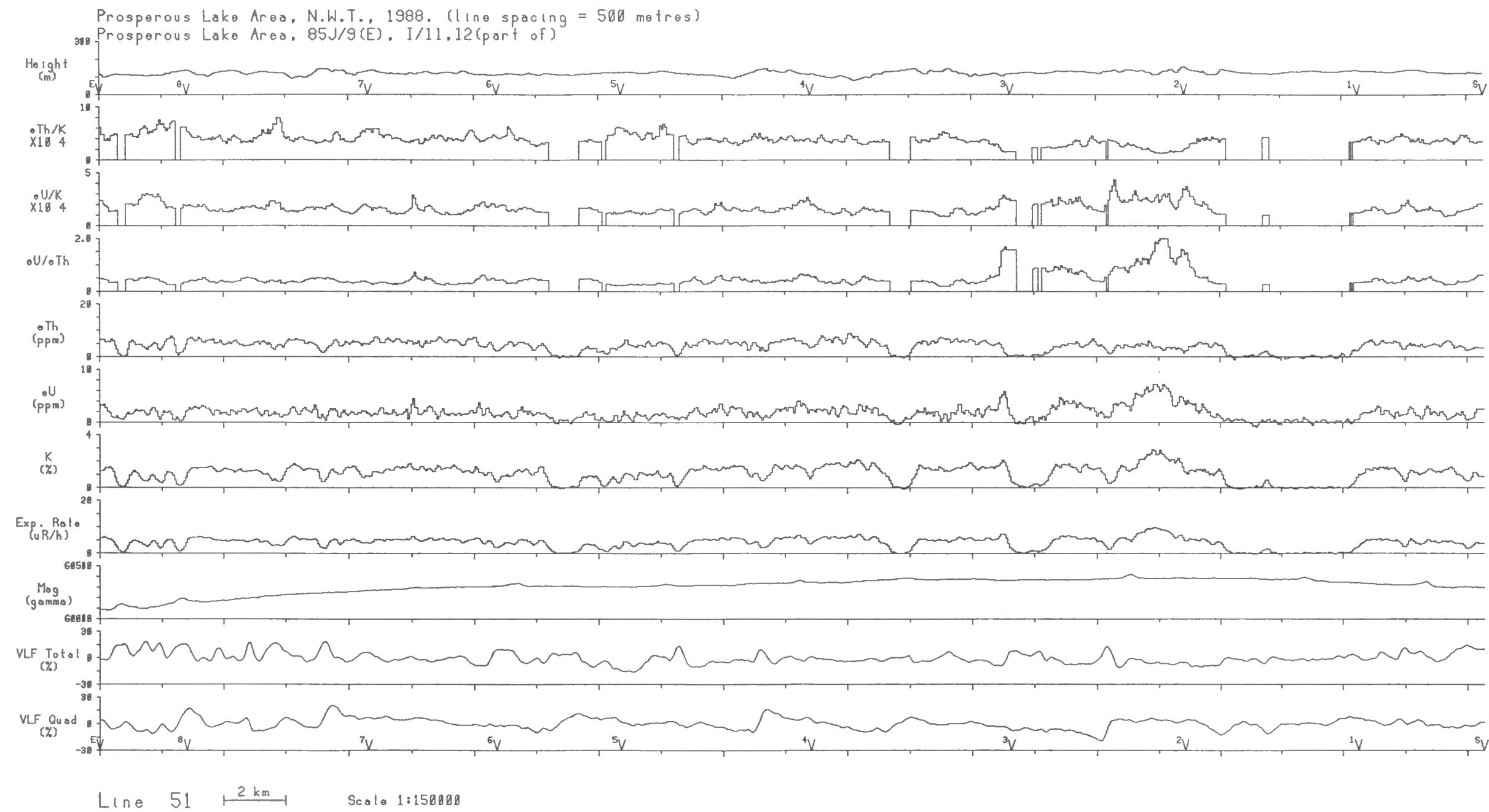
Line 47 2 km

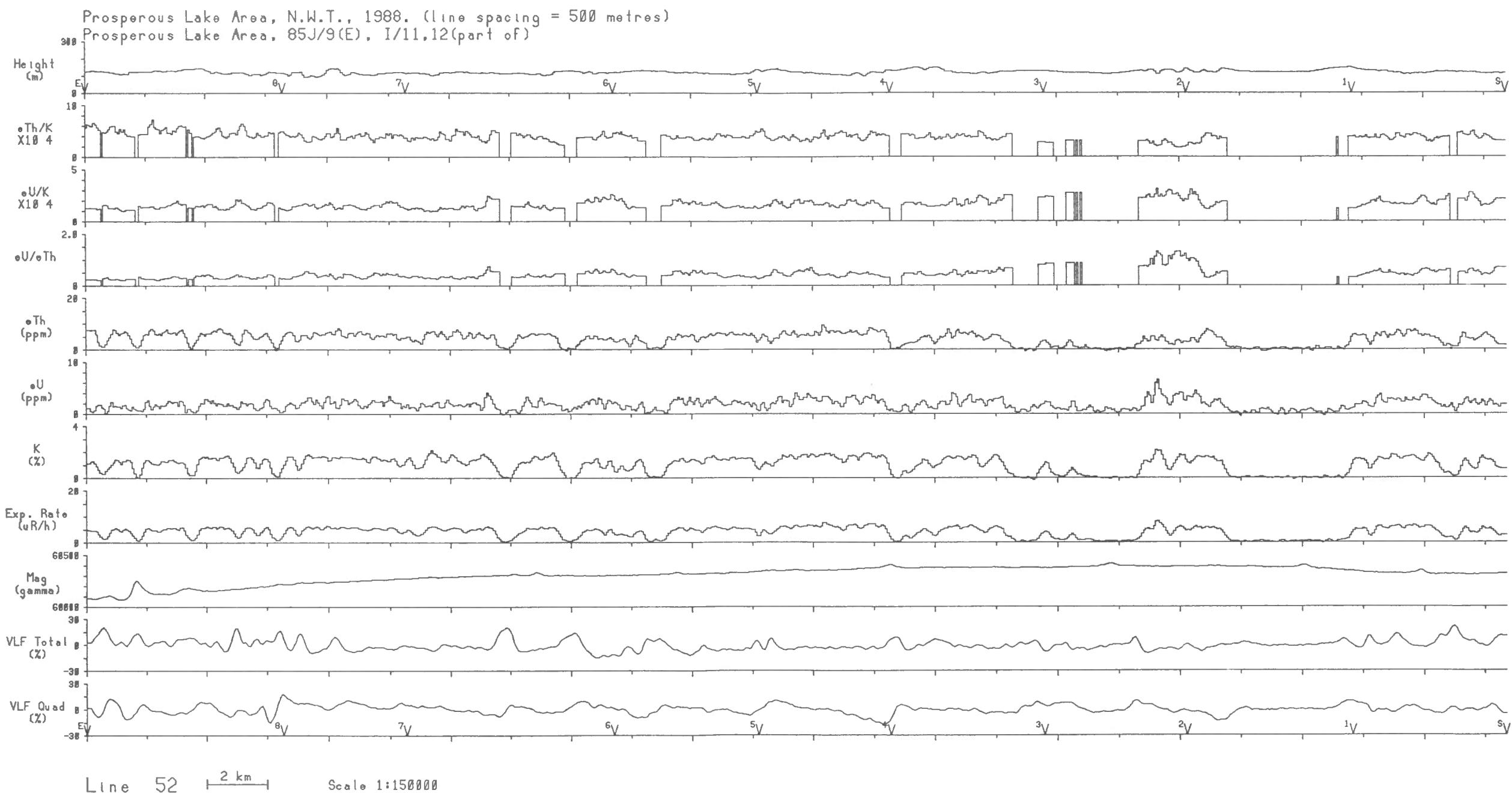
Scale 1:150000

