Public-data File 91-22ff

NATIONAL URANIUM RESOURCE EVALUATION GEOCHEMICAL DATA FOR STREAM- AND LAKE-SEDIMENT SAMPLES IN THE RUBY QUADRANGLE, ALASKA

by

M.A. Wiltse

Alaska Division of
Geological & Geophysical Surveys

December 1990

THIS REPORT HAS NOT BEEN REVIEWED FOR TECHNICAL CONTENT (EXCEPT AS NOTED IN TEXT) OR FOR CONFORMITY TO THE EDITORIAL STANDARDS OF DGGS.

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INTRODUCTION

Purpose:

In December of 1990 the Alaska Division of Geological and Geophysical Surveys (ADGGS) began a mineral resource evaluation of those lands still available for state selection under the Alaska Statehood Act. As part of that process ADGGS is reviewing the stream- and lake-sediment geochemical data generated during the U.S. Department of Energy, National Uranium Resource Evaluation (NURE) program.

This Public-data File has been released so that a summary of that data is available to interested persons. This publication has not been formally reviewed for technical accuracy or for conformity to the editorial standards of ADGGS.

Scope of data:

ADGGS has reviewed NURE geochemical data for the following 1:250,000 quadrangles:

Anchorage	ANC
Baird Mountains	XBM
Beaver	BVR
Bendeleben	BEN
Bering Glacier	XBG
Bettles	BET
Big Delta	XBD
Black River	BLR
Candle	CAN
Chandalar	CHN
Charley River	CHR
Circle	CIR
Eagle	EAG
Gulkana	GUL
Healy	Hea
Hughes	hug
Iditarod	IDT
Kateel River	KAT
Lime Hills	LIM
Livengood	LIV
Medfra	MED
Melozitna	MLZ
Misheguk Mountain	MIS
Mount Hayes	XMH
Nabesna	NAB

Nome	NOM
Norton Bay	NOB
Nulato	NUT
Phillip Smith Mountains	PSM
Point Hope	XPH
Point Lay	XPL
Ruby	RUB
Selawik	SLK
Shungnak	SHU
Sleetemute	SLT
Solomon	SOL
Talkeetna Mountains	TLM
Tanacross	TNX
Tanana	TAN
Teller	TEL
Umiat	UMI
Unalakleet	UKT
Utukok River	XUR
Valdez	VAL
Wiseman	WIS

Limitations of data:

Our review has been limited to the following elements: Ag, As, Au, Ba, Be, Bi, Cd, Co, Cr, Cu, Fe, La, Mn, Mo, Ni, Pb, Sb, Sn, Ti, U, U/Th, V, W, Zn

The Nure data set also contains analyses for: Al, Ca, Ce, Cl, Cs, Dy, Eu, Hf, K, Li, Lu, Mg, Na, Nb, Rb, Sc, Sm, Sr, Ta, Tb, Th, Yb, Zr. These data have not been analyzed in the present study.

Because of the procedures used in generating the initial chemical analyses, the NURE geochemical data set has severe limitations. Many elements were determined at only a few sample sites resulting in many samples having incomplete data coverage. The detection limit for many elements is high, making those data of limited effectiveness in delineating mineral resources. Regardless of these and other shortcomings, however, the NURE data do provide information concerning mineralization in many poorly accessible parts of Alaska.

Contents:

This Public-data File (PDF), and the PDF's for the above listed quadrangles, contain a columnar ASCII file on a 5 1/4" high density floppy disk that includes: sample number, replicate code, sample type code, latitude, longitude, and the complete set of elemental analyses available for each sample in the quadrangle. These data are consistently ordered in the file as shown below:

Sample number, Replicate code, Latitude, Longitude, Sample-type code, U Ag Bi Cd Cu Nb Ni Pb Sn W As Zr Mo Be Li Al Au Ba Ca Ce Cl Co Cr Cs Dy Eu Fe Hf K La Lu Mn Mg Na Rb Sb Sc Sm Sr Ta Tb Th Ti V Yb Zn U/Th

All values are entered as parts per million. The data file bears a three letter identification and the extension "ASC" (eg. EAG.ASC for the Eagle Quadrangle data file).

A sample replicate code of "0" indicates that the sample is the initial sample taken at a site and is the code found for most samples. Subsequent samples collected from the same site have successively higher integer designations. Sample type codes range from "01" to "99". The definition of these codes is found in Appendix A "Key to Sample Types".

Within the elemental analysis fields of a sample, values of -999 indicate that no analyses was attempted for that element. Other negative numbers (eg. -5) in an elemental analysis field of a record indicate that the element was not detected at a level equal to the absolute value of the negative number tabulated.

TREATMENT OF DATA

Elements:

Although all the elemental NURE data available for a quadrangle is included in the digital ASCII file supplied with this PDF, only a 24 element subset of data was analyzed for this PDF: Ag, As, Au, Ba, Be, Bi, Cd, Co, Cr, Cu, Fe, La, Mn, Mo, Ni, Pb, Sb, Sn, Ti, U, U/Th, V, W, Zn.

Grouping of data:

The majority of the Alaska Nure geochemical data is derived from stream sediment or lake sediment samples. Many data sets, however, have a few samples that are subtypes of these two fundamental sample groups. For the purpose of the data review released in this PDF, all subtype samples have been recoded to either the stream sediment type or the lake sediment type, whichever type they most closely resembled. We estimate that less than 1 percent of the samples encountered in this review were recoded.

Following sample-type recoding, brief summary statistics were calculated separately for the stream sediment samples (type=12) and for the lake sediment samples (type=13). These statistics provide a quick reference to the number of samples that have analytical values exceeding the detection limit and provide an indication of the geochemical dispersion of the elements for each sample type.

Single-element Pseudomaps of the data have been made that show the location of all samples having analytical values greater than the mean. This was accomplished by separately standardizing the data for each sample type, recoding all standard scores that were less-than-or-equal-to-zero to zero and then plotting a symbol at each sample site, the size of which is proportional to the elemental standardized value (Z-score) at that sample site. Because Z-scores are measures of standard deviation, this procedure results in a psuedomap with varying symbol size that directly reflects how far a sample's element content is above the mean. The larger symbols correspond to element values that are farthest above the mean value for the element in question. A Symbol-size key is provided in figure 1 which indicates the symbol size for element abundances from 1 to 6 standard deviations above the mean.

THE FOLLOWING RESULTS ARE FOR:
TYPE = 12.000

TOTAL OBSERVATIONS: 283

	U	AG	BI	CD	CU
N OF CASES	283	0	5	2	280
MINIMUM	0.160	.	5.000	5.000	10.000
MAXIMUM	14.900	.	6.000	9.000	108.000
MEAN	2.893	.	5.600	7.000	28.257
STANDARD DEV	1.209	.	0.548	2.828	10.578

	NI	PB	SN	W	AS
N OF CASES	264	160	5	6	272
MINIMUM	16.000	5.000	10.000	15.000	5.000
MAXIMUM	172.000	32.000	21.000	45.000	447.000
MEAN	34.125	7.613	14.200	21.833	16.199
STANDARD DEV	15.764	2.940	4.207	11.669	30.132

	MO	BE	AU	BA	CO
N OF CASES	0	0	7	266	283
MINIMUM	.	.	0.340	284.000	7.500
MAXIMUM	.	.	0.890	1925.000	196.000
MEAN	.	.	0.539	833.850	25.328
STANDARD DEV	.	.	0.217	216.398	19.484

	CR	FE	MN	SB	TI
N OF CASES	267	280	283	0	270
MINIMUM	36.000	3341.000	88.000	.	1085.000
MAXIMUM	658.000	282600.000	5756.000	.	10820.000
MEAN	105.266	32679.814	665.322	.	5144.789
STANDARD DEV	67.078	17231.514	467.477	.	1294.938

	V	ZN	UTH	LA
N OF CASES	279	97	267	232
MINIMUM	34.000	35.000	0.185	13.000
MAXIMUM	252.000	343.000	0.868	87.000
MEAN	124.093	132.361	0.389	32.263
STANDARD DEV	30.020	62.044	0.085	10.208

THE FOLLOWING RESULTS ARE FOR:
TYPE = 13.000

TOTAL OBSERVATIONS: 410

	U	AG	BI	CD	CU
N OF CASES	410	0	1	1	407
MINIMUM	0.330	.	5.000	5.000	12.000
MAXIMUM	5.640	.	5.000	5.000	120.000
MEAN	2.429	.	5.000	5.000	36.248
STANDARD DEV	0.601	.	.	.	13.760

	NI	PB	SN	W	AS
N OF CASES	392	313	1	19	342
MINIMUM	15.000	5.000	10.000	15.000	5.000
MAXIMUM	77.000	46.000	10.000	41.000	1310.000
MEAN	31.551	8.751	10.000	18.316	14.383
STANDARD DEV	8.783	5.031	.	5.841	70.487

	MO	BE	AU	BA	CO
N OF CASES	0	0	5	379	410
MINIMUM	.	.	0.280	403.000	8.000
MAXIMUM	.	.	0.370	2196.000	163.900
MEAN	.	.	0.326	898.850	27.305
STANDARD DEV	.	.	0.043	179.866	20.907

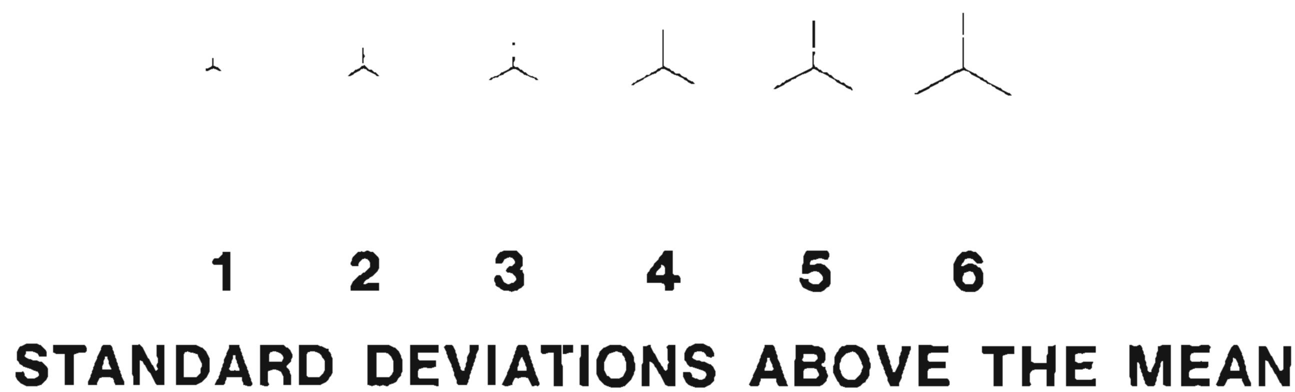
	CR	FE	MN	SB	TI
N OF CASES	372	398	410	2	385
MINIMUM	28.000	3408.000	89.000	4.000	1318.000
MAXIMUM	156.000	166200.000	1550.000	4.000	9594.000
MEAN	79.438	24464.281	404.149	4.000	4336.073
STANDARD DEV	17.600	10571.562	126.064	0.000	882.067

	V	ZN	UTH	LA
N OF CASES	406	174	378	208
MINIMUM	20.000	31.000	0.215	14.000
MAXIMUM	326.000	406.000	0.586	72.000
MEAN	113.961	155.902	0.370	29.990
STANDARD DEV	29.600	69.551	0.068	7.041

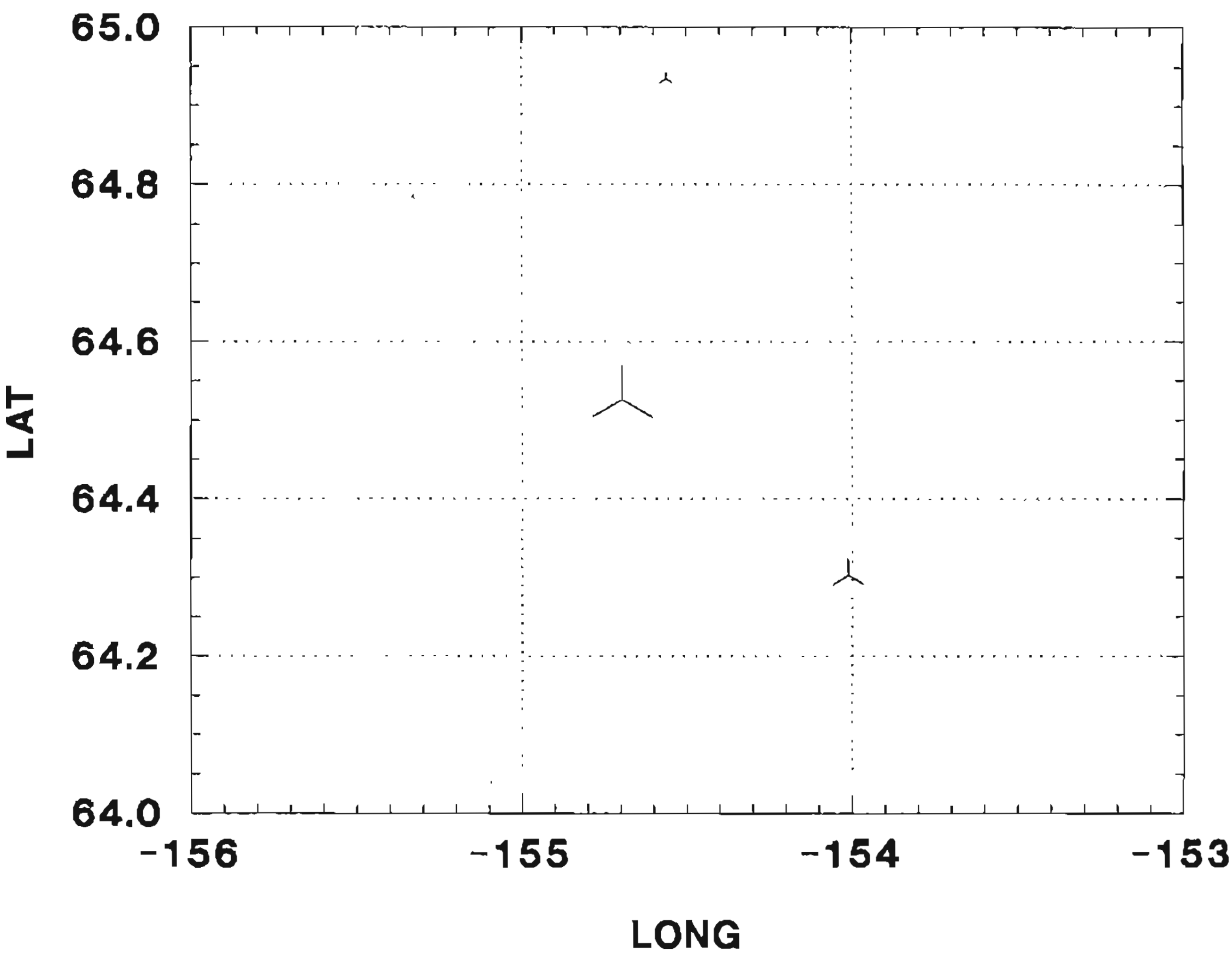
THESE RESULTS ARE FOR rubL NURE DATA

TOTAL OBSERVATIONS: 693

Figure 1. Symbol-size key for single element pseudomaps indicating the size of plotted symbols for values that are from 1 to 6 standard deviations above the mean.



