

Public-data File 91-22pp

**NATIONAL URANIUM RESOURCE EVALUATION GEOCHEMICAL
DATA FOR STREAM- AND LAKE-SEDIMENT SAMPLES IN THE
UNALAKLEET 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.

794 University Avenue, Suite 200
Fairbanks, Alaska 99709-3645

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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	CTR
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
Sleetmute	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 pseudomap 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: 393

	U	AG	BI	CD	CU
N OF CASES	393	0	37	3	386
MINIMUM	0.220	.	5.000	5.000	11.000
MAXIMUM	15.010	.	8.000	6.000	225.000
MEAN	3.316	.	5.595	5.333	31.863
STANDARD DEV	1.175	.	0.725	0.577	18.539

	NI	PB	SN	W	AS
N OF CASES	350	263	3	8	371
MINIMUM	15.000	5.000	10.000	16.000	5.000
MAXIMUM	99.000	25.000	18.000	34.000	184.000
MEAN	31.871	8.563	13.333	20.750	13.995
STANDARD DEV	11.094	3.200	4.163	5.751	15.298

	MO	BE	AU	BA	CO
N OF CASES	0	0	0	380	393
MINIMUM	.	.	.	358.000	10.500
MAXIMUM	.	.	.	1430.000	134.600
MEAN	.	.	.	779.195	25.871
STANDARD DEV	.	.	.	164.938	12.740

	CR	FE	MN	SB	TI
N OF CASES	385	392	393	10	383
MINIMUM	25.000	8639.000	62.000	2.000	3086.000
MAXIMUM	398.000	129500.000	2921.000	6.000	6822.000
MEAN	104.875	39818.339	755.562	3.500	4895.736
STANDARD DEV	42.198	9173.957	347.853	1.354	619.189

	V	ZN	UTH	LA
N OF CASES	391	143	384	378
MINIMUM	24.000	42.000	0.241	13.000
MAXIMUM	614.000	375.000	1.564	57.000
MEAN	132.836	147.259	0.386	31.876
STANDARD DEV	32.132	61.698	0.115	5.816

THE FOLLOWING RESULTS ARE FOR:
 TYPE = 13.000

TOTAL OBSERVATIONS: 198

	U	AG	BI	CD	CU
N OF CASES	198	0	13	1	188
MINIMUM	0.170	.	5.000	17.000	10.000
MAXIMUM	5.970	.	8.000	17.000	59.000
MEAN	2.466	.	5.692	17.000	30.814
STANDARD DEV	0.757	.	1.109	.	11.642

	NI	PB	SN	W	AS
N OF CASES	152	124	2	3	158
MINIMUM	15.000	5.000	10.000	15.000	5.000
MAXIMUM	86.000	75.000	12.000	20.000	188.000
MEAN	29.730	8.403	11.000	17.000	12.373
STANDARD DEV	11.973	6.644	1.414	2.646	15.693

	MO	BE	AU	BA	CO
N OF CASES	0	0	0	170	198
MINIMUM	.	.	.	400.000	6.700
MAXIMUM	.	.	.	1321.000	151.300
MEAN	.	.	.	865.729	28.331
STANDARD DEV	.	.	.	189.775	20.011

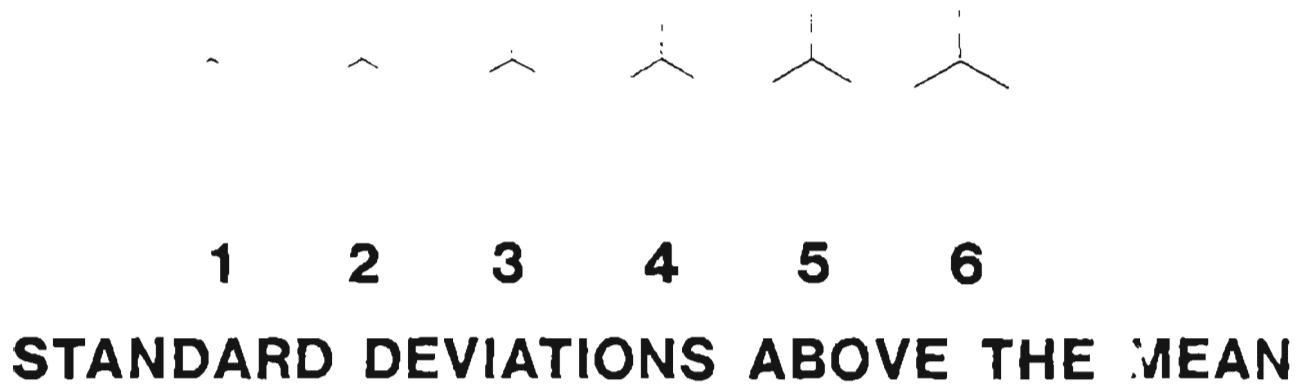
	CR	FE	MN	SB	TI
N OF CASES	166	196	198	2	182
MINIMUM	24.000	5118.000	55.000	3.000	1496.000
MAXIMUM	315.000	234800.000	1765.000	3.000	11770.000
MEAN	83.584	32544.301	497.823	3.000	4422.500
STANDARD DEV	32.732	17666.191	216.381	0.000	1150.939