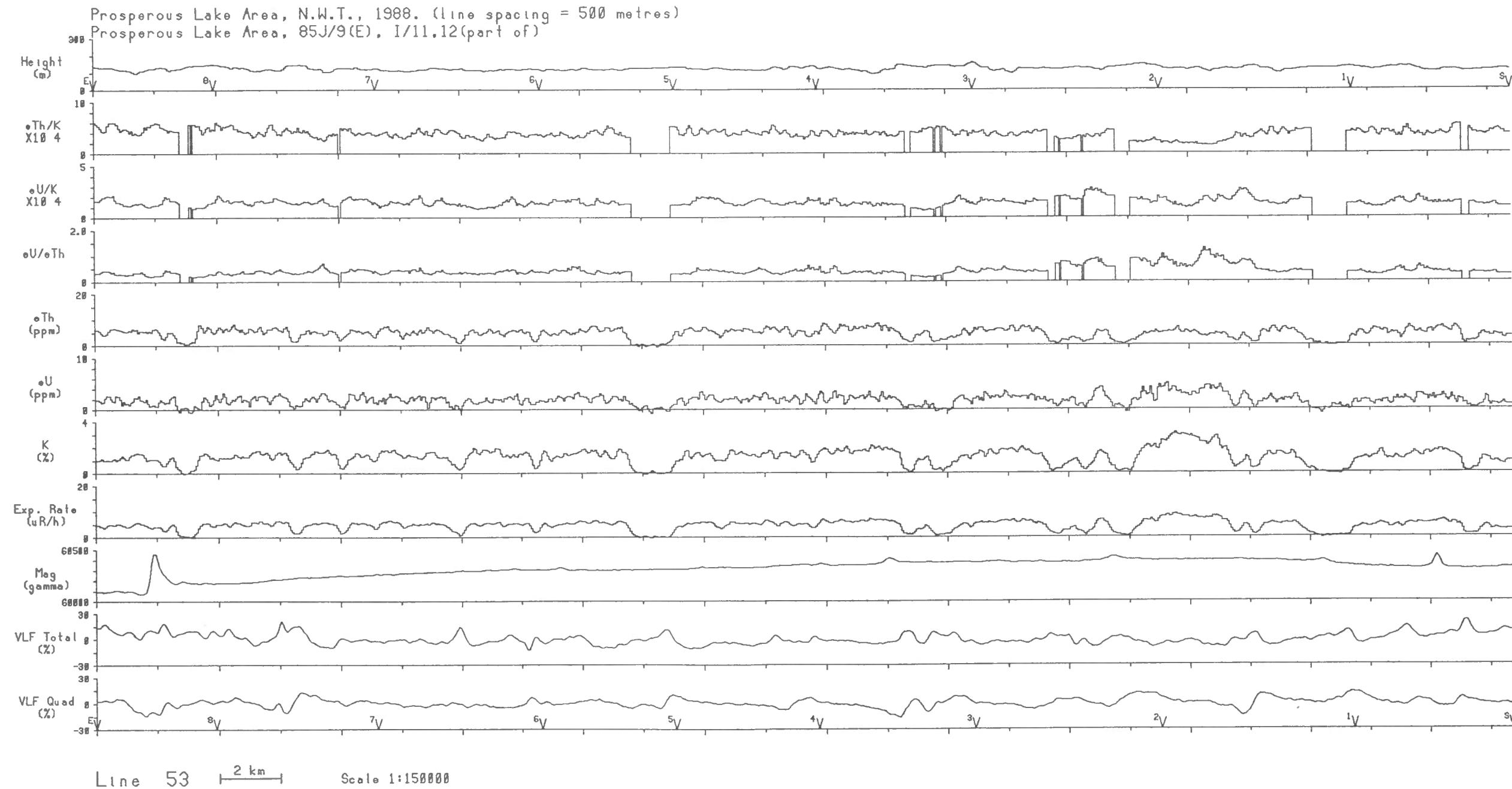


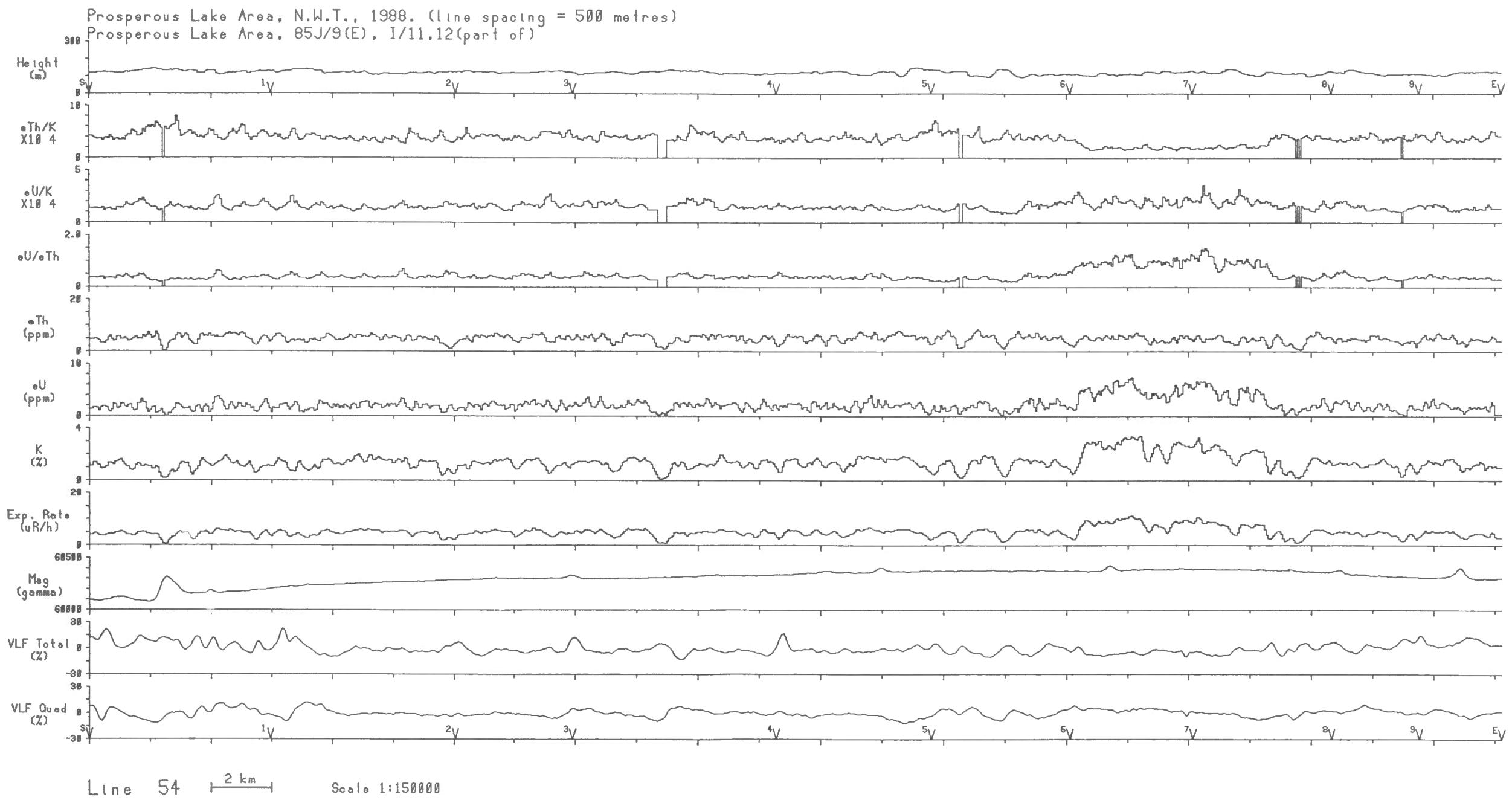


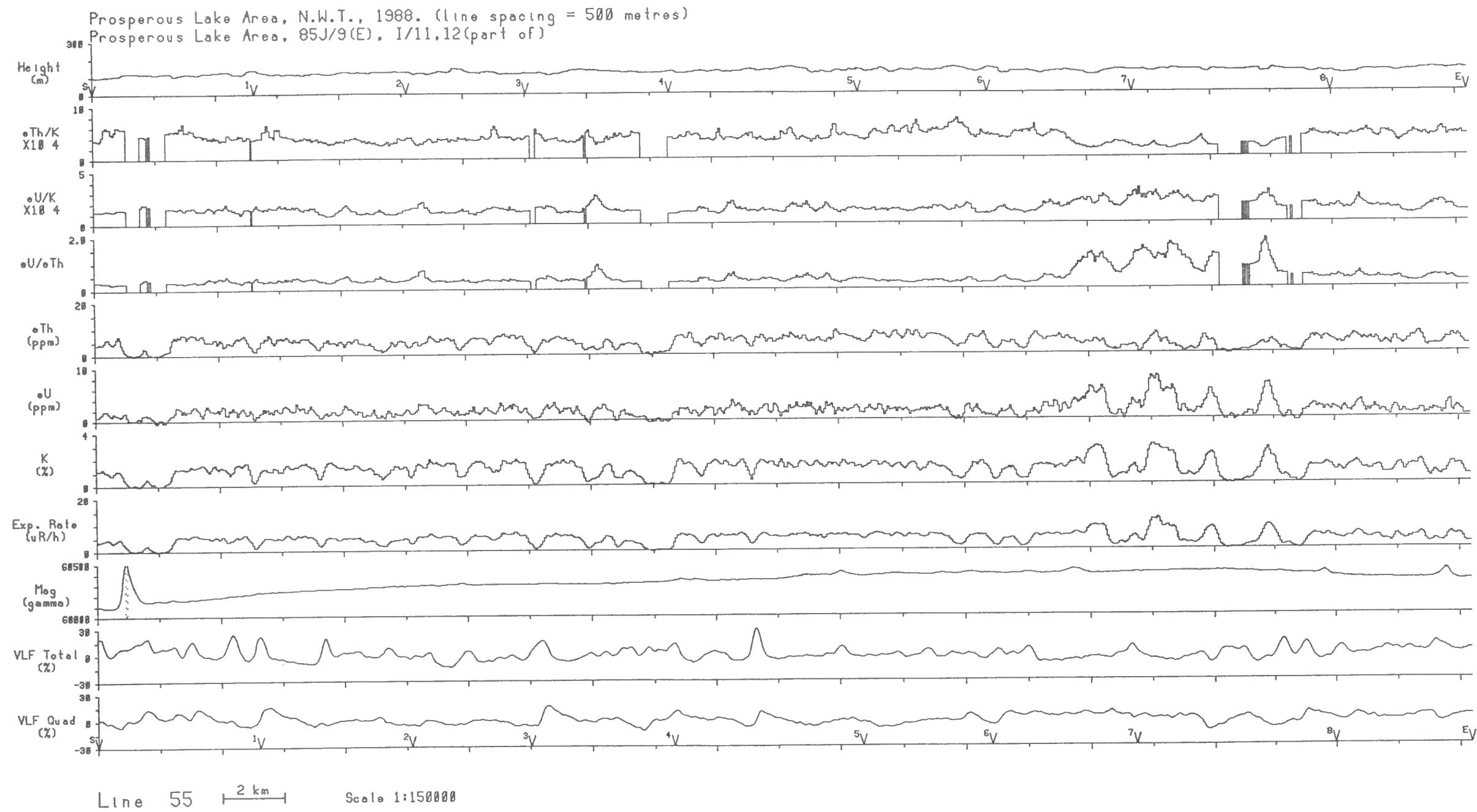