RUBZMAP NURE DATA FOR W



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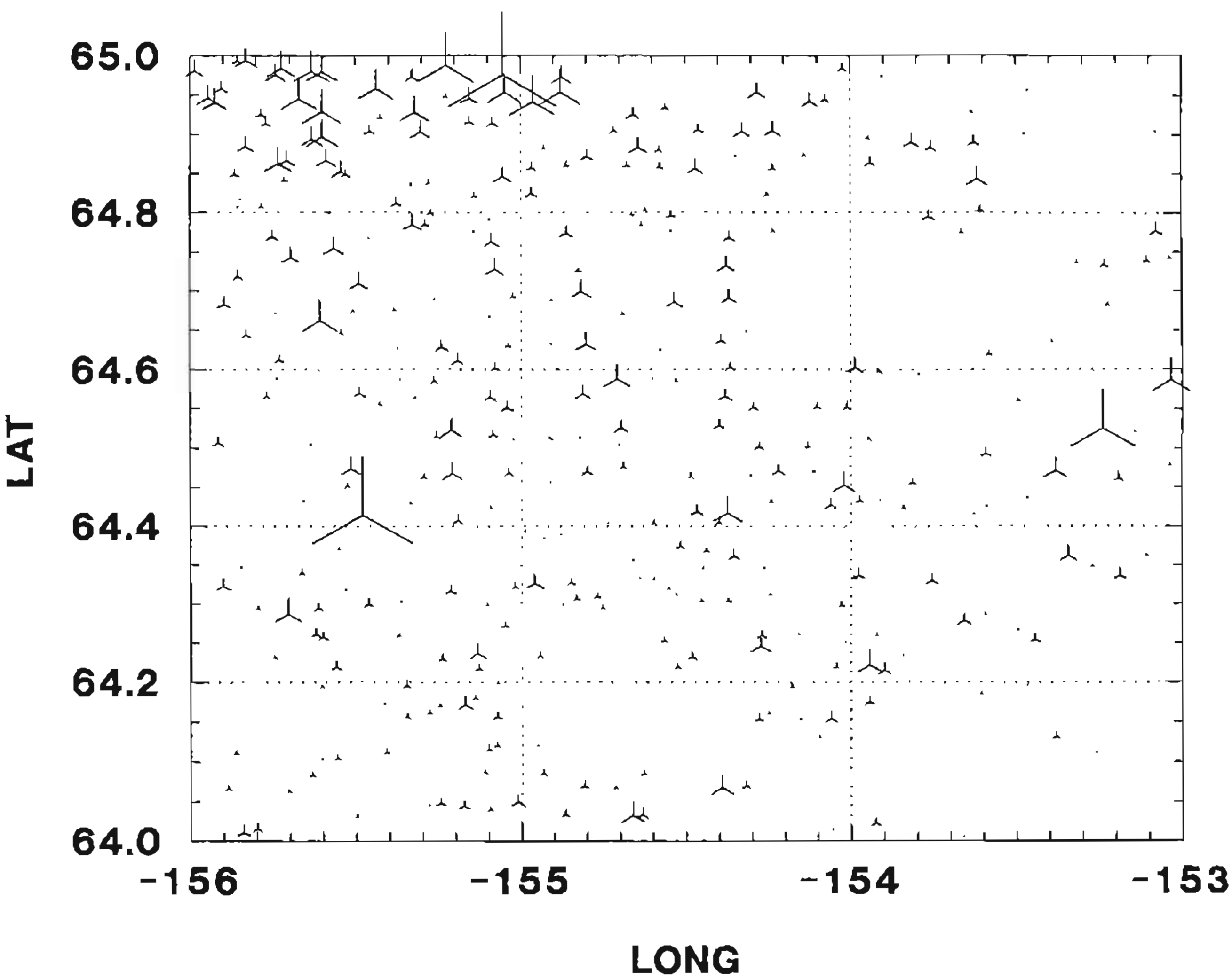

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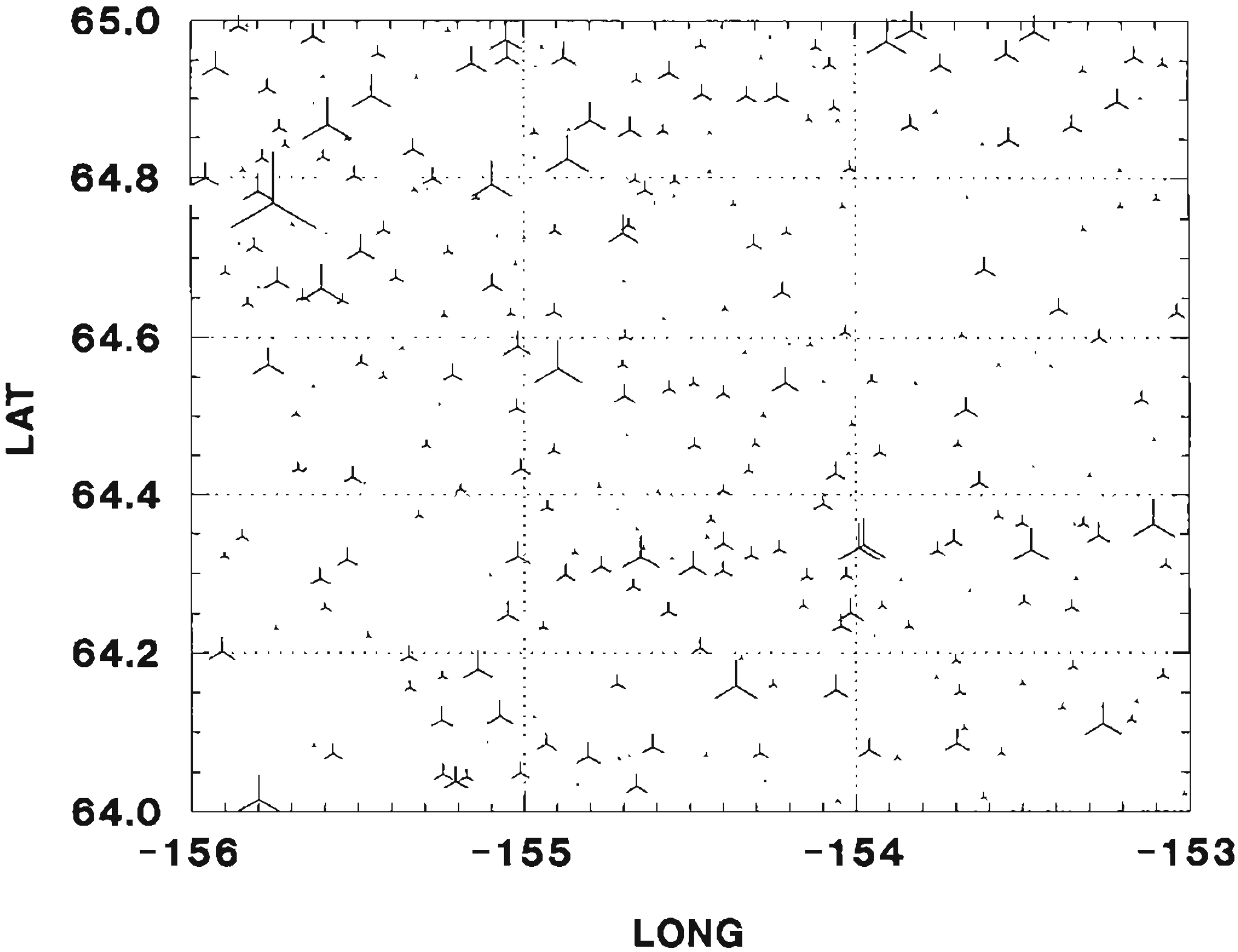

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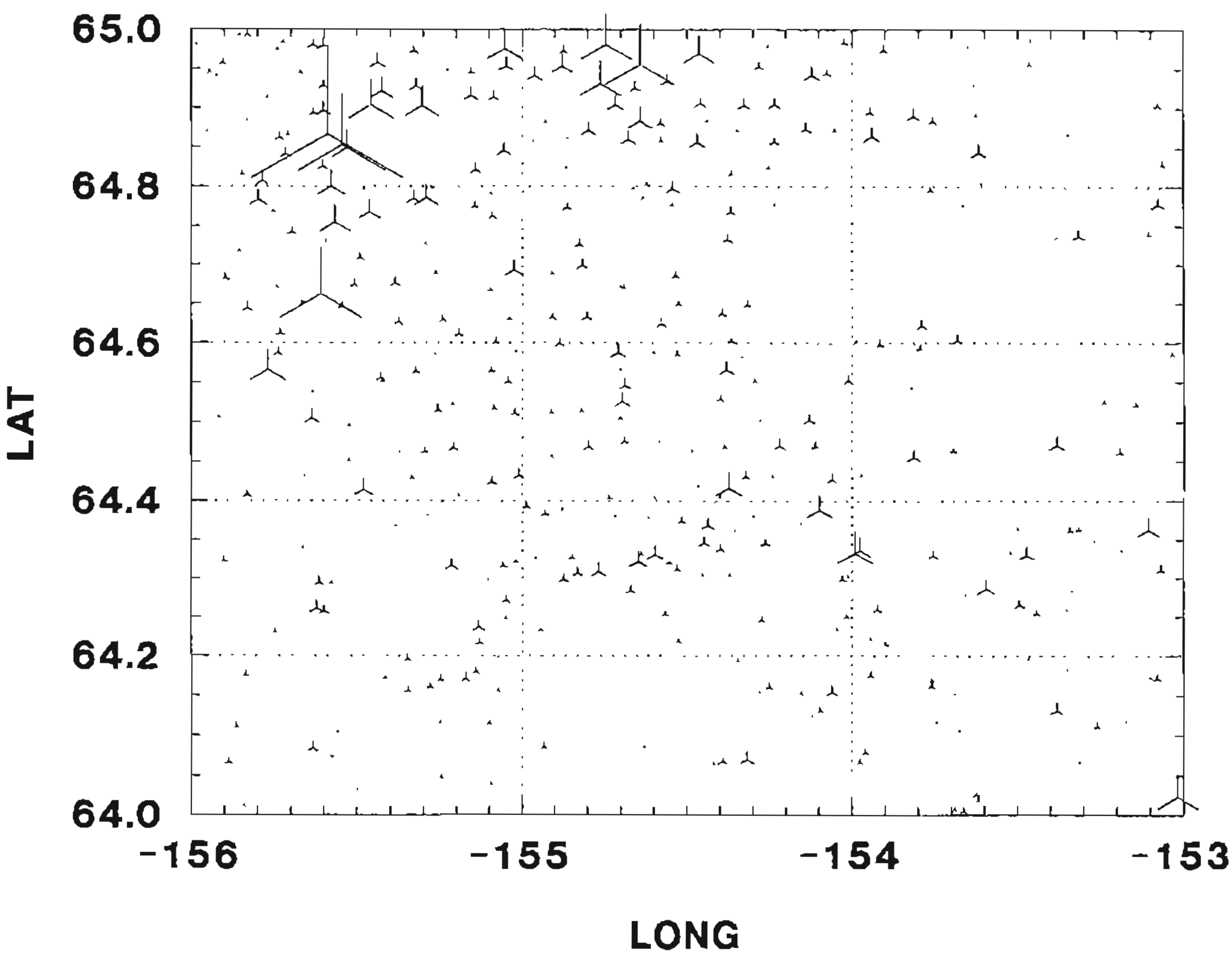