	V	ZN	UTH	LA
N OF CASES	195	68	172	144
MINIMUM	28.000	64.000	0.224	15.000
MAXIMUM	227.000	502.000	0.632	43.000
MEAN	115.513	168.441	0.360	29.944
STANDARD DEV	35.118	76.853	0.064	5.197

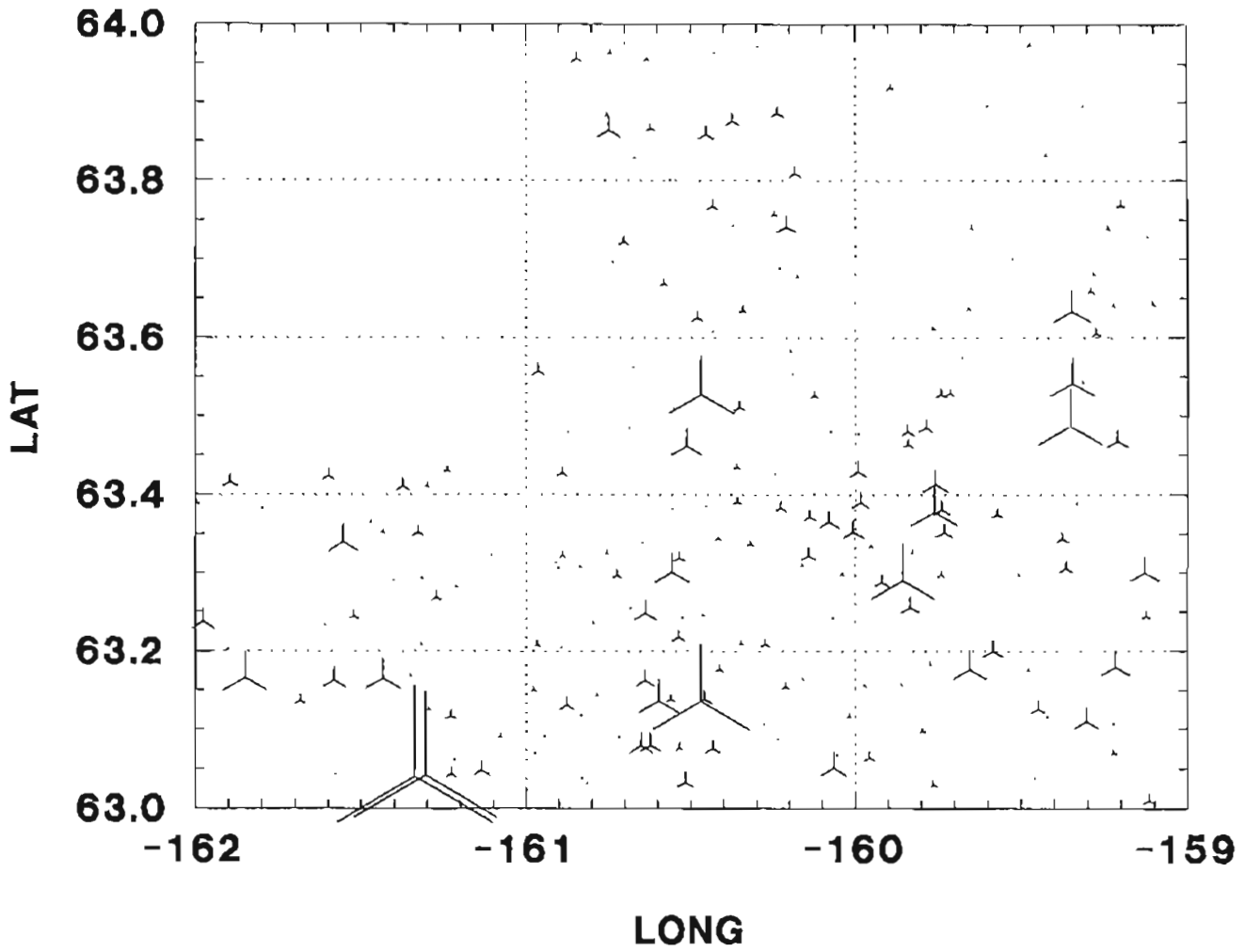
THESE RESULTS ARE FOR UKTL NURE DATA