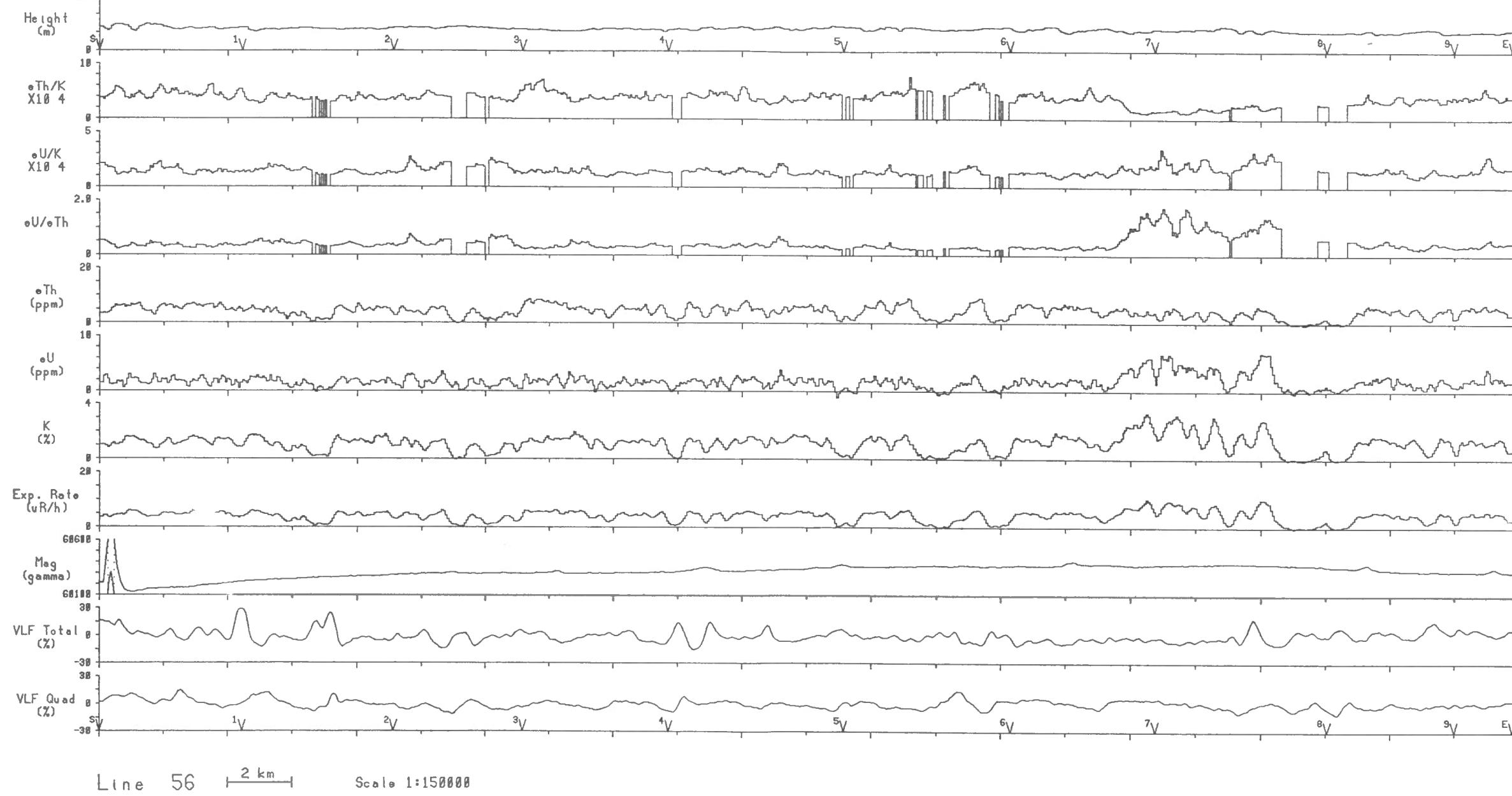






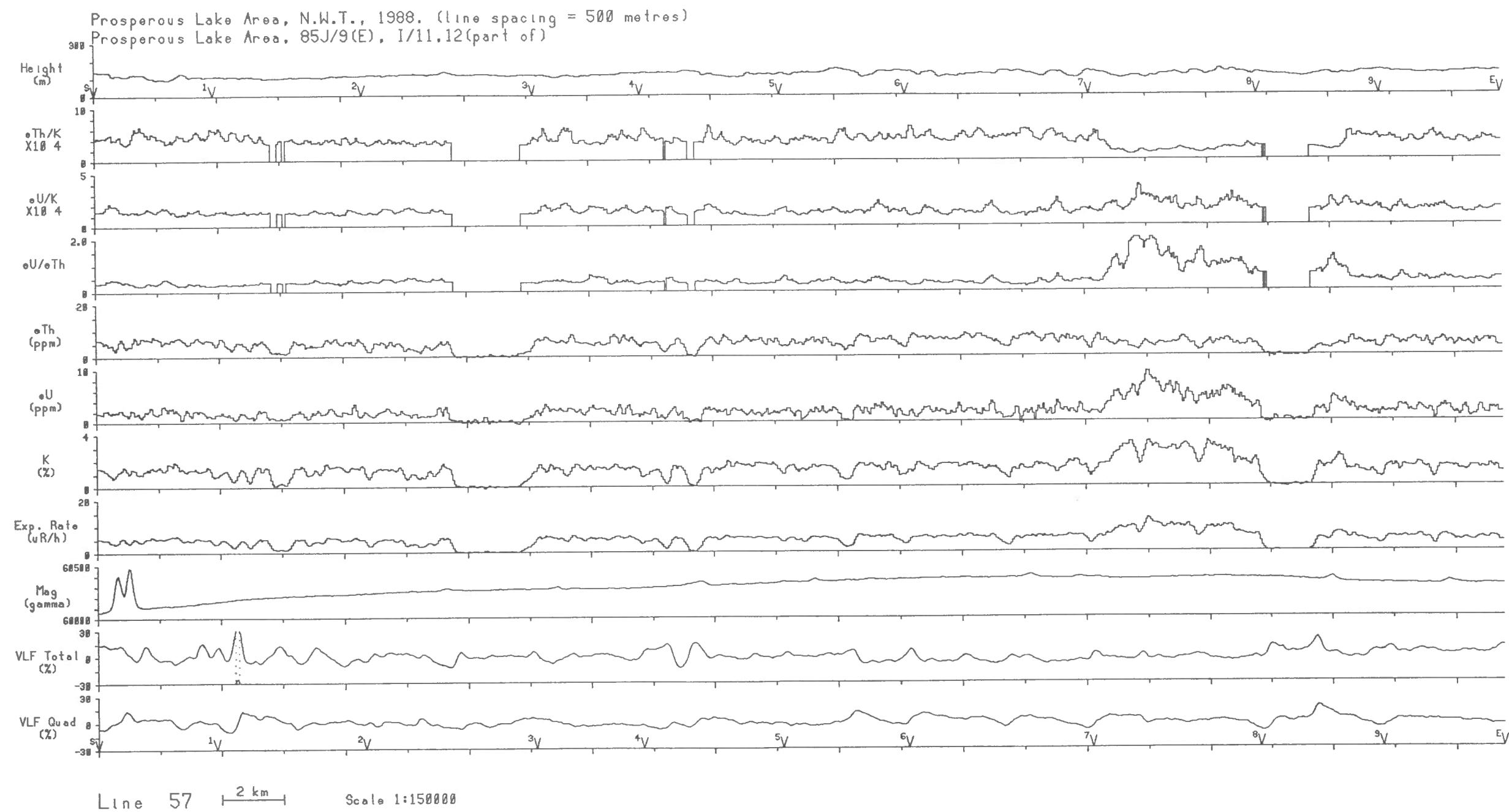


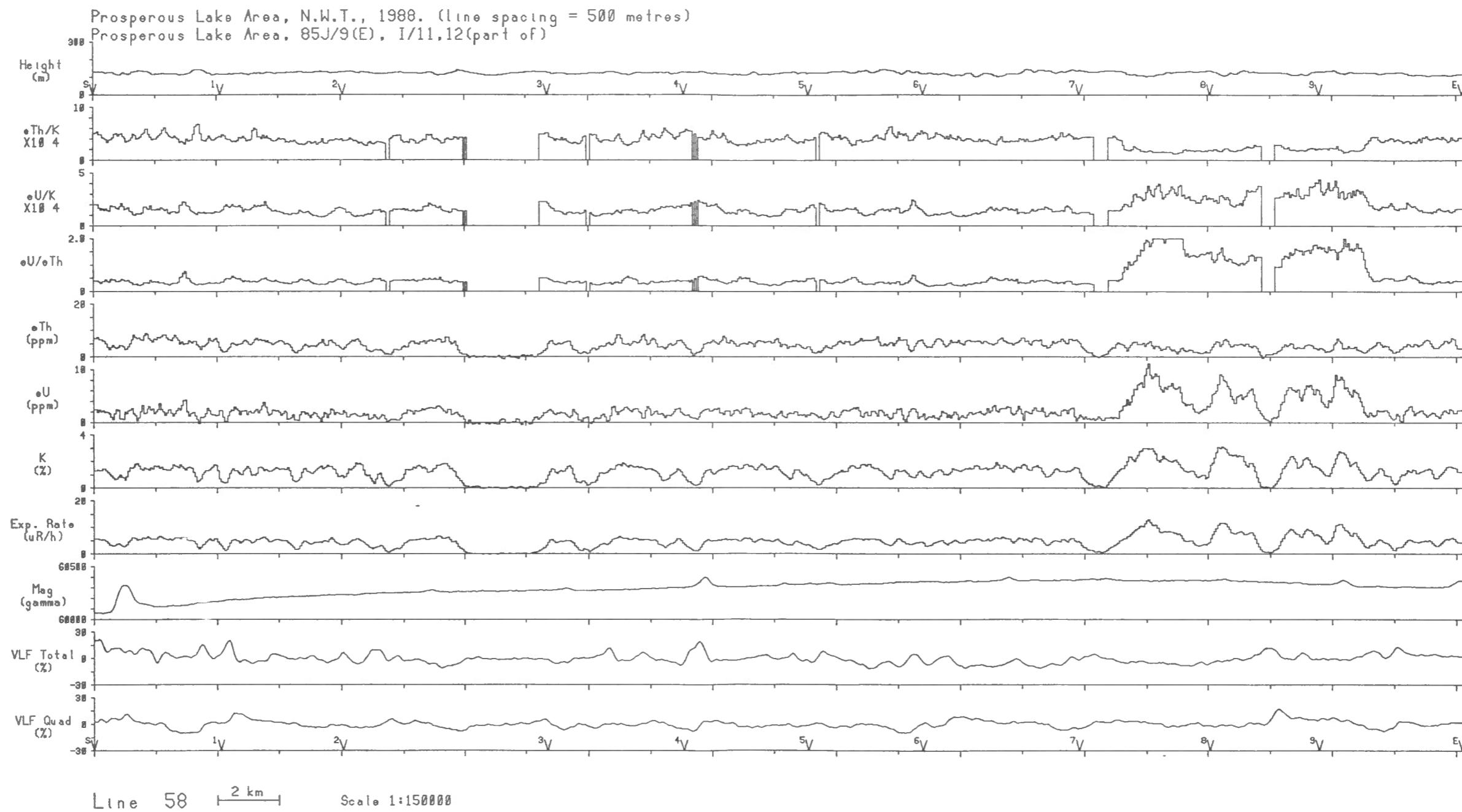
Prosperous Lake Area, N.W.T., 1988. (line spacing = 500 metres)
Prosperous Lake Area, 85J/9(E), I/11,12(part of)