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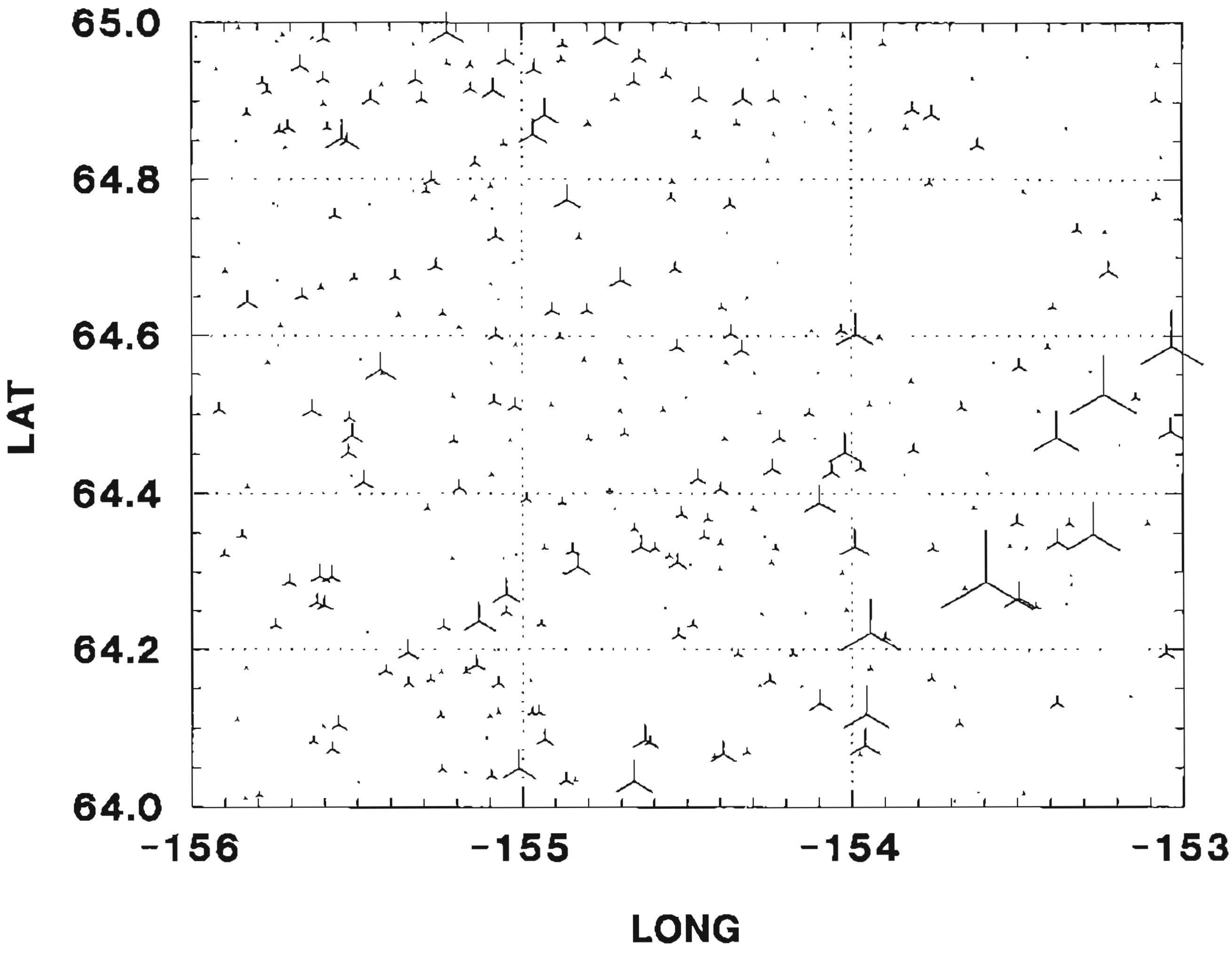

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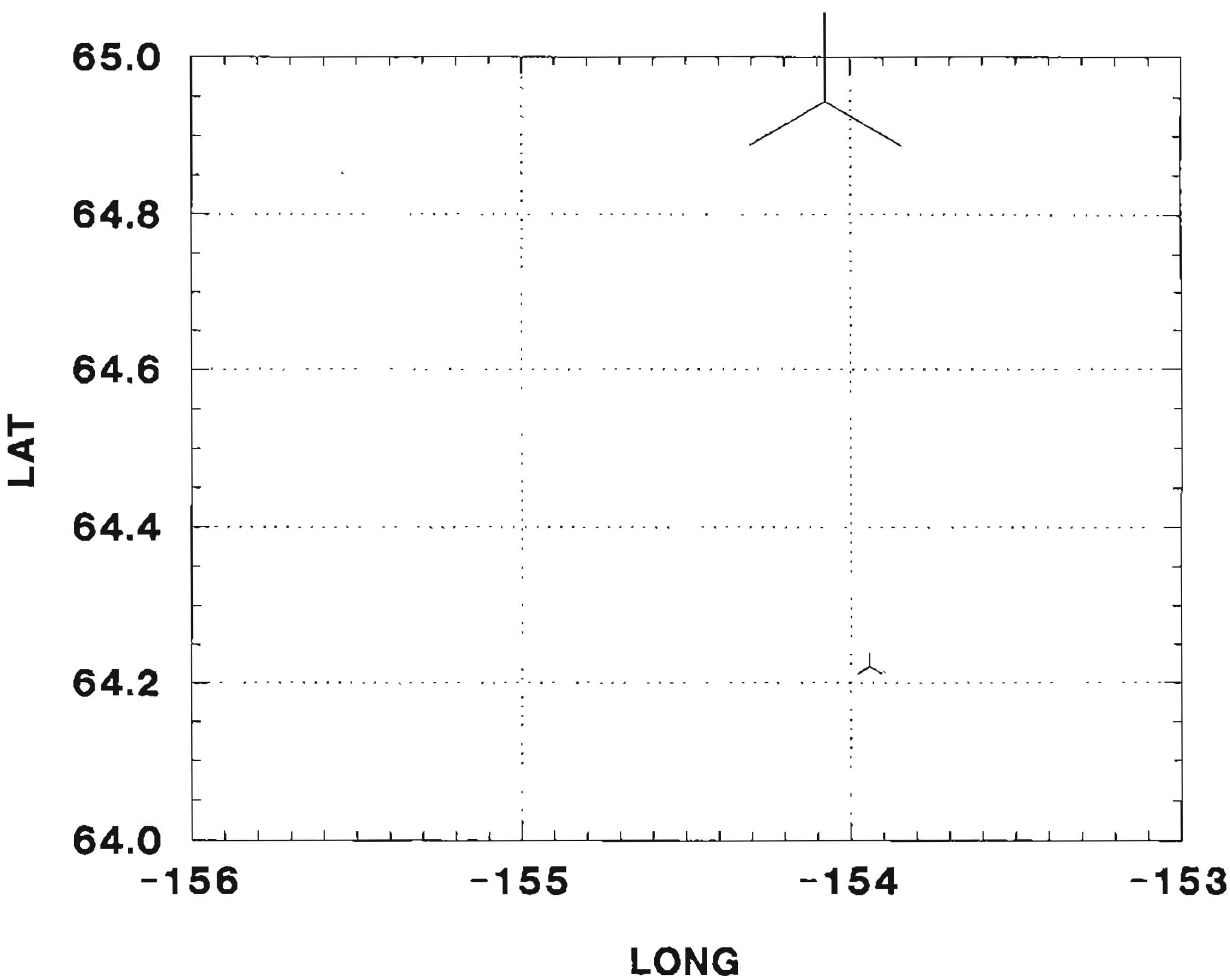
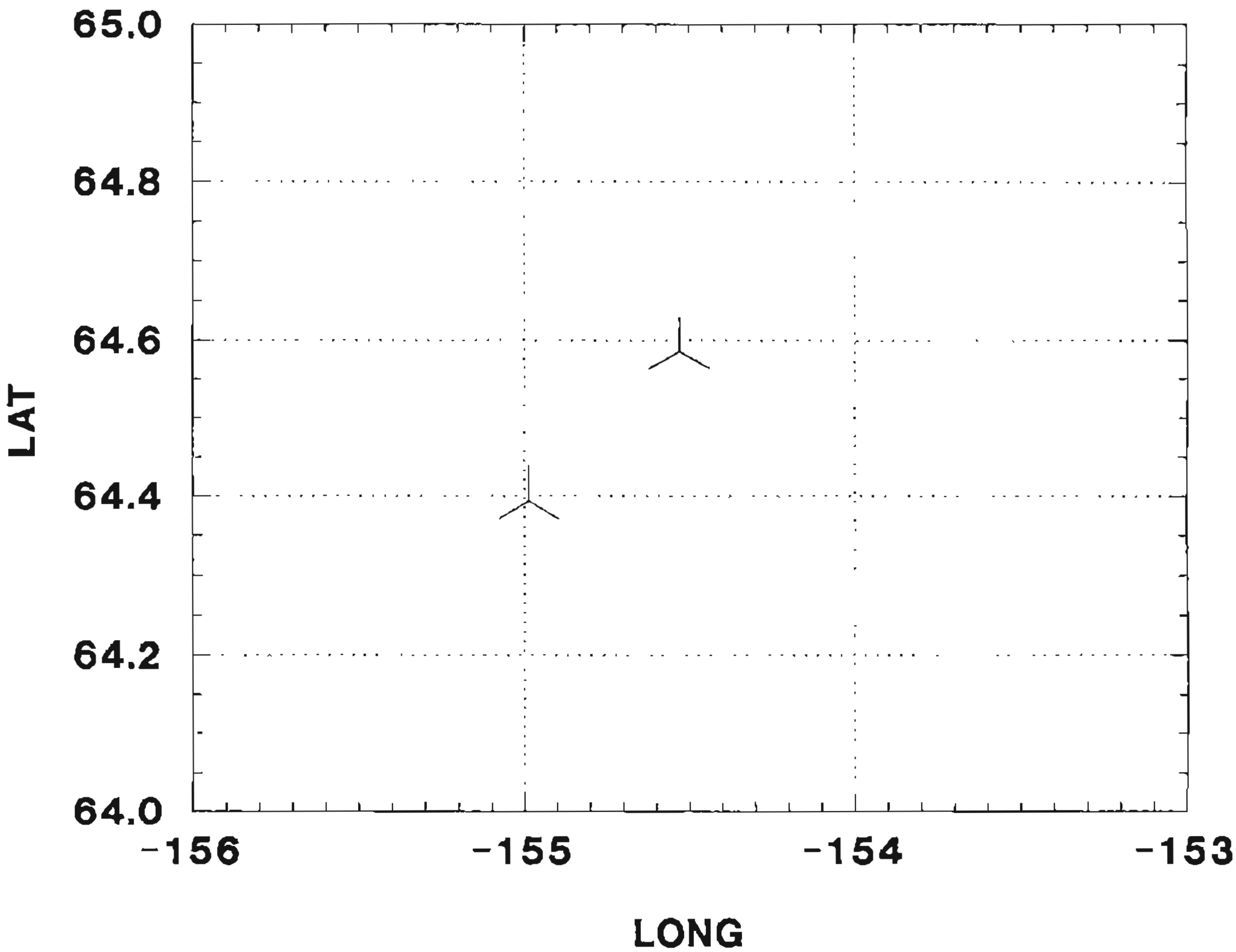
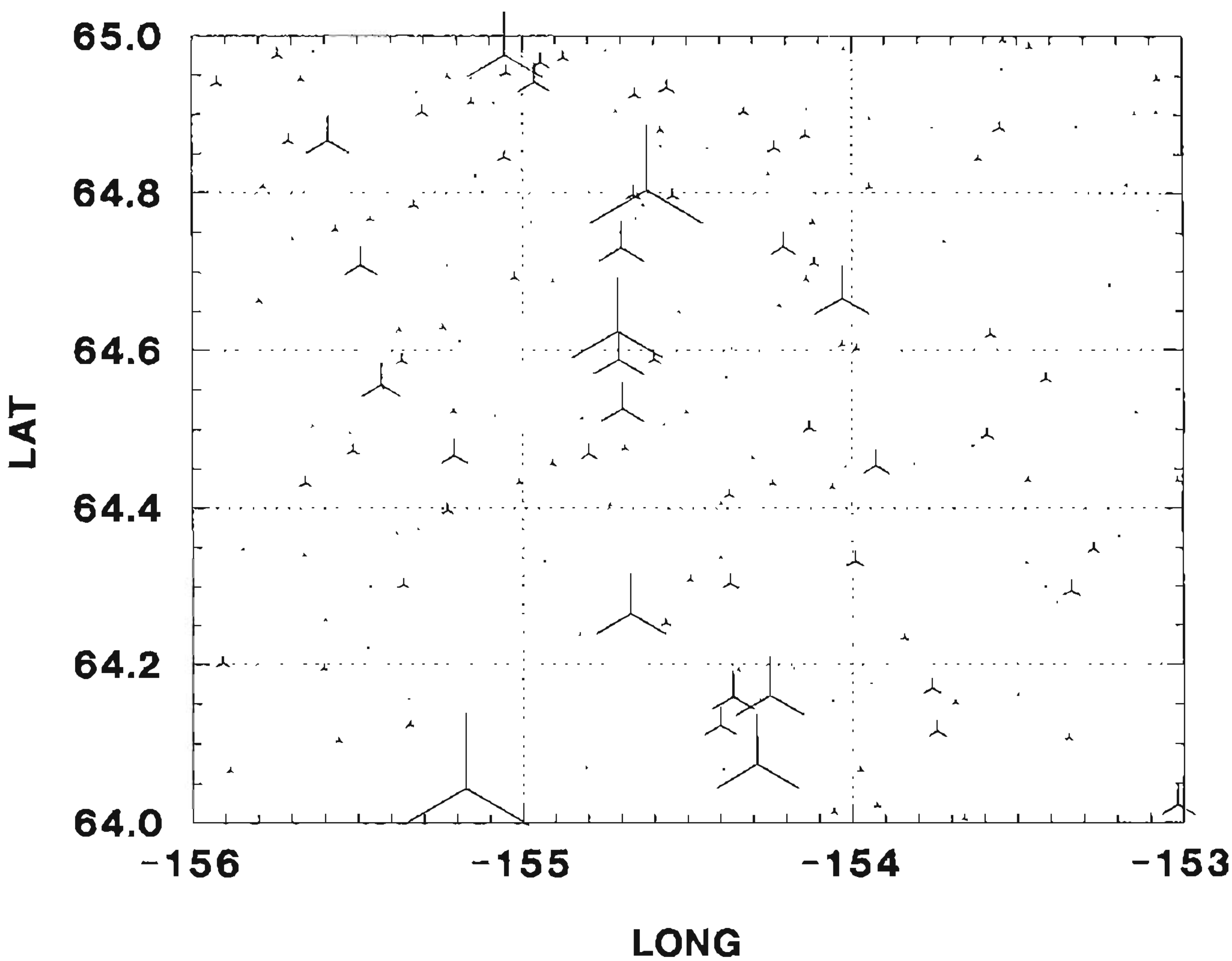