TOTAL OBSERVATIONS: 591

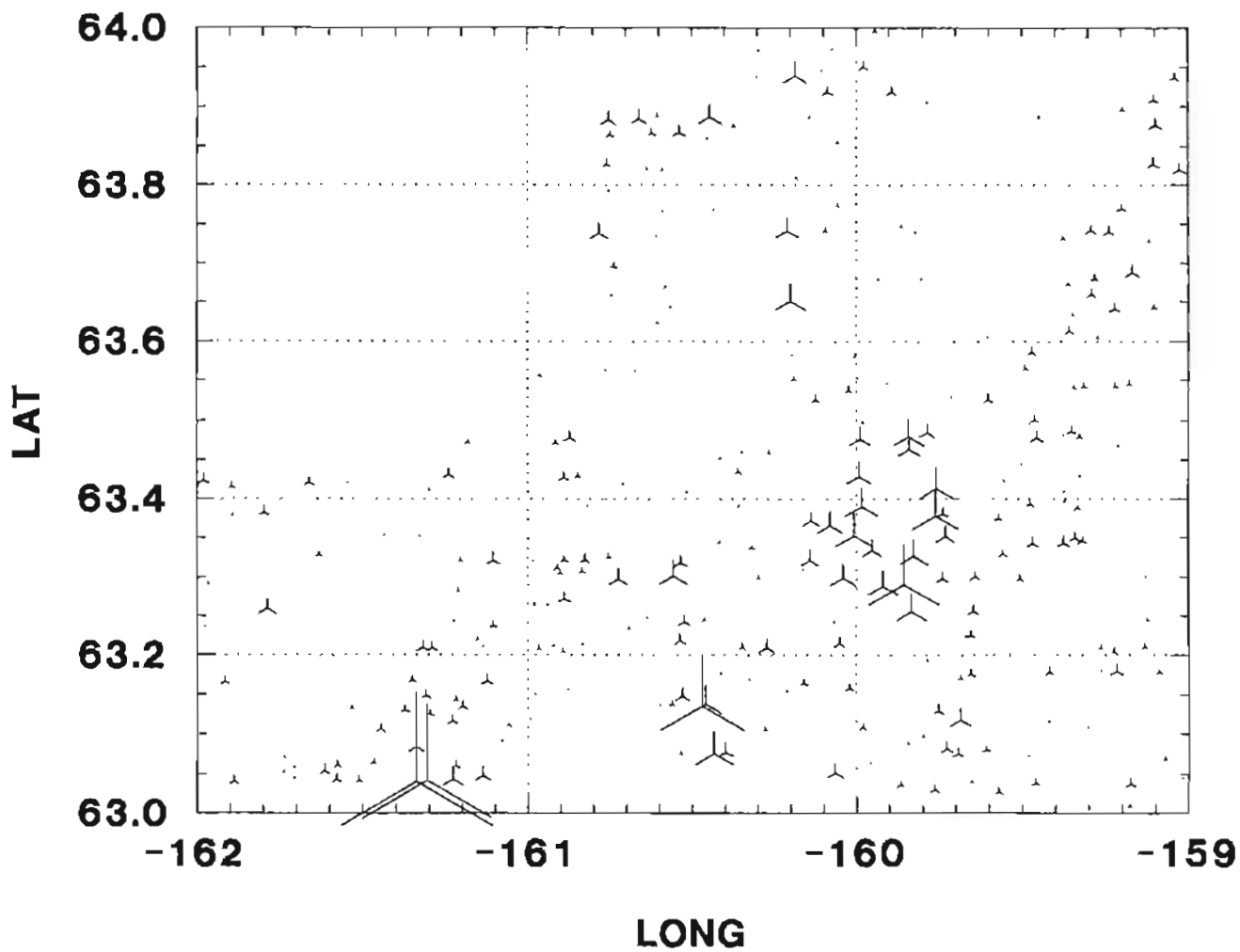
Figure 1. Symbol-size key for single element pseudomaps indicating the size of plotted symbols for values that are from 1 to 6 standard deviations above the mean.