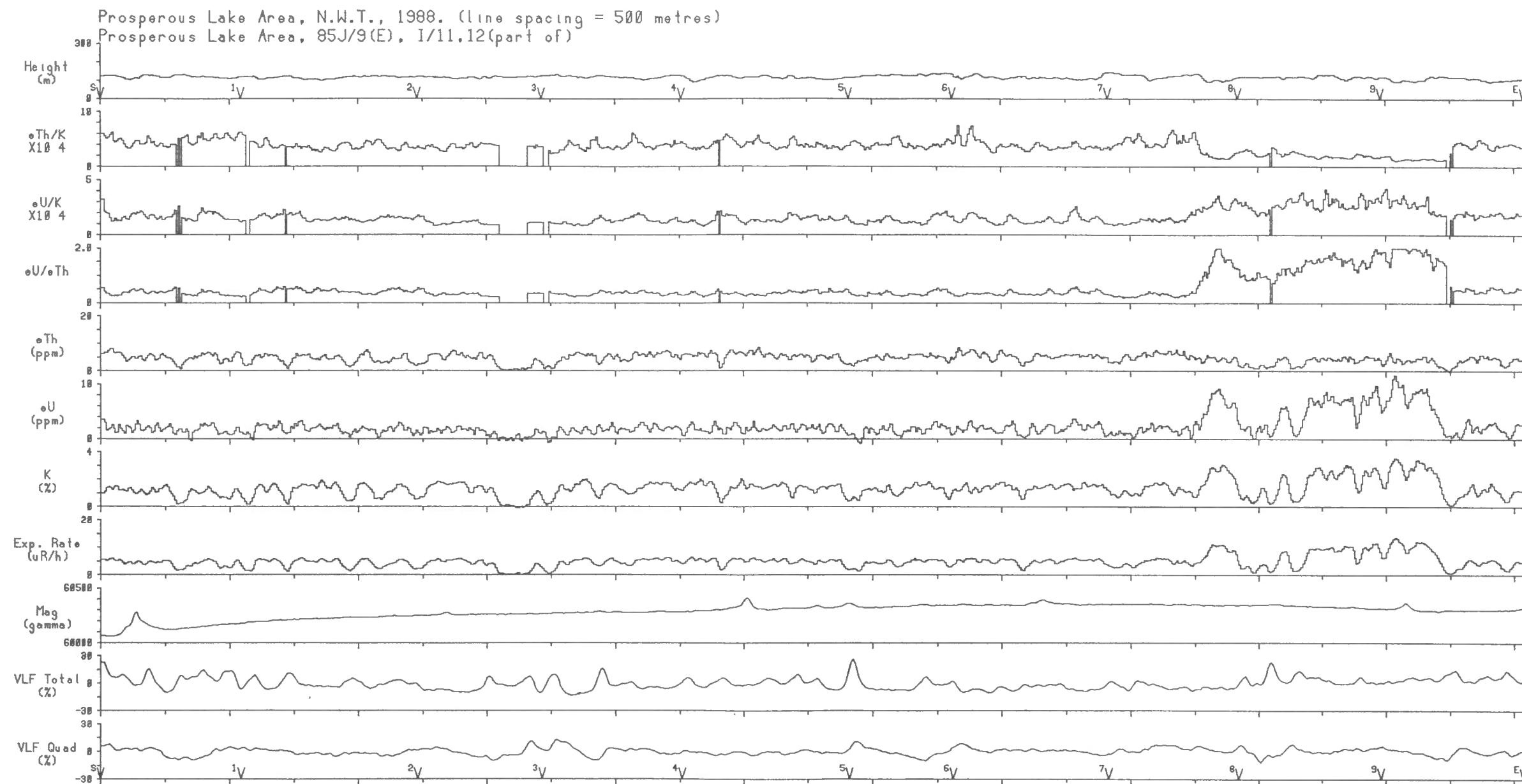


Line 56 2 km

Scale 1:150000

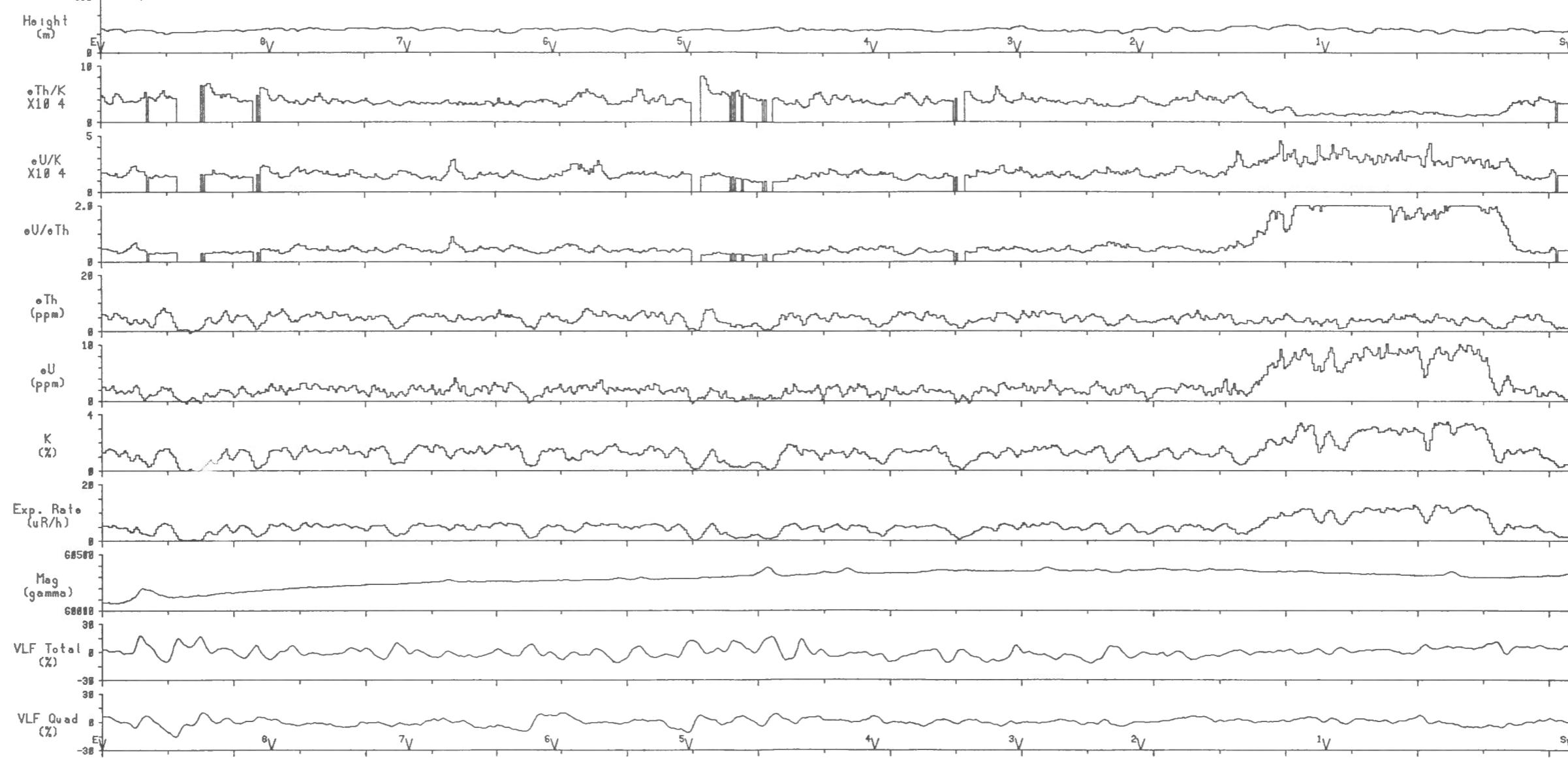






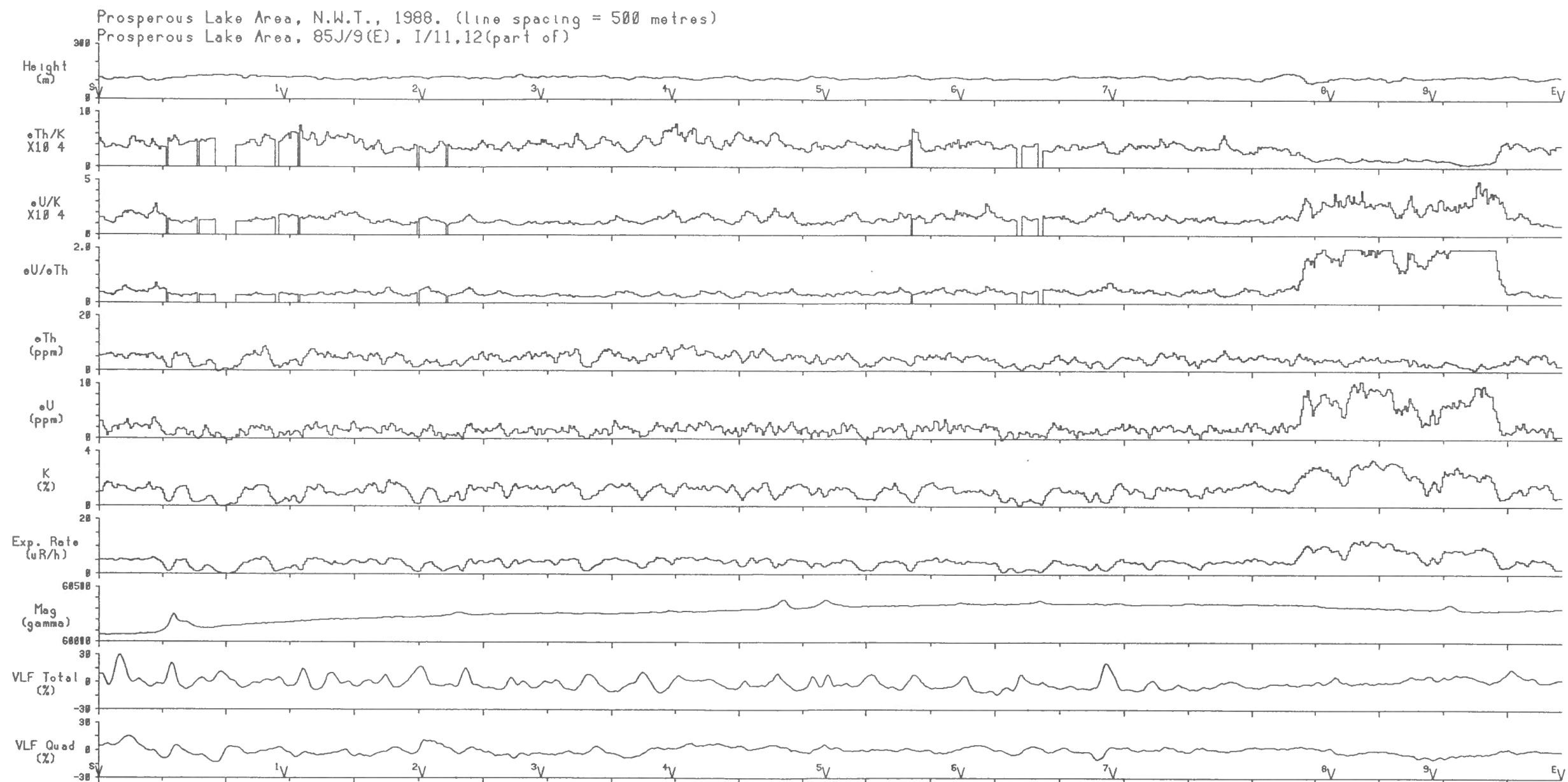
Line 59 2 km Scale 1:150000

Prosperous Lake Area, N.W.T., 1988. (line spacing = 500 metres)
Prosperous Lake Area, 85J/9(E), I/11.12(part of)