RUBZMAP NURE DATA FOR SB



RUBZMAP NURE DATA FOR PB



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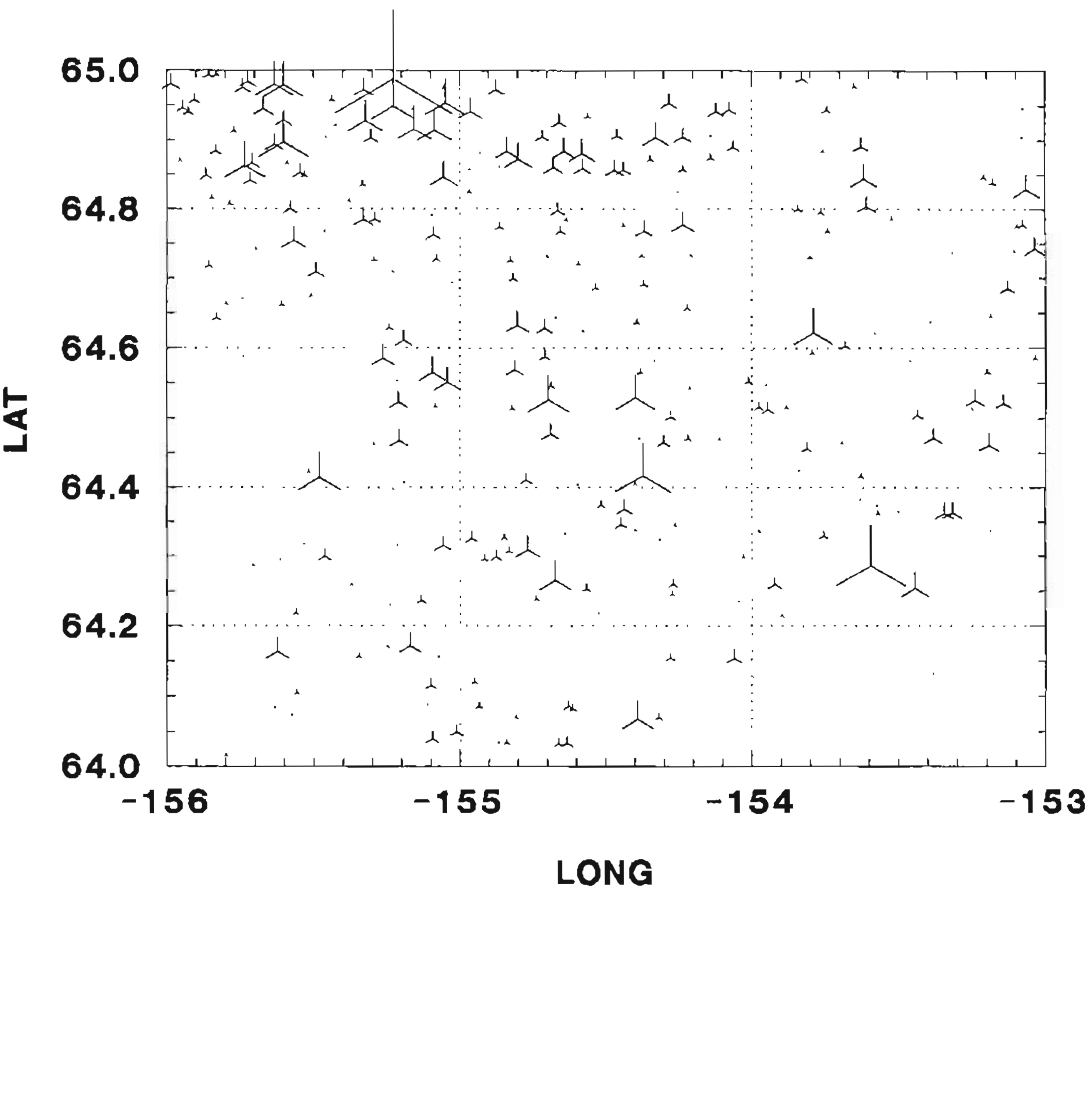

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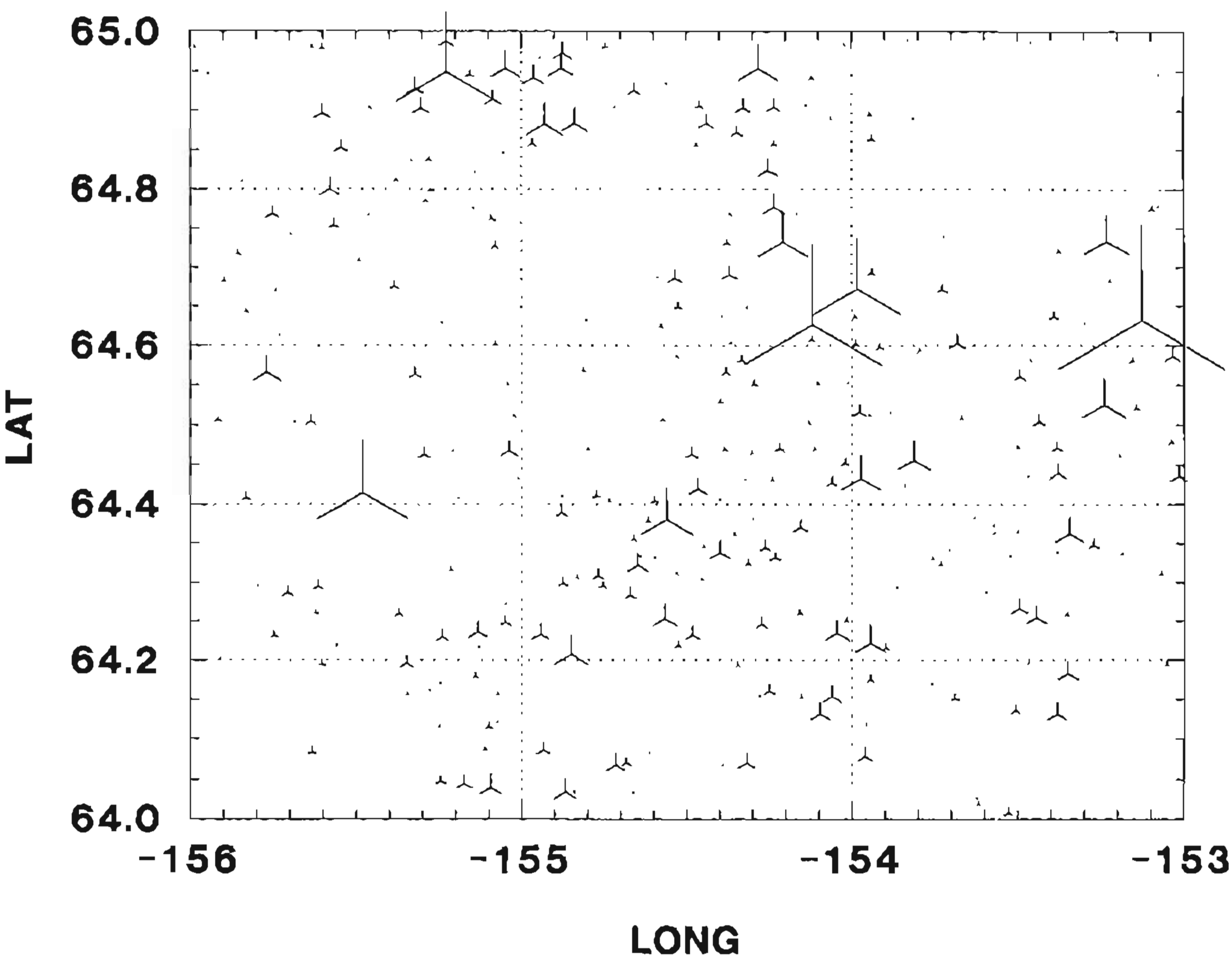
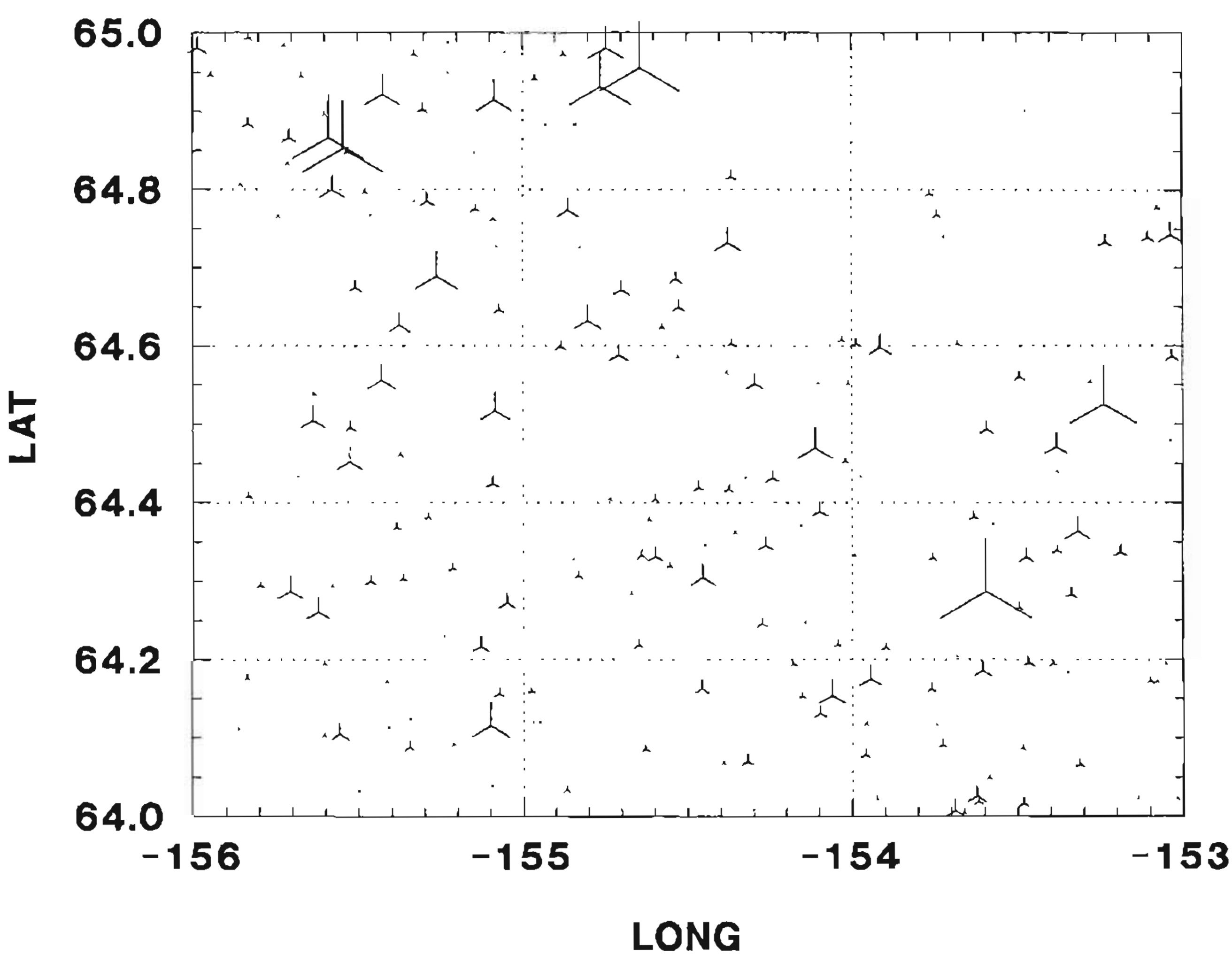
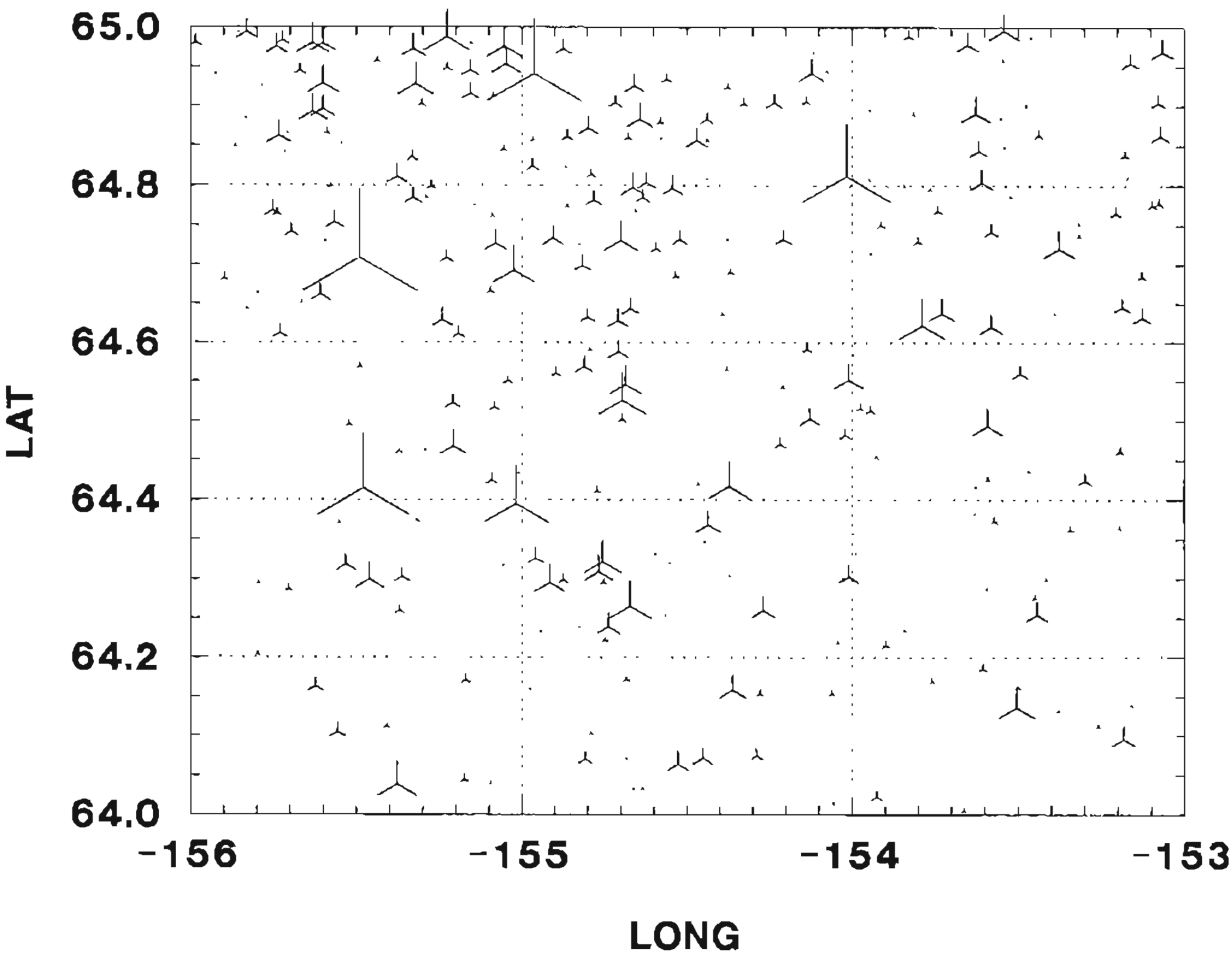