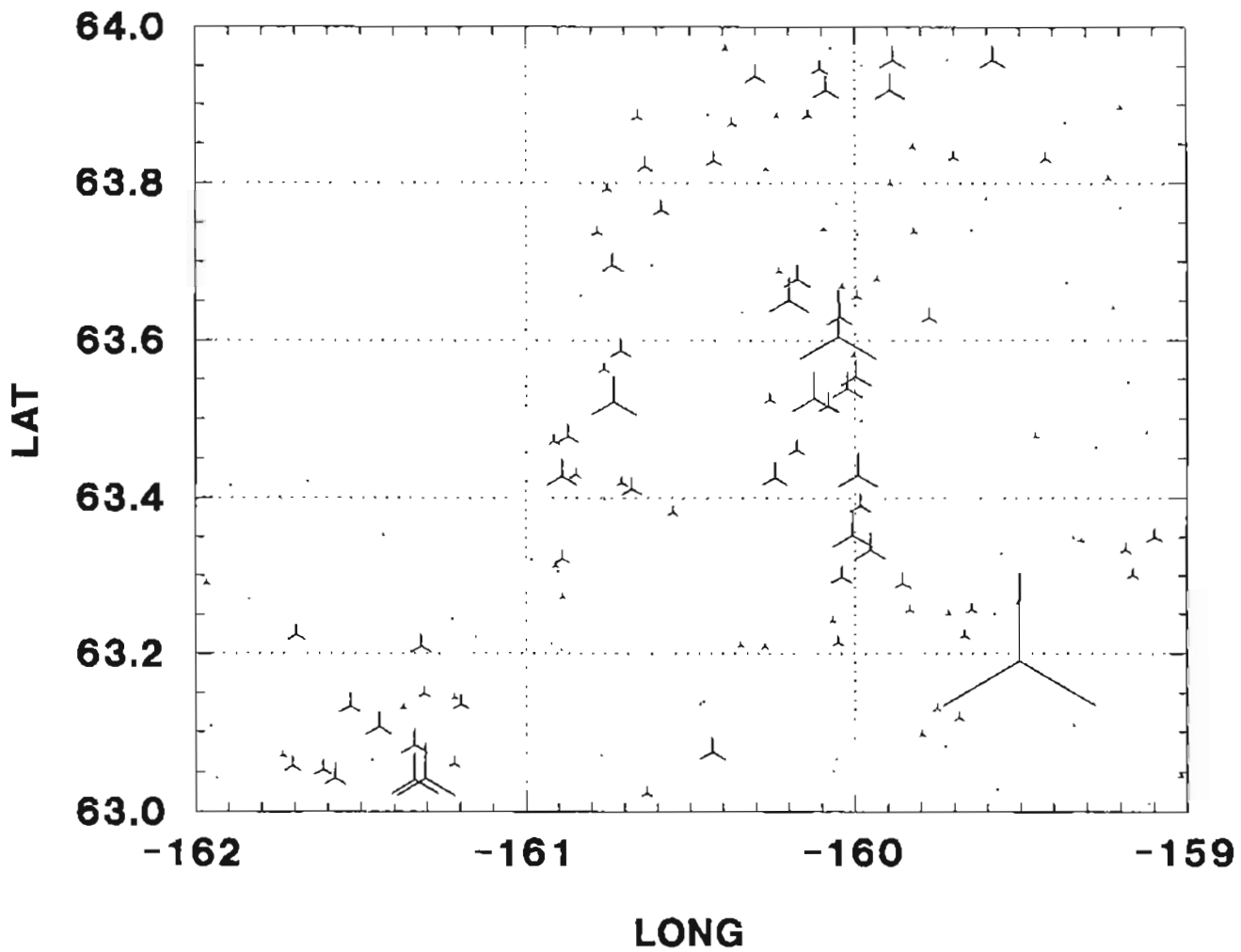
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