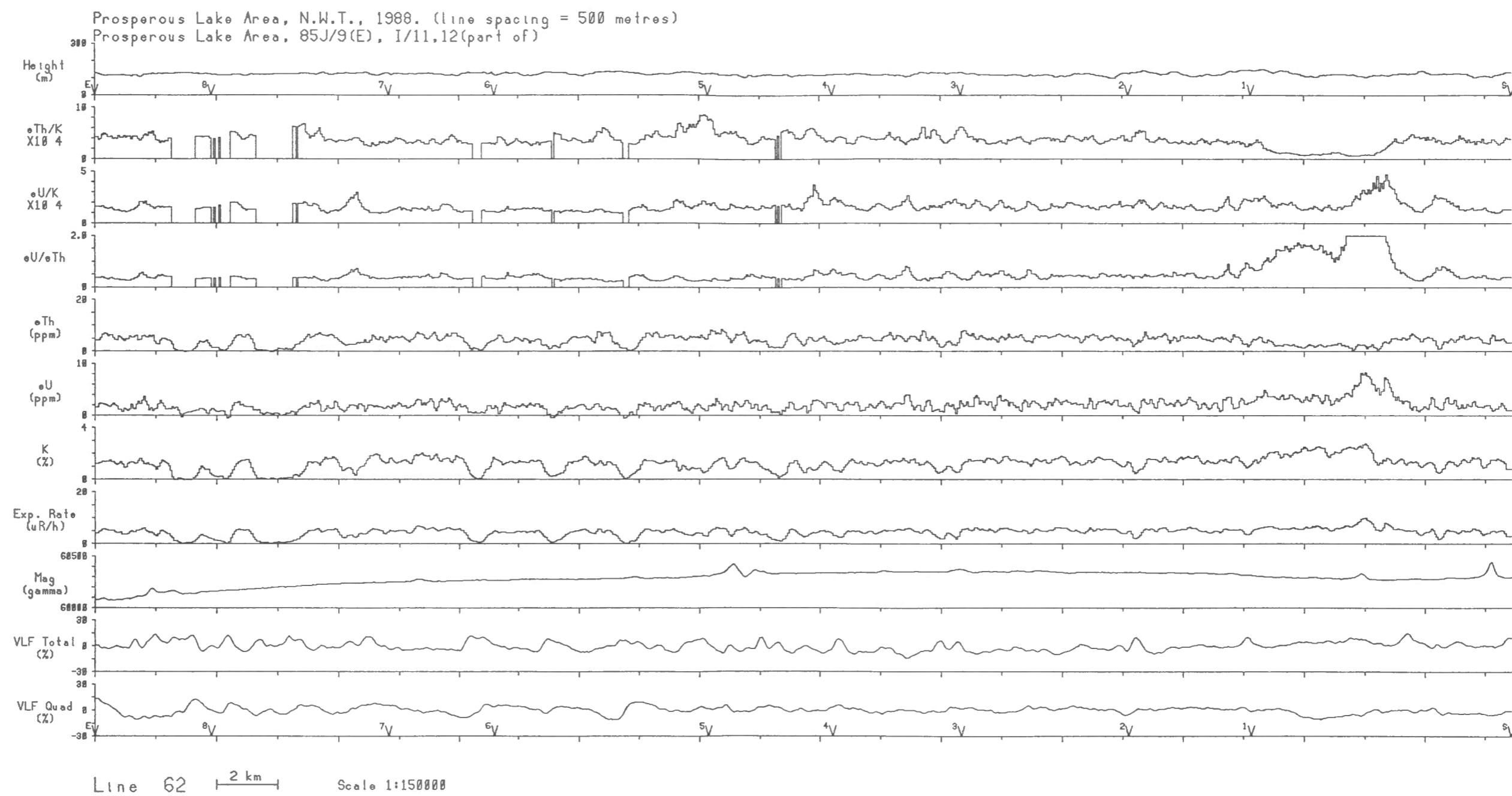


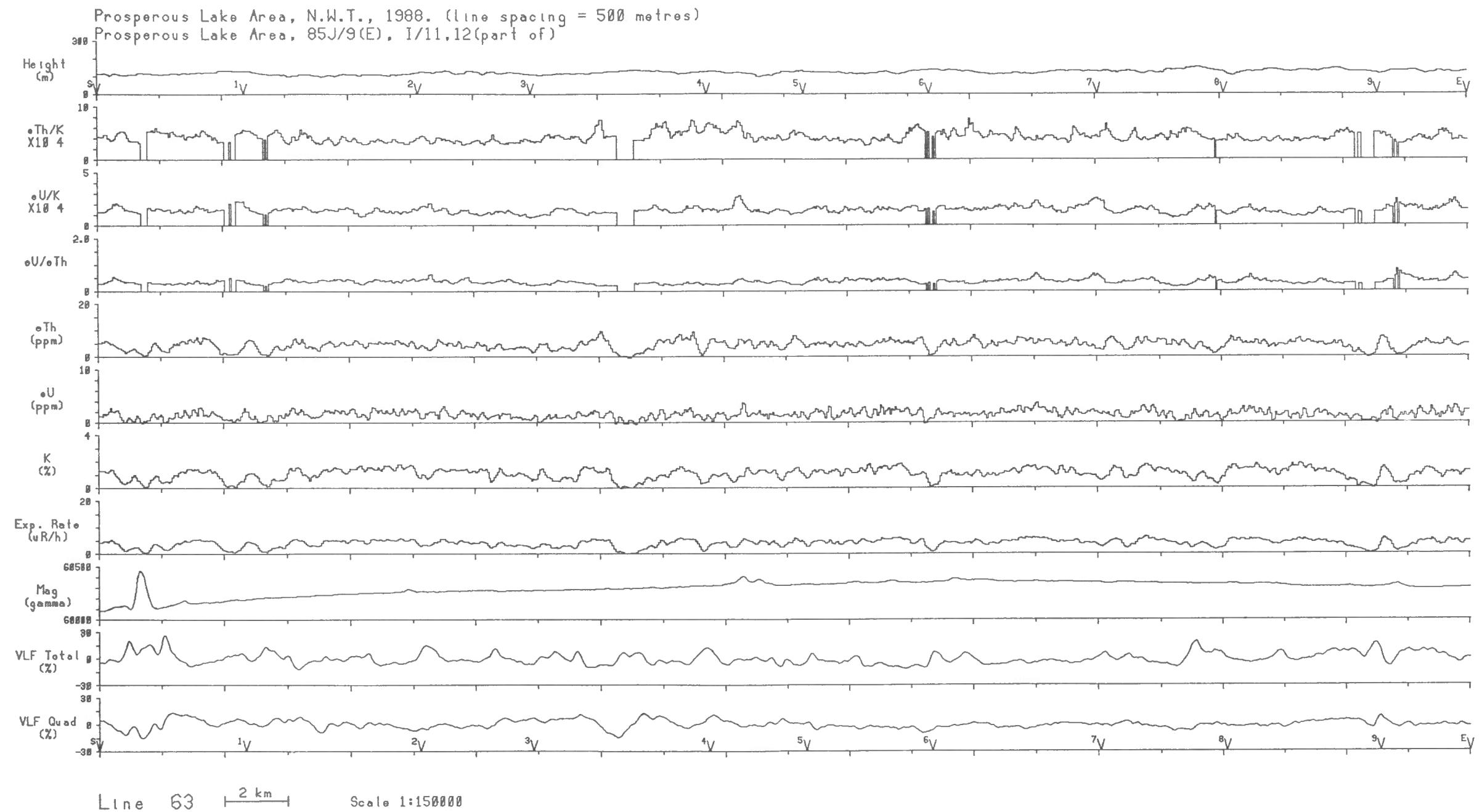
Line 60 2 km

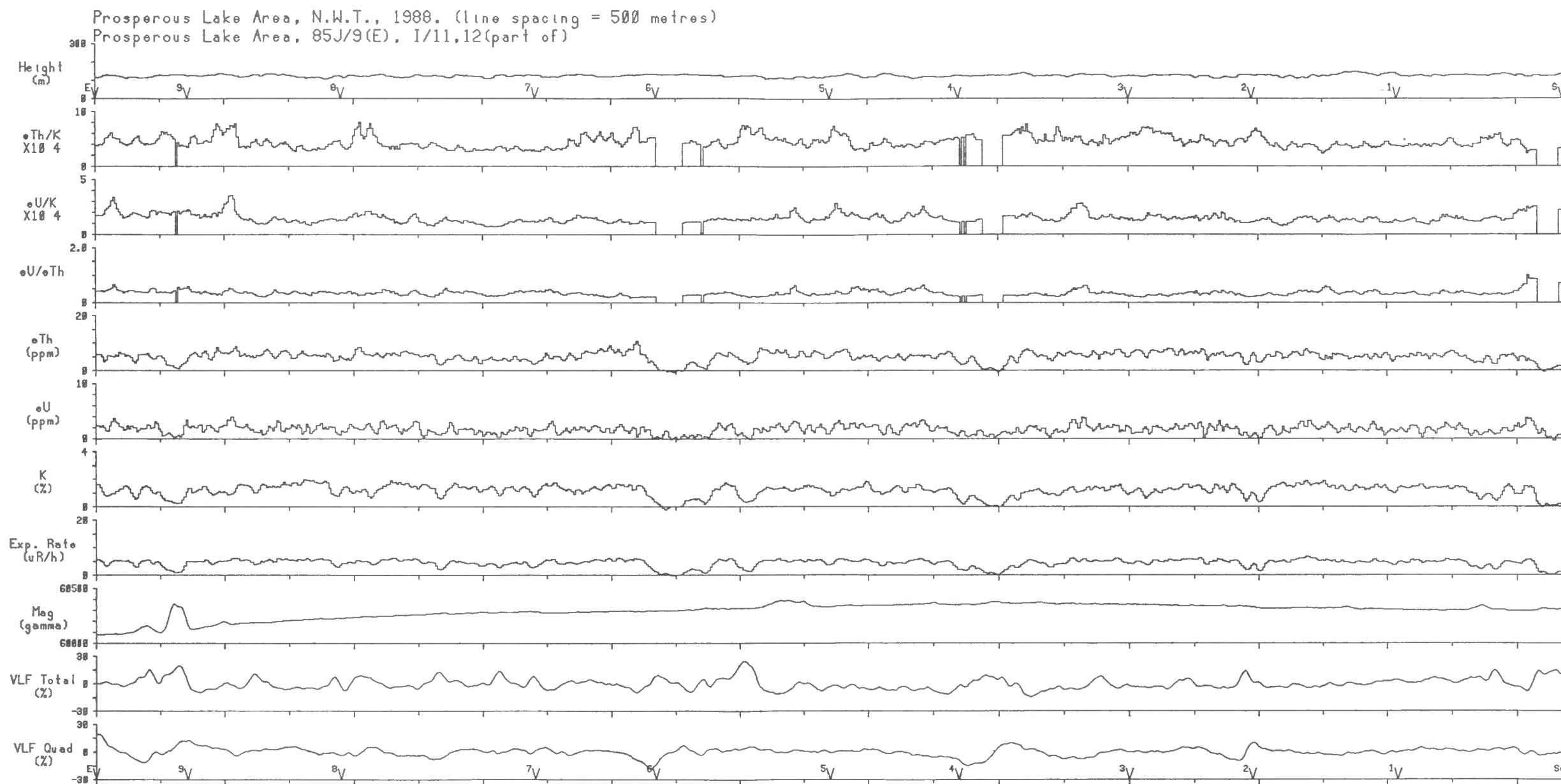
Scale 1:150000



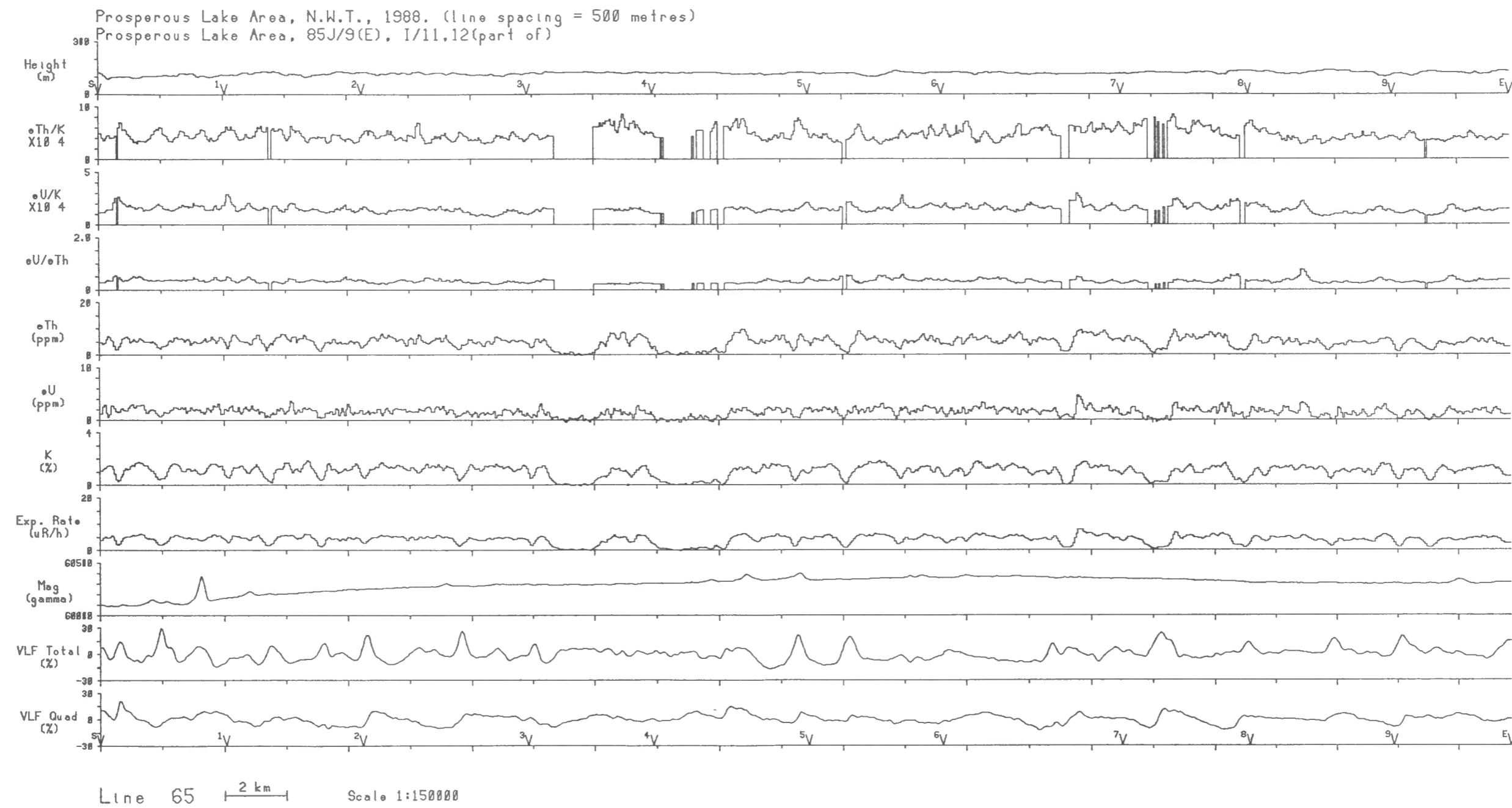