RUBZMAP NURE DATA FOR LA



RUBZMAP NURE DATA FOR CU



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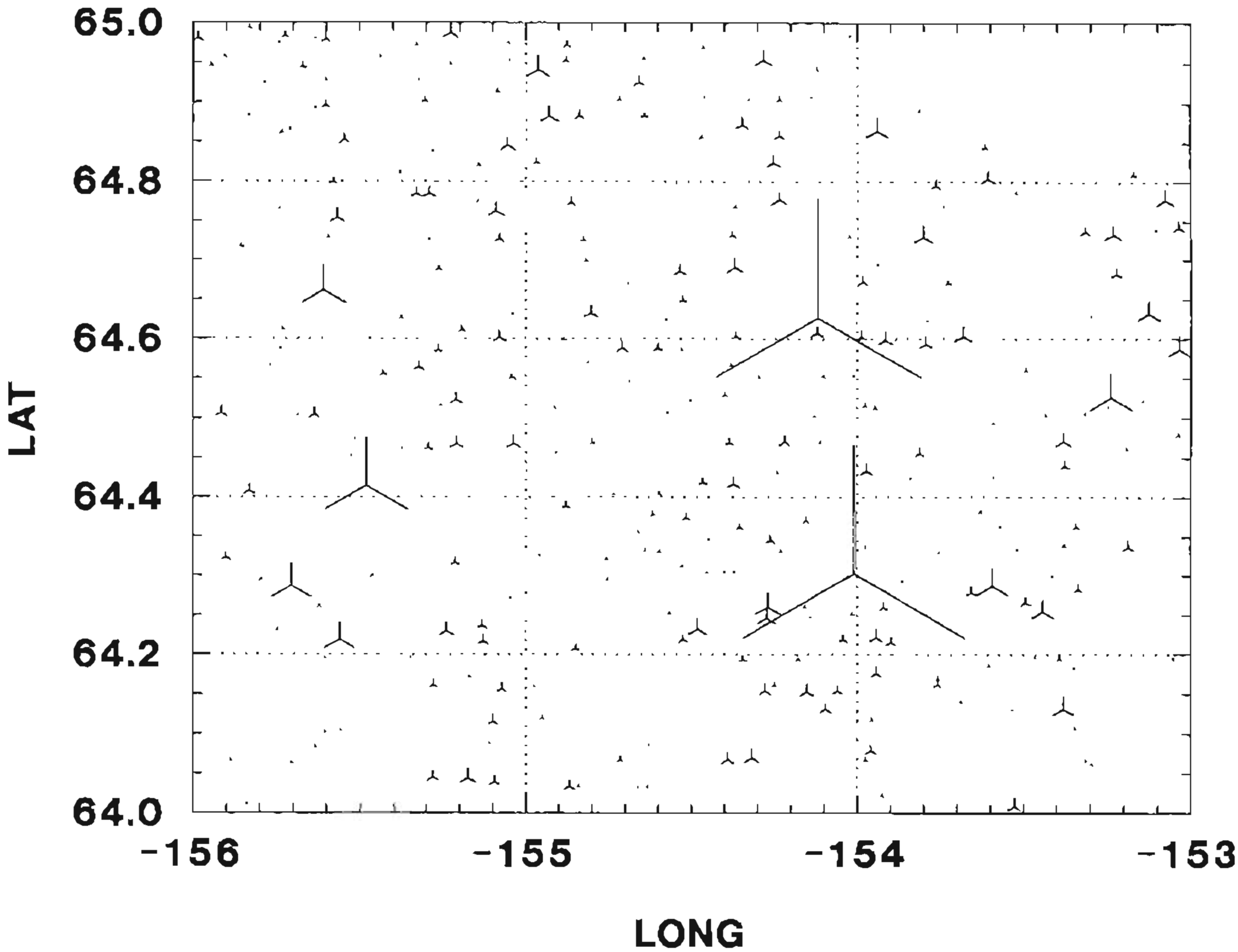

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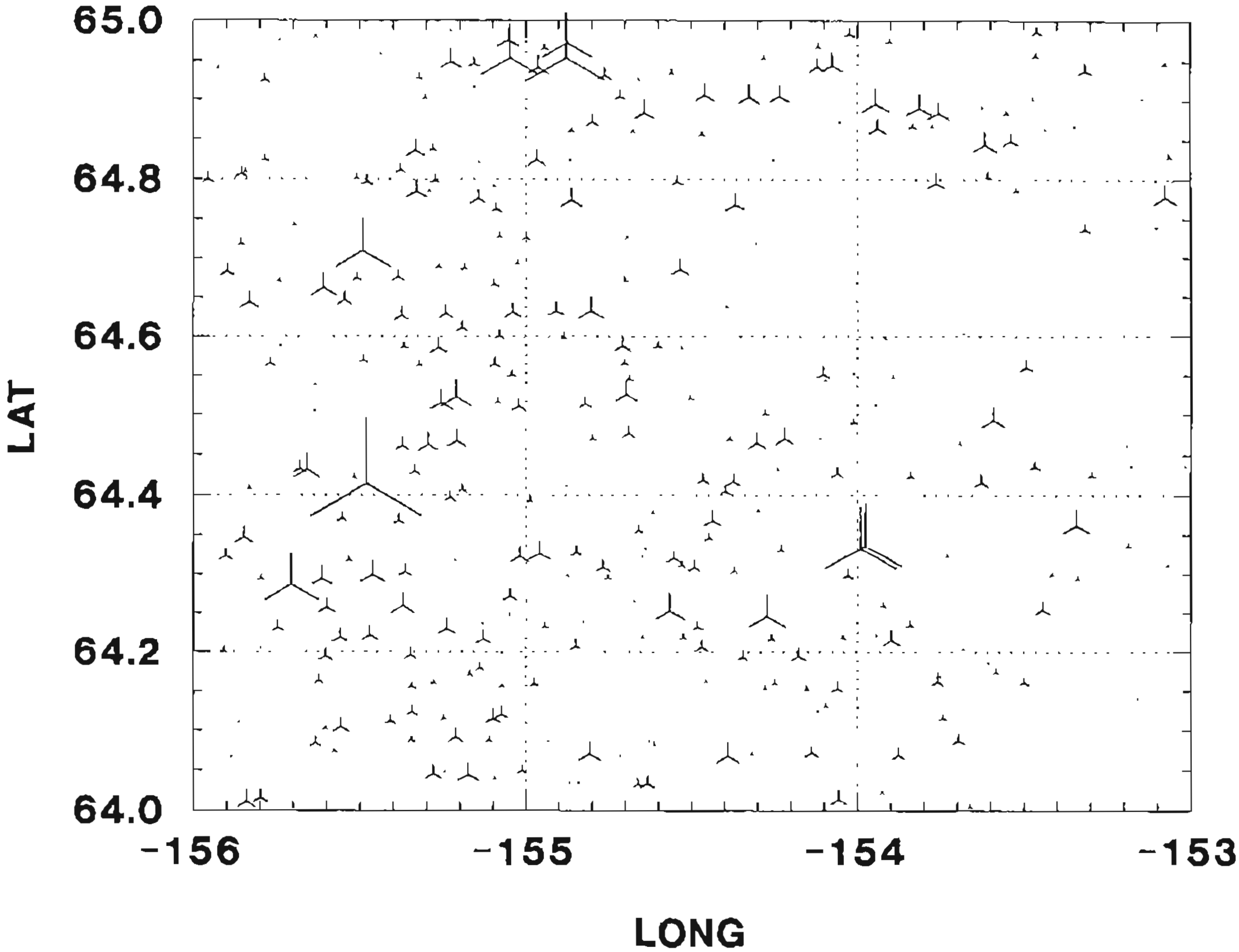
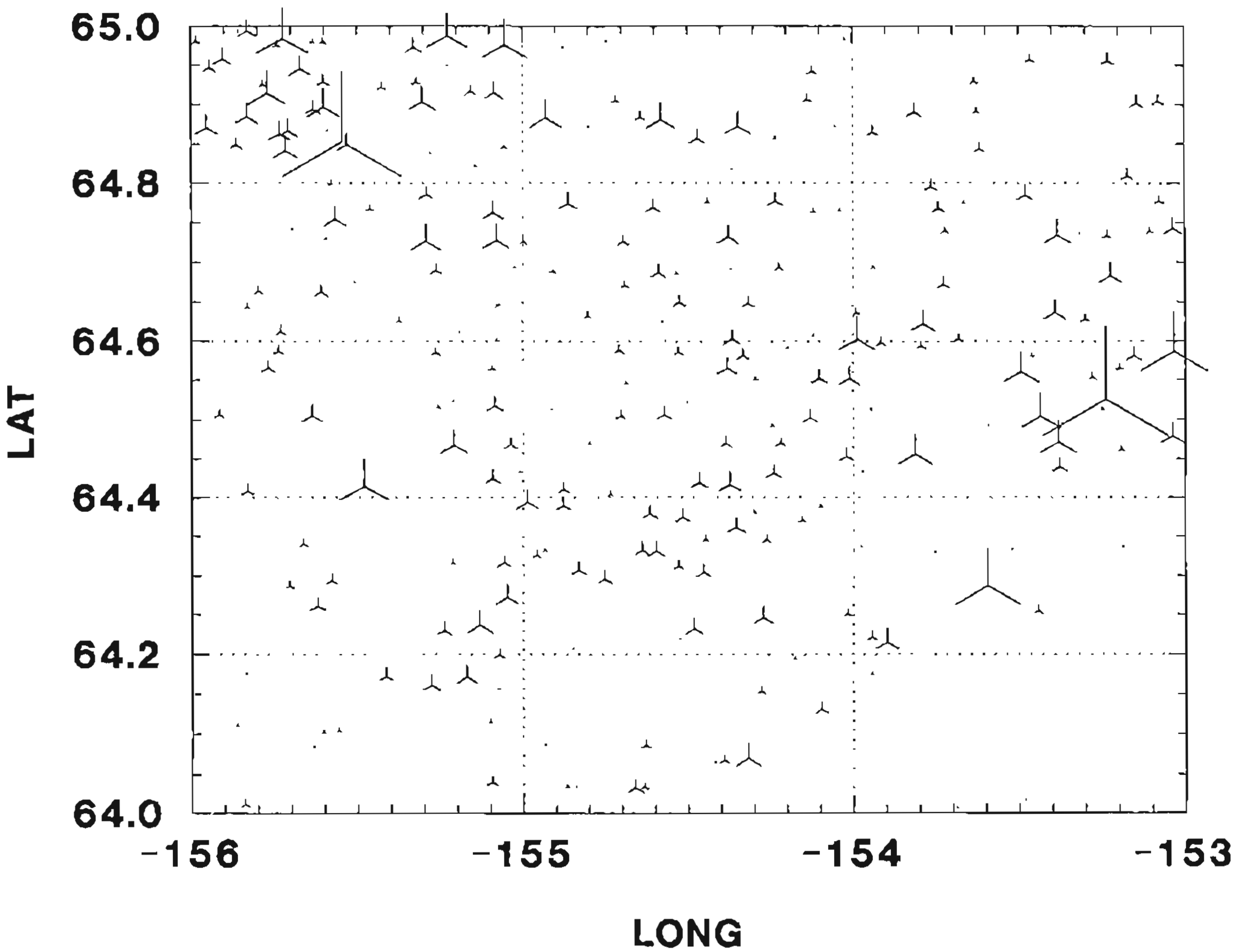