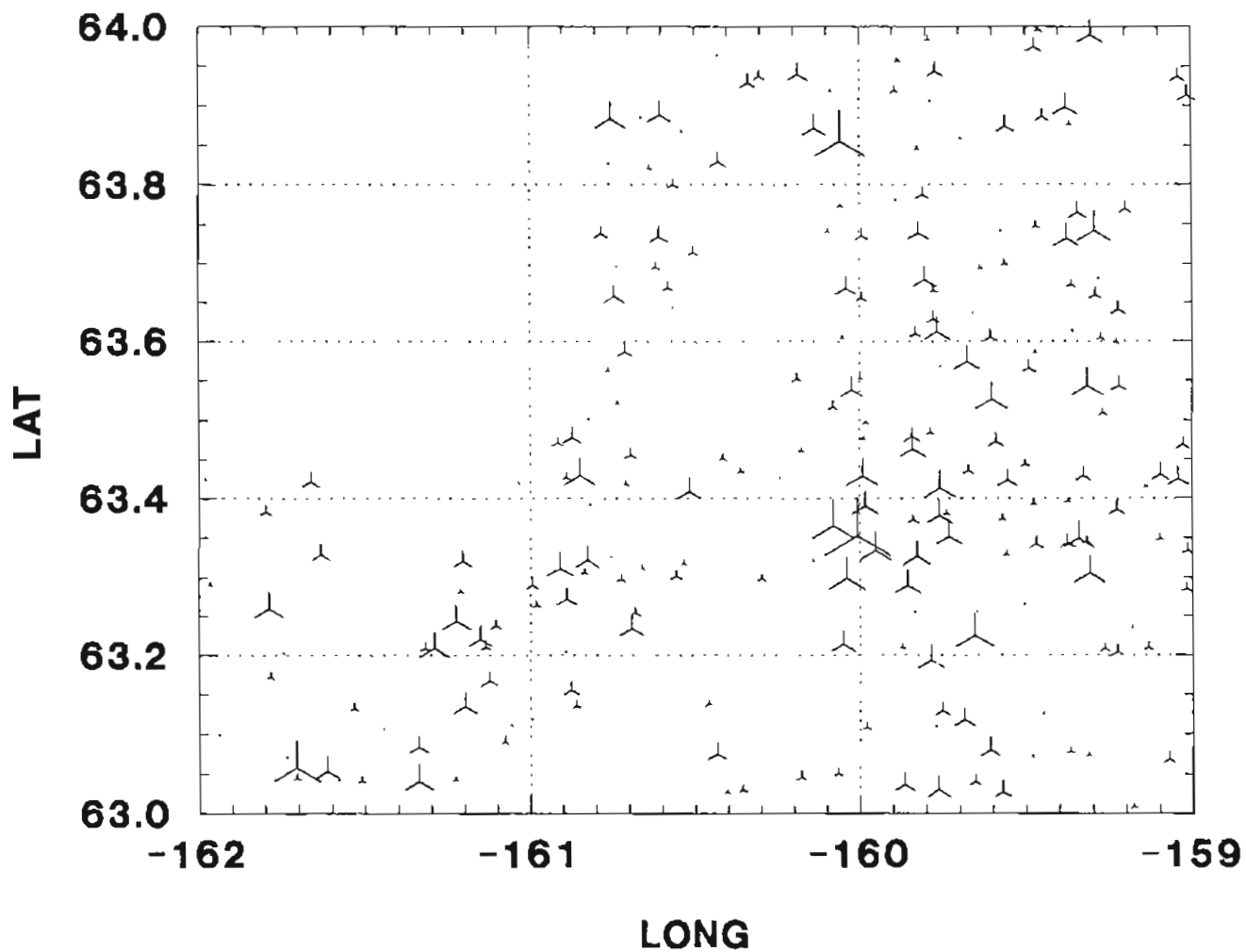
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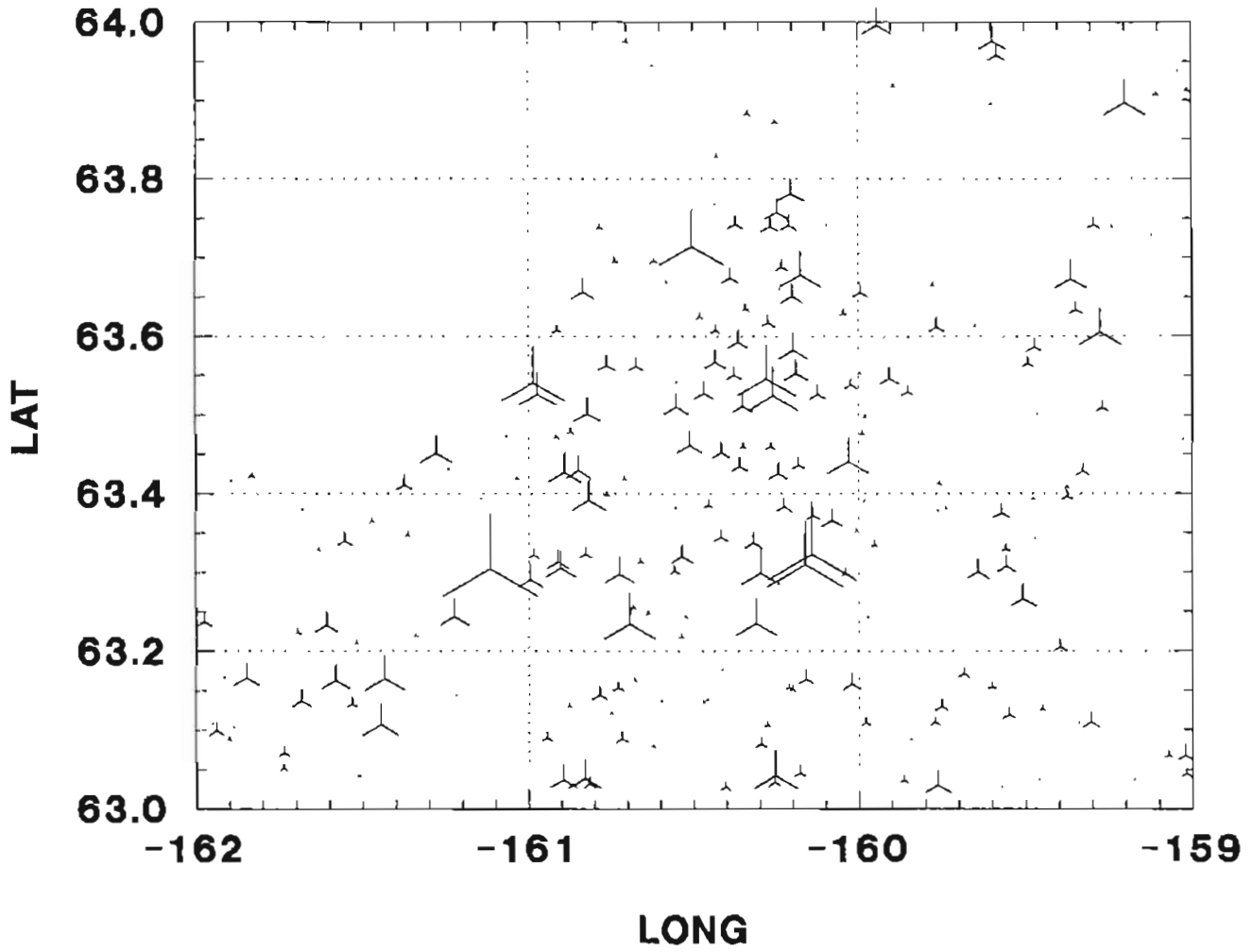