Line 61 2 km Scale 1:150000





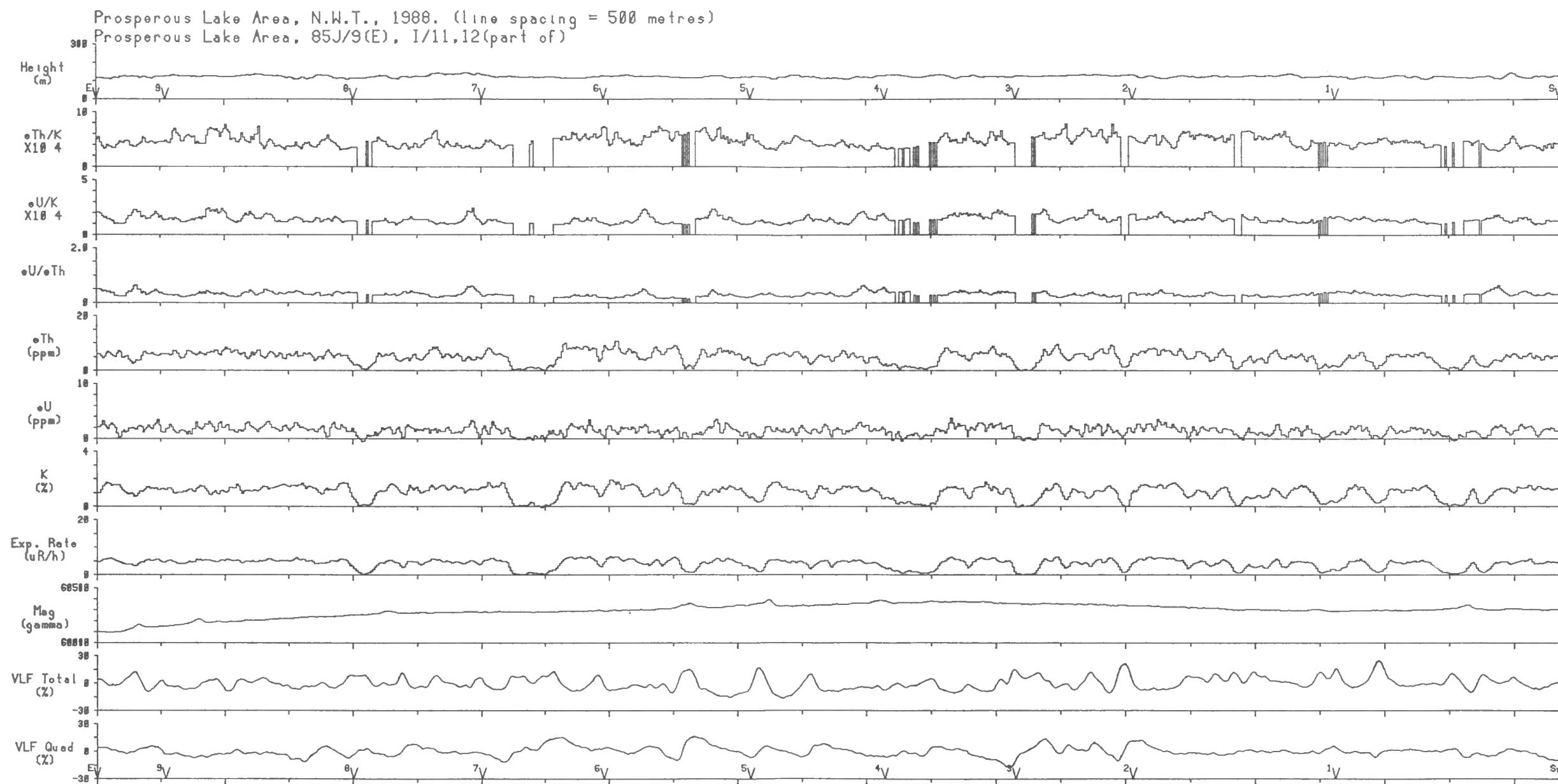


Line 64 2 km Scale 1:150000



Line 65 2 km

Scale 1:150000



Line 66 2 km Scale 1:150000