RUBZMAP NURE DATA FOR CR



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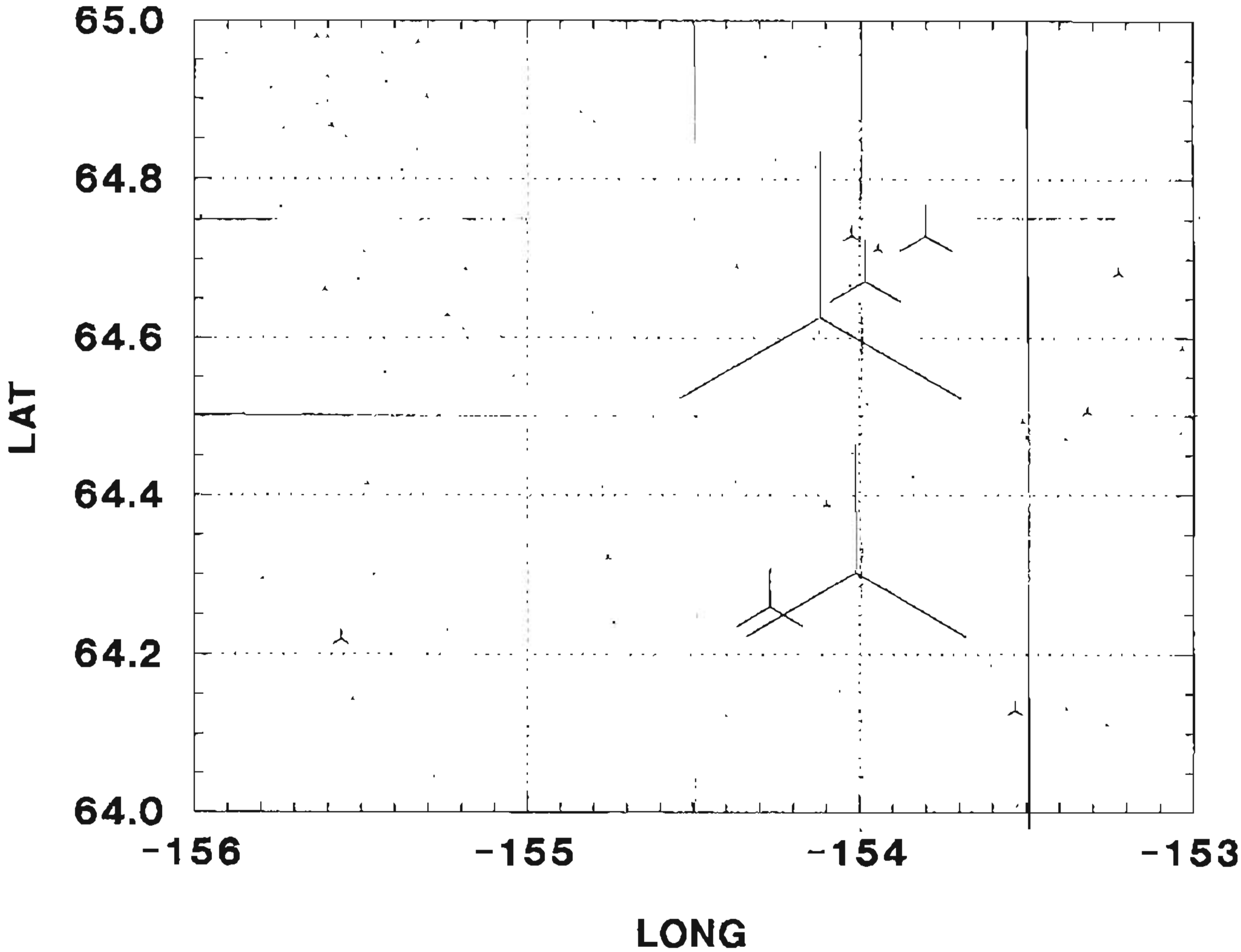
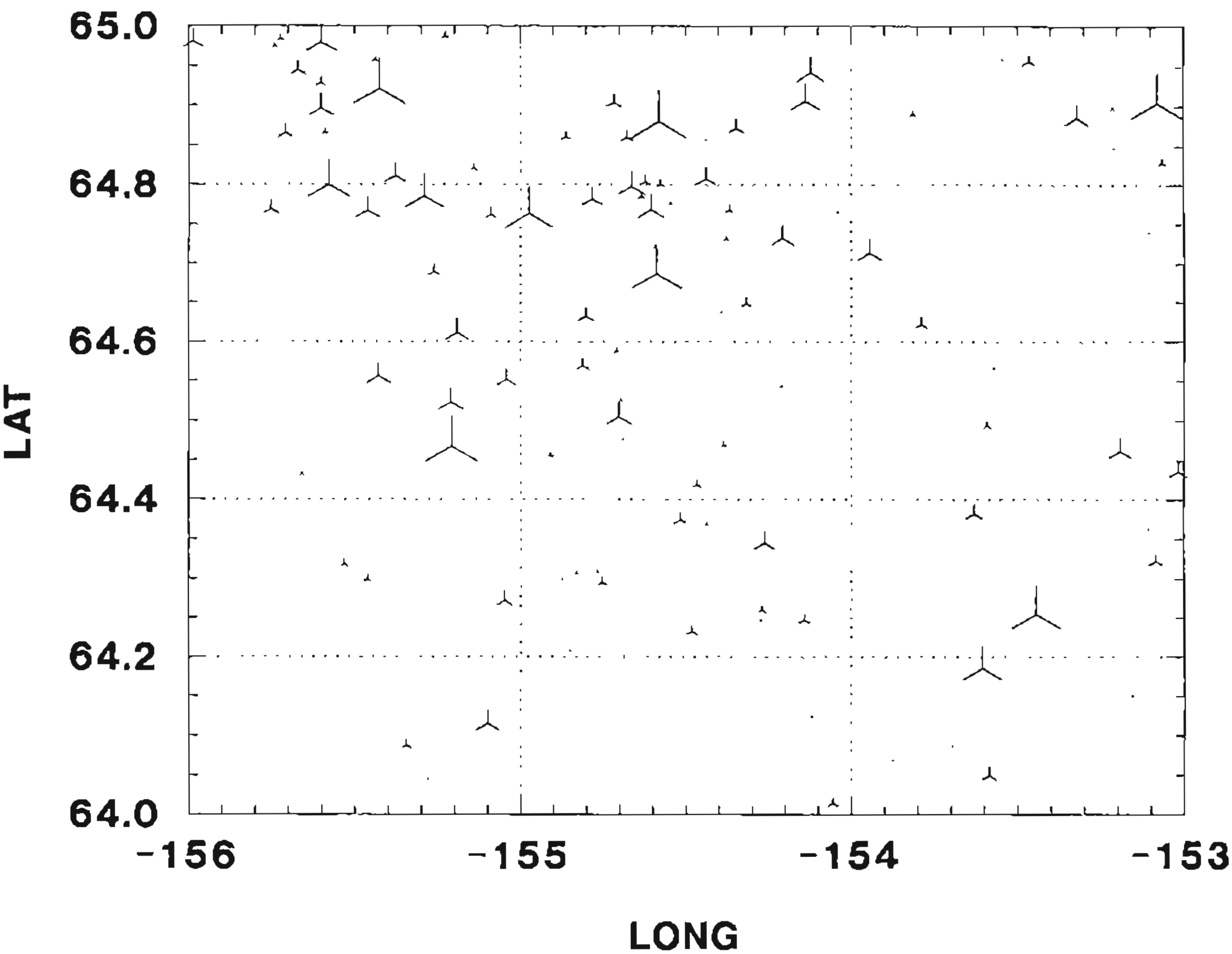
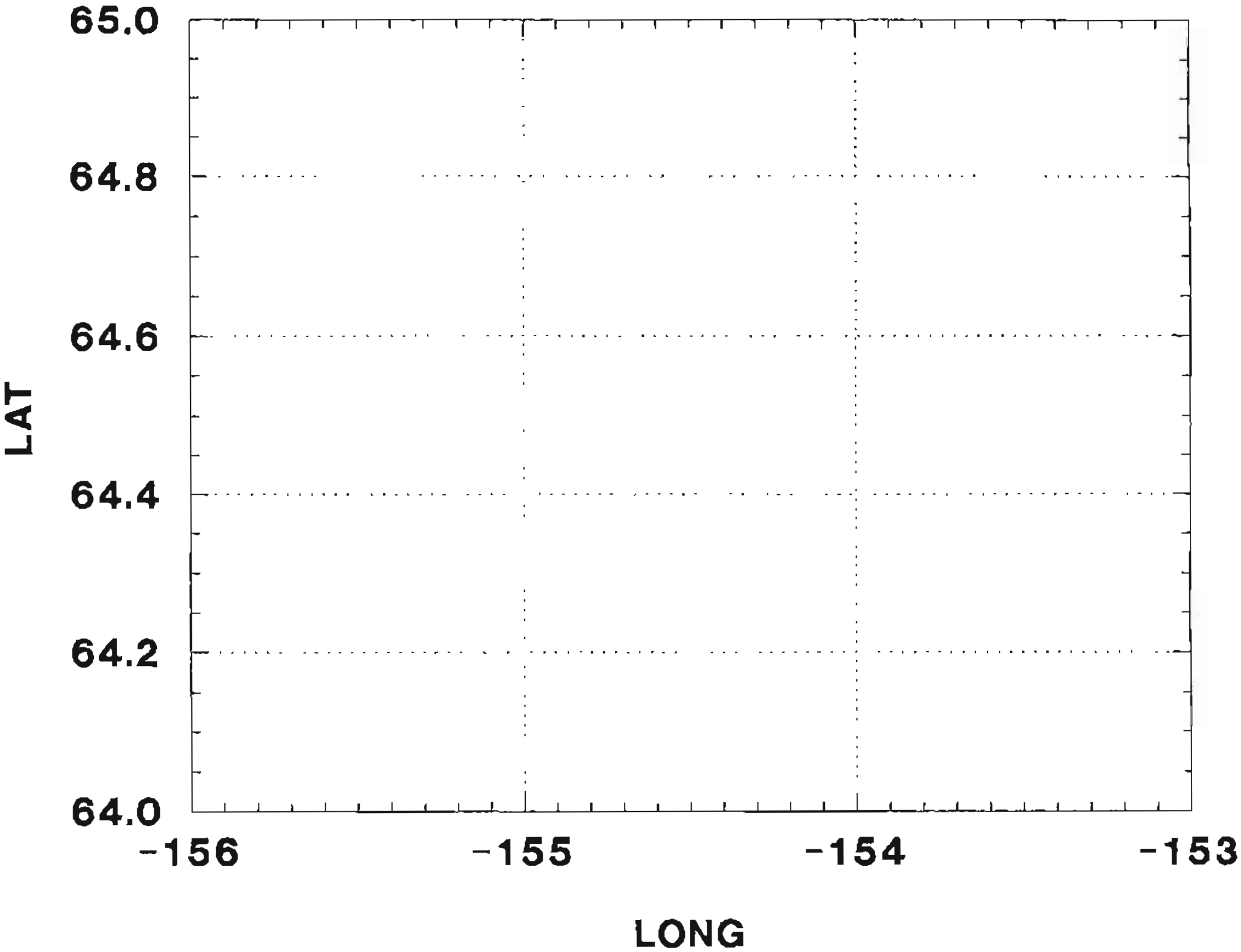


RUBZMAP NURE DATA FOR ZN



RUBZMAP NURE DATA FOR MO



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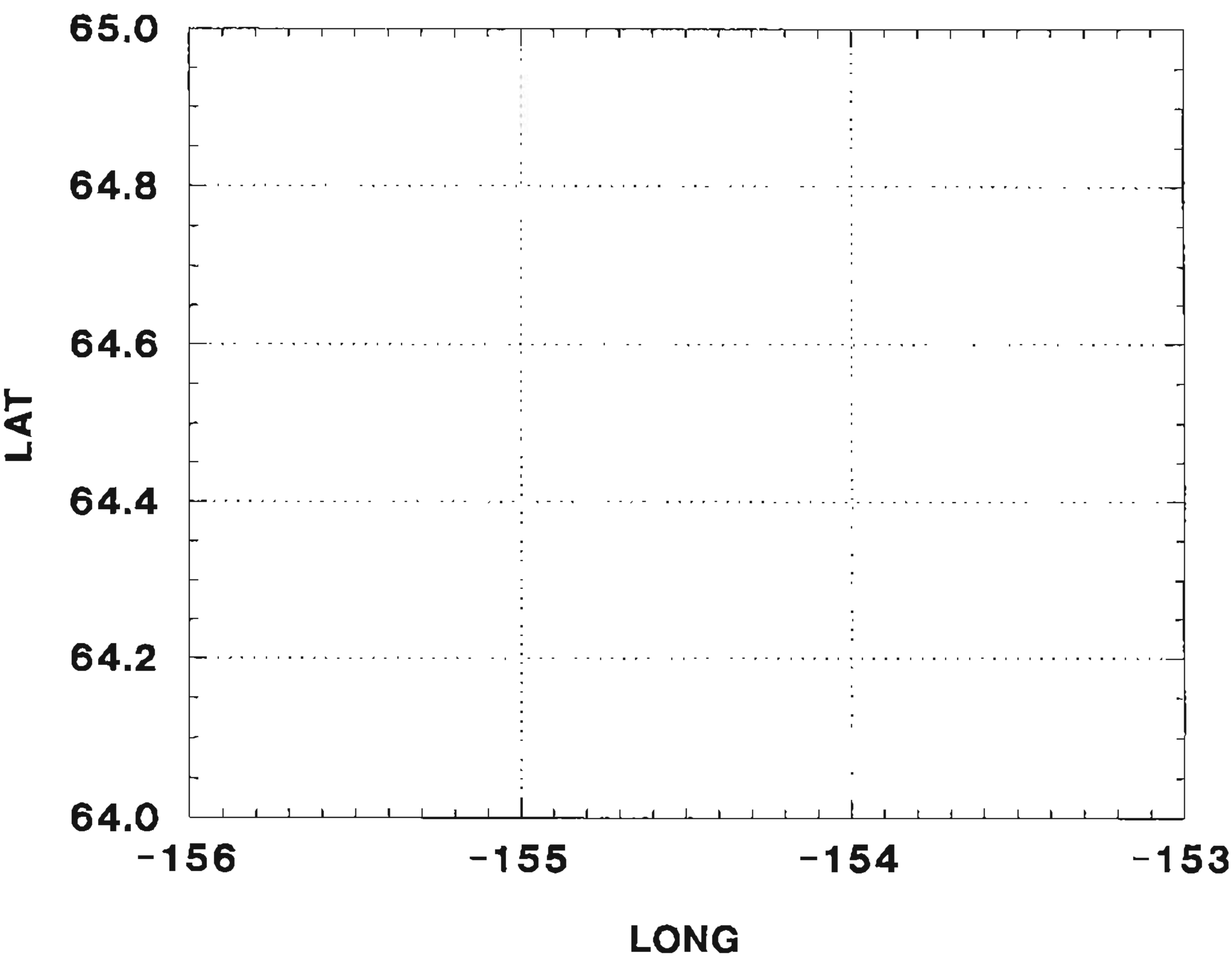
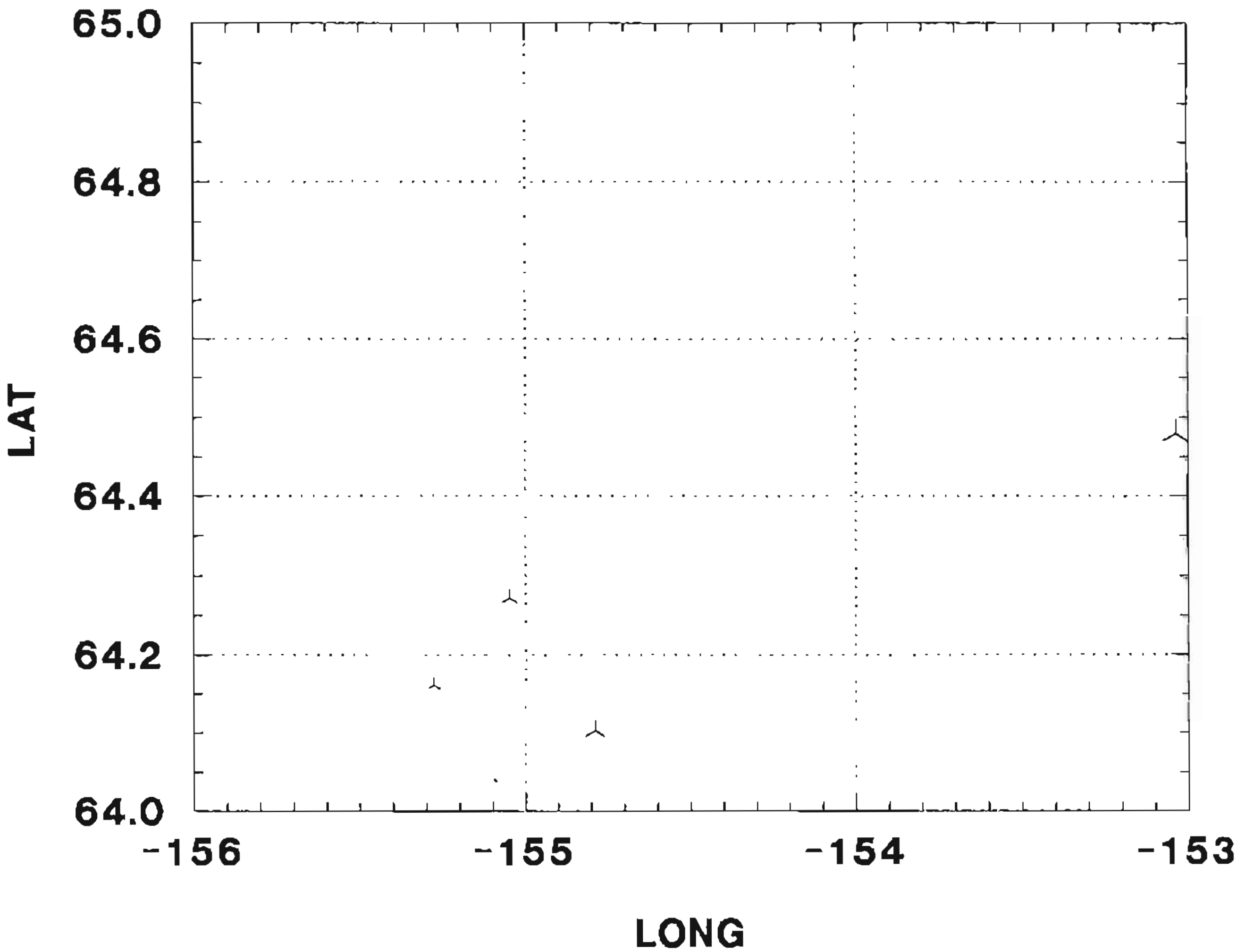