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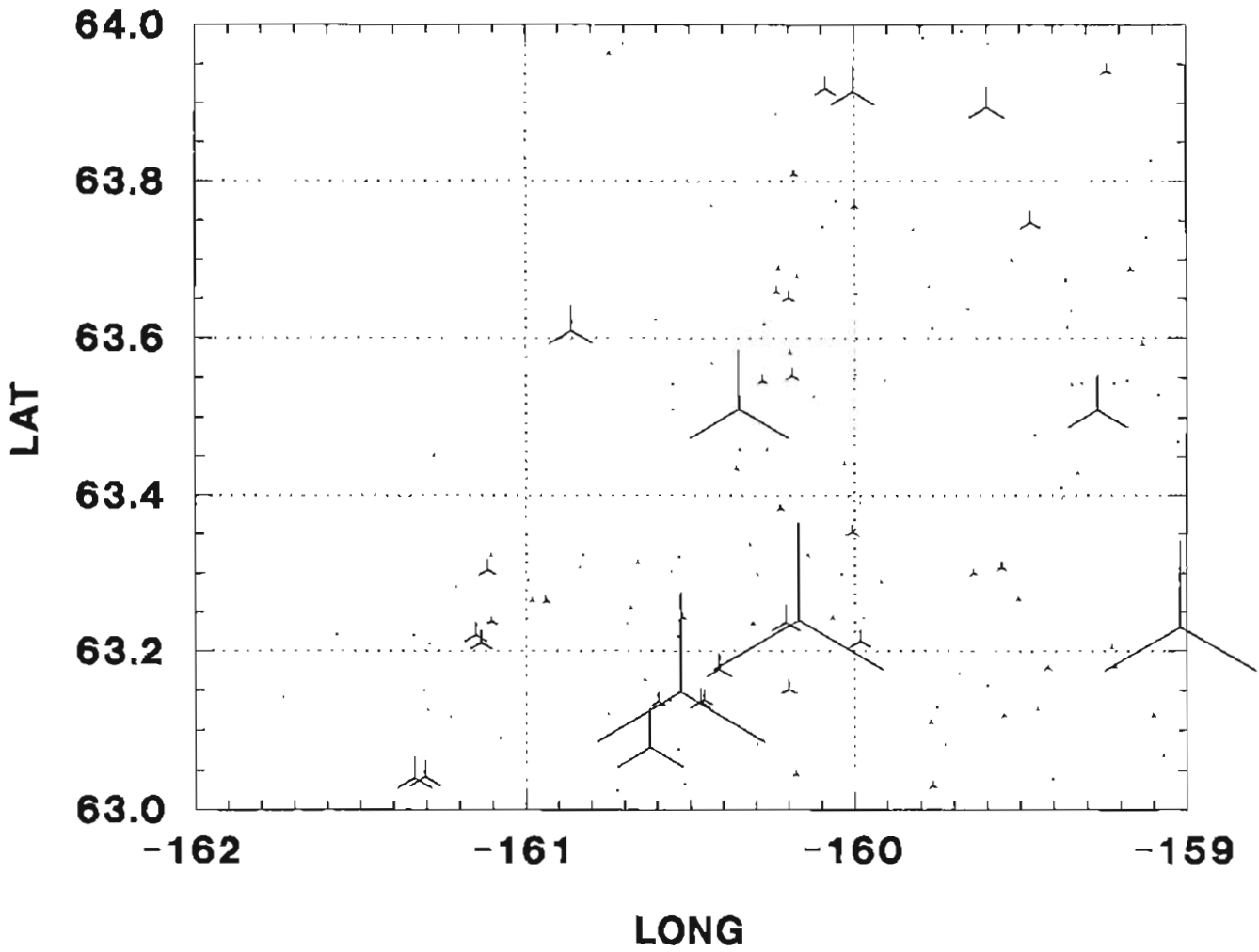
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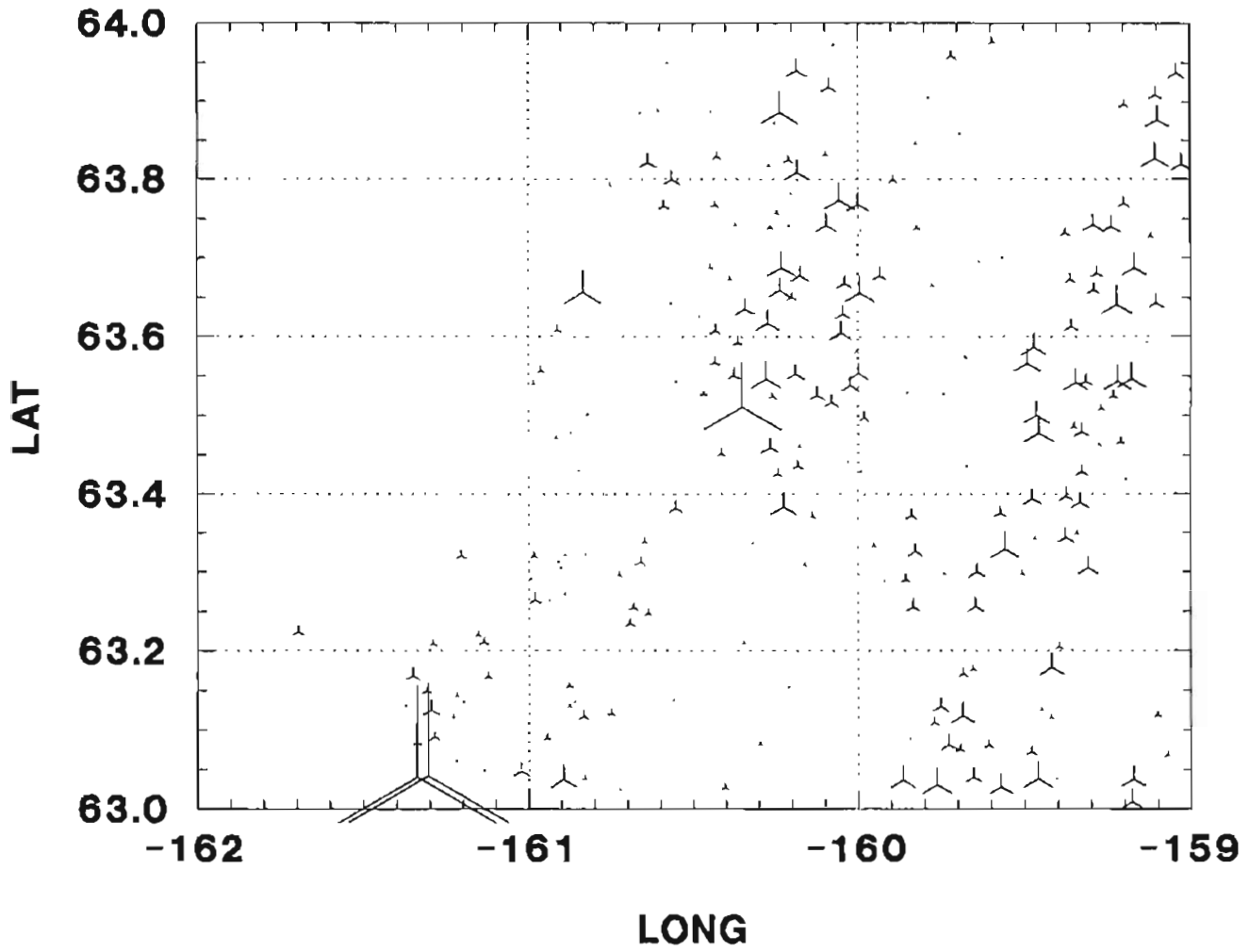
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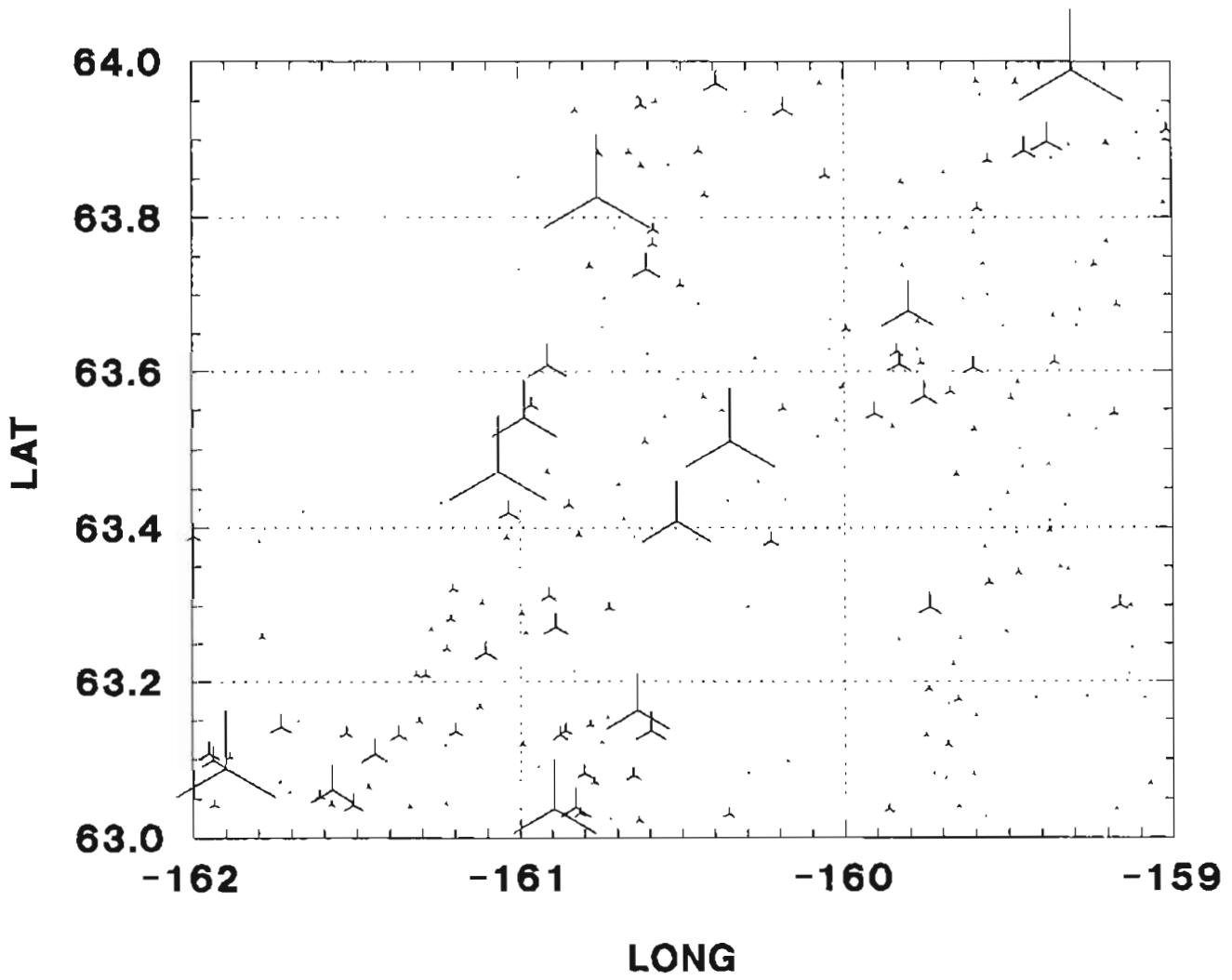
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