RUBZMAP NURE DATA FOR AU



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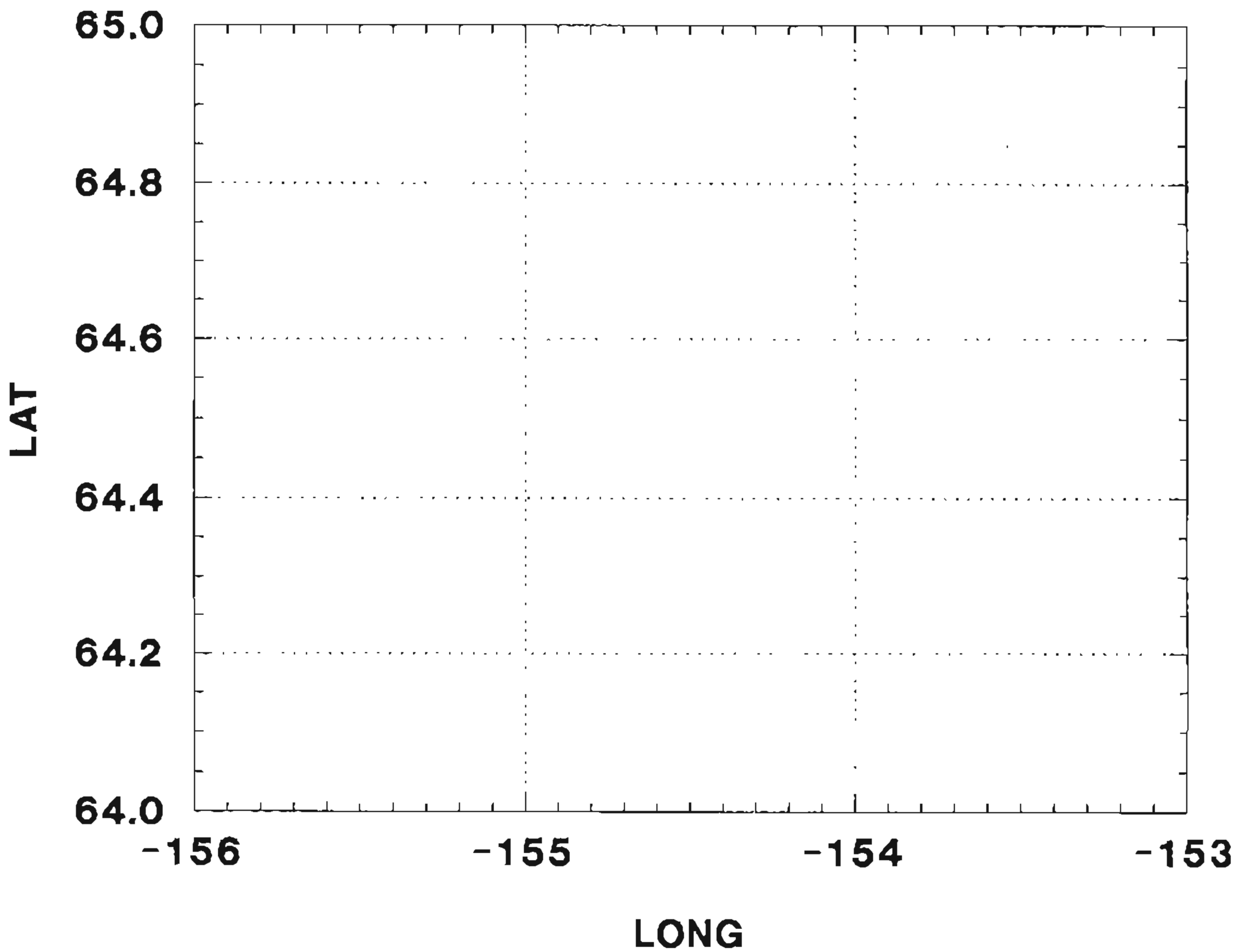

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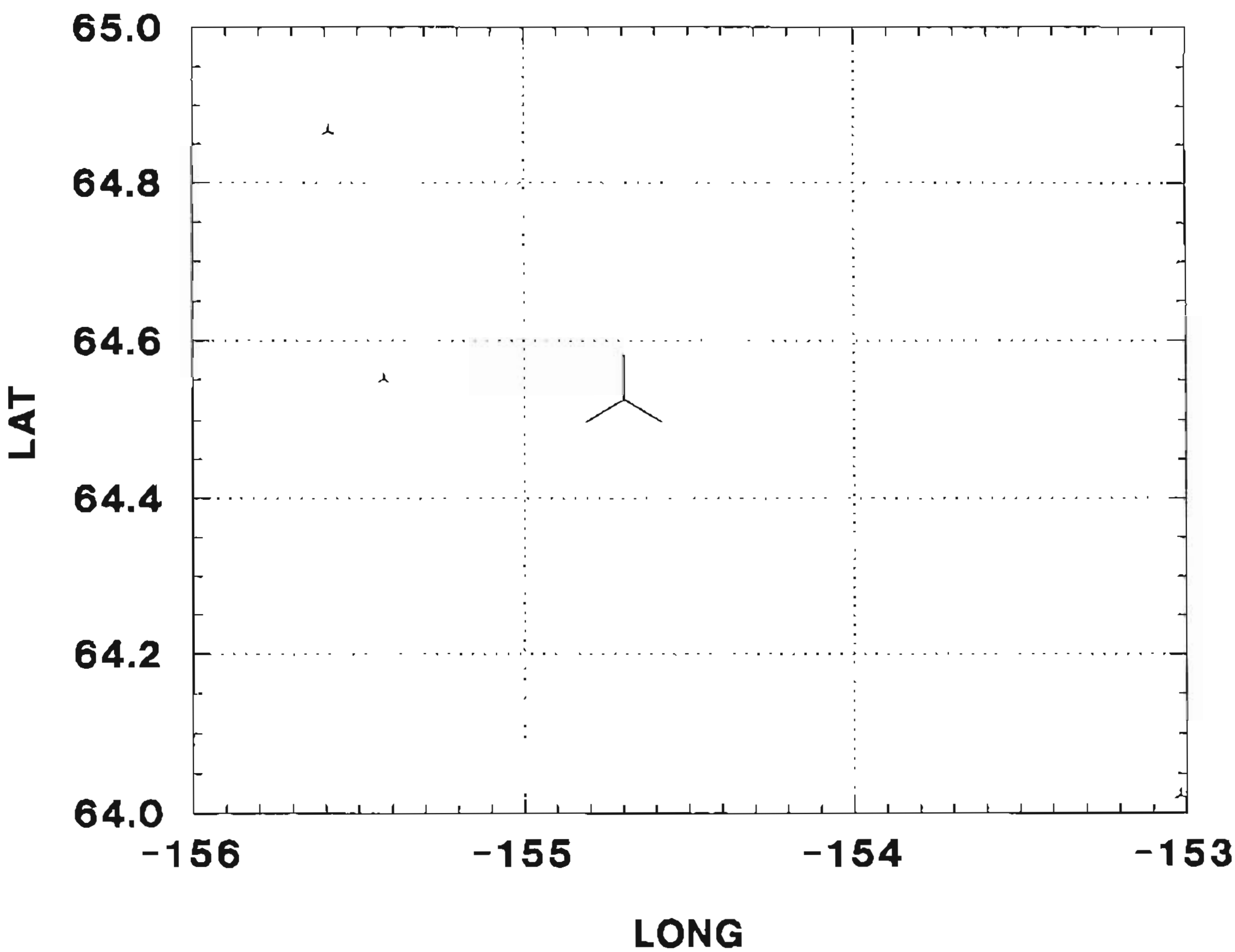

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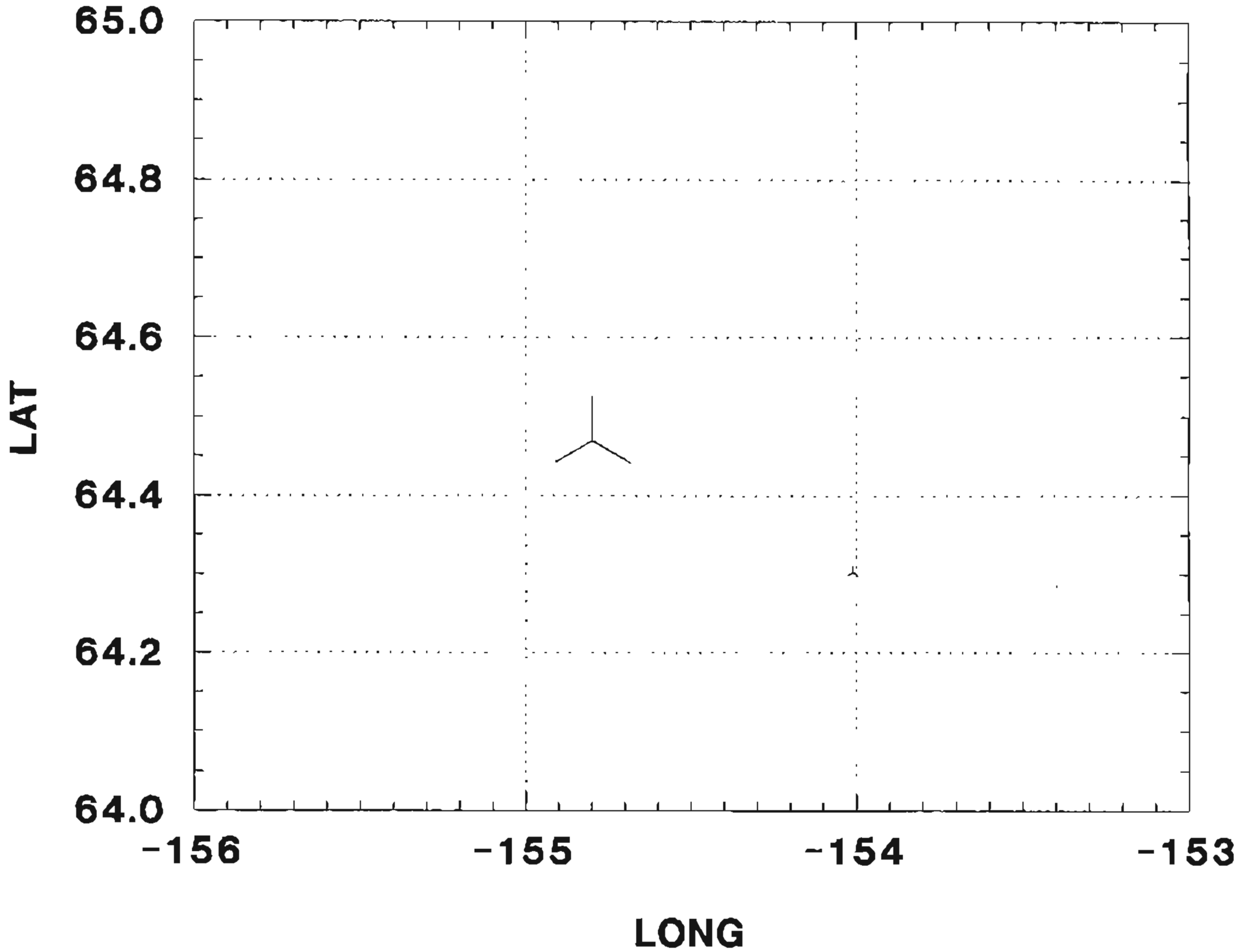

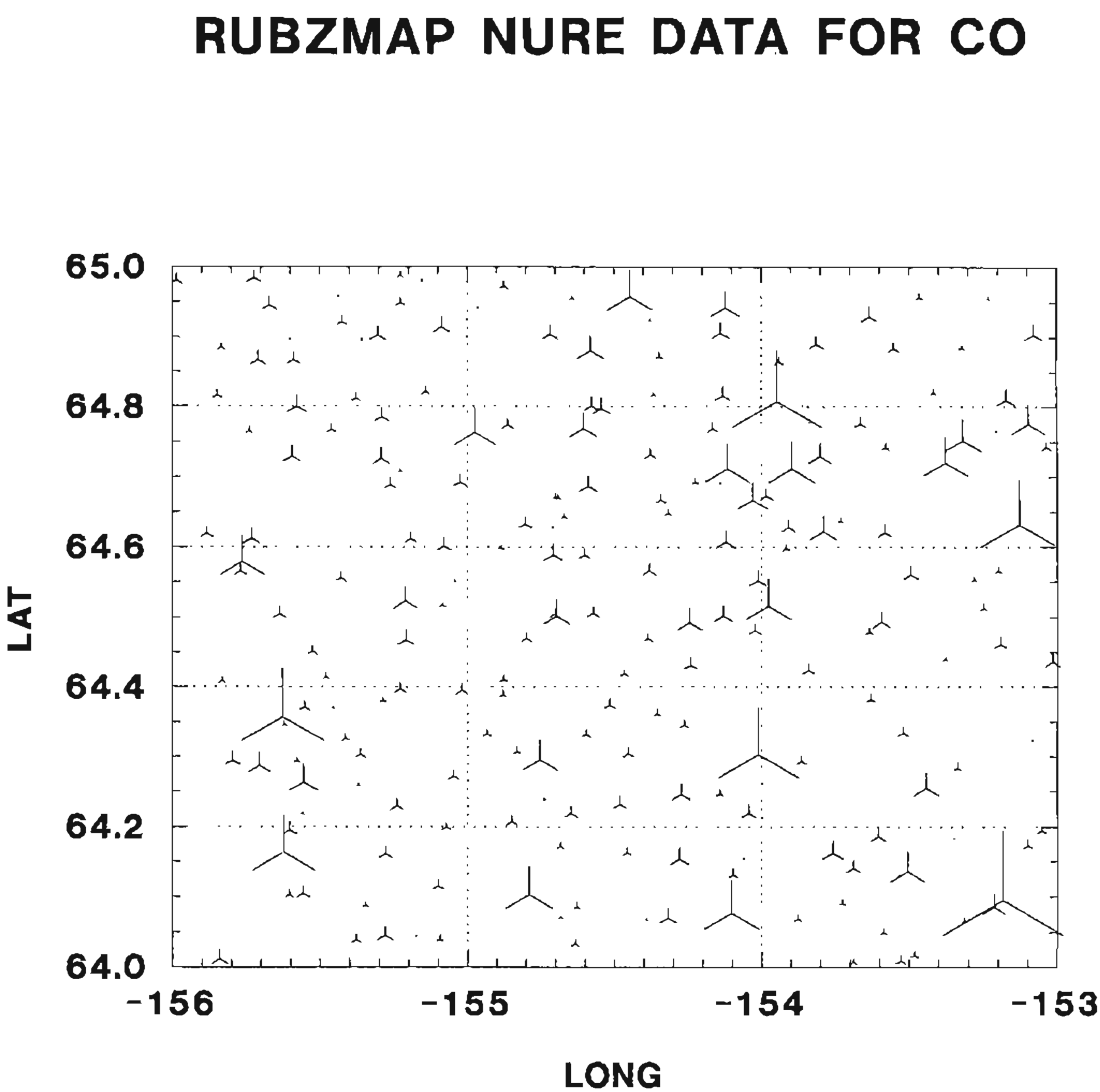
RUBZMAP NURE DATA FOR CO
65.0
64.8
64.6
64.4
64.2
64.0
LAT
-156
-155
-154
-153
LONG

APPENDIX A

KEY TO SAMPLE TYPES

This numerical key provides the necessary tie between the specific type or form of each sample taken and each individual suite of field and laboratory data to which the sample relates. It defines the various sample types collected by the LASL in the DOE HSSR for uranium.

The two-digit key number assigned to each sample type designates three distinct properties of the samples taken. These properties are: (a) The general sample source (spring, stream, dry stream, etc.); (b) The sample medium (water or sediment); and (c) The treatment given the sample in the field or laboratory prior to its analysis by the LASL.

The key numbers are inserted in the sample type columns of the specially formatted DOE sample numbering system to positively identify the sample type for all LASL sample data submitted.

KEY NO. SOURCE / MEDIUM / TREATMENT

01 - Spring water sample untreated.

02 - Stream water sample untreated.

03 - Well water sample untreated.

04 - Natural pond water sample untreated.

05 - Artificial pond water sample untreated.

06 - Spring water sample filtered through a 0.45-μ membrane filter and acidified to a pH of ≤1 with reagent-grade nitric acid (HNO_3).

07 - Stream water sample filtered through a 0.45-μ membrane filter and acidified to a pH of ≤1 with reagent-grade nitric acid (HNO_3).

08 - Well water sample filtered through a 0.45-μ membrane filter and acidified to a pH of ≤1 with reagent-grade nitric acid (HNO_3).

09 - Natural pond water sample filtered through a 0.45-μ membrane filter and acidified to a pH of ≤1 with reagent-grade nitric acid (HNO_3).

10 - Artificial pond water sample filtered through a 0.45-μ membrane filter and acidified to a pH of ≤1 with reagent-grade nitric acid (HNO_3).

11 - Wet spring sediment sample dried at ≤100°C and sieved to -100 mesh through stainless steel sieves.

12 - Wet stream sediment sample dried at ≤100°C and sieved to -100 mesh through stainless steel sieves.

13 - Wet natural pond sediment sample dried at ≤100°C and sieved to -100 mesh through stainless steel sieves.

14 - Wet artificial pond sediment sample dried at ≤100°C and sieved to -100 mesh through stainless steel sieves.

15 - Dry stream sediment sample dried at ≤100°C (if necessary) and sieved to -100 mesh through stainless steel sieves.

26 - Spring water sample acidified to a pH of ≤1 with reagent-grade nitric acid (HNO_3).

27 - Stream water sample acidified to a pH of ≤1 with reagent-grade nitric acid (HNO_3).

29 - Natural pond or lake water sample acidified to a pH of ≤1 with reagent-grade nitric acid (HNO_3).

31- Wet spring sediment sample dried at ≤100°C and sieved to -40 mesh through stainless steel sieves.

32- Wet stream sediment sample dried at ≤100°C and sieved to -40 mesh through stainless steel sieves.

33- Wet natural lake sediment sample dried at ≤100°C and sieved to -40 mesh through stainless steel sieves.

35- Dry stream sediment sample dried at ≤100°C and sieved to -40 mesh through stainless steel sieves.

41- Wet spring sediment sample dried at ≤100°C and sieved to -80 mesh through stainless steel sieves.

42- Wet stream sediment sample dried at ≤100°C and sieved to -80 mesh through stainless steel sieves.

43- Wet natural lake sediment sample dried at ≤100°C and sieved to -80 mesh through stainless steel sieves.

45- Dry stream sediment sample dried at ≤100°C and sieved to -80 mesh through stainless steel sieves.

51- Wet spring sediment sample dried at ≤100°C and sieved to -170 mesh through stainless steel sieves.

52- Wet stream sediment sample dried at ≤100°C and sieved to -170 mesh through stainless steel sieves.

53- Wet natural lake sediment sample dried at ≤100°C and sieved to -170 mesh through stainless steel sieves.

55- Dry stream sediment sample dried at ≤100°C and sieved to -170 mesh through stainless steel sieves.

61- Wet spring sediment sample dried at -100°C and sieved to -230 mesh through stainless steel sieves.

62- Wet stream sediment sample dried at -100°C and sieved to -230 mesh through stainless steel sieves.

63- Wet natural lake sediment sample dried at -100°C and sieved to -230 mesh through stainless steel sieves.

65- Dry stream sediment sample dried at -100°C and sieved to -230 mesh through stainless steel sieves.

71- Sediment sample collected from the stream bank, dried at ≤100°C, and sieved to -40 mesh through stainless steel sieves.

72- Sediment sample collected from the stream bank, dried at ≤100°C, and sieved to -80 mesh through stainless steel sieves.

73- Sediment sample collected from the stream bank, dried at ≤100°C, and sieved to -100 mesh through stainless steel sieves.

74- Sediment sample collected from the stream bank, dried at ≤100°C, and sieved to -170 mesh through stainless steel sieves.

75- Sediment sample collected from the stream bank, dried at ≤100°C, and sieved to -230 mesh through stainless steel sieves.

96 - Dry natural pond sediment sample dried at ≤100°C (if necessary) and sieved to -100 mesh through stainless steel sieves.

97 - Dry artificial pond sediment sample dried at ≤100°C (if necessary) and sieved to -100 mesh through stainless steel sieves.

98 - Other water 99 - Other sediment	These key numbers are to be used only for water (98) or sediment (99) samples coming from a special source and/or given a special treatment not described for any of the types of samples above.

PDF 91 - 22: ERRATA

ONE ELEMENT WAS OMITTED FROM LISTING OF ELEMENTS ON DISK. THAT ELEMENT WAS ....SE.....IT SHOULD GO BETWEEN AS AND ZR.

CORRECT ORDER OF ELEMENTS ON FILE IS:

U AG BI CD CU NB NI PB SN
W AS SE ZR MO BE LI AL AU
BA CA CE CL CO CR CS DY EU
FE HF K LA LU MN MG NA RB
SB SC SM SR TA TB TH TI V
YB ZN and U/TH

PDF 91-22 - UPDATE

The section of PDF 91-22 which describes the format of the NURE data as it is available on computer disk has changed. Instead of all data on one file/quadrangle in columnar format separated by blanks, it is now split into 3 files/quadrangle with commas and blanks separating the fields. The new files are named "NXXX#.ASC". N is for NURE data, XXX is the 3 character quadrangle identification, and # is 1, 2, or 3. This new version will make it easier for users to input the data directly into Quatro-Pro, Lotus, or other spread sheets with a 250 character limit on record length. In Quatro-Pro use IMPORT option, ASCII file, QUOTE & COMMA delimited. Two records were added in front of the data:

1.) a header record which says

"Part <n>, Quadrangle: <name>"

2.) a record with column headings so users can tell which elements are in the file and the order. The column headings are comma and blank delimited too. The data is still in ASCII format and the commas can be eliminated by using a variety of text editors.

Following are the formats of the 3 files. Column 1 was left blank for all records so that all data in the files could be printed even when the first item is interpreted as a carriage control character.

FILE 1:

Record 1: 55 Characters of text. - starts col 2 and length depends on length of quadrangle name. It is enclosed in quotes.

Record 2: col 2-39

"Samp-Id","RC", "Lat.", "Long.", "ST" (Sample Type--see main text)

Starting in col 40, 14 groups of: , "Xx" which are the elements names for the columns. For this record they are: U, Ag, Bi, Cd, Cu, Nb, Ni, Pb, Sn, W, As, Se, Zr, and Mo. NOTE: There is NOT a comma after the last item and all items are enclosed in quotes.

Record 3 to end:

col 2-8. 7 digit sample number.

col 9-10 ", " - a comma followed by a blank

col 11-13 replicate code - 3 digits allowed, most values will be 0 or 1 digit.

col 14-24 ", " followed by Latitude in decimal degrees with 5 decimal places

col 25-35 ", " followed by Longitude in decimal degrees with 5 decimal places

col 36-39 ", " followed by 2 digit sample type

Starting in col 40, 17 groups of "," (comma) followed by 8 digit value of element in ppm. Decimal point is present. None of the values require all 8 digits so that leaves a blank space after the comma. NOTE: no comma after the last item.

FILE 2:

Record 1: - Same as for file 1

Record 2: col 2 to 8 - "Samp-Id"

Starting in col 9, 17 groups of: , "Xx", which are element names for the columns. For this file they are: Be, Li, Al, Au, Ba, Ca, Ce, Cl, Co, Cr, Cs, Dy, Eu, Fe, Hf, K, and La. NOTE: no comma at end and items enclosed in quotes.

Record 3 to end:

Col 2-8 7 digit sample number.

Starting in col 9, 17 groups of ",", followed by 8 eight digit value of element. As in File 1.

FILE 3: Same format as file 2 with different elements. The elements are: Lu, Mn, Mg, Na, Rb, Sb, Sc, Sm, Sr, Ta, Tb, Th, Ti, V, Yb, Zn, and U/Th

NOTE: In the original listing of the elements, Se was accidently left out. It goes between As and Zr.

A copy of this file is included on disk. It is labeled README.NUR. If there are any problems reading this data contact Shirley Liss at DGGS. (907) - 474 - 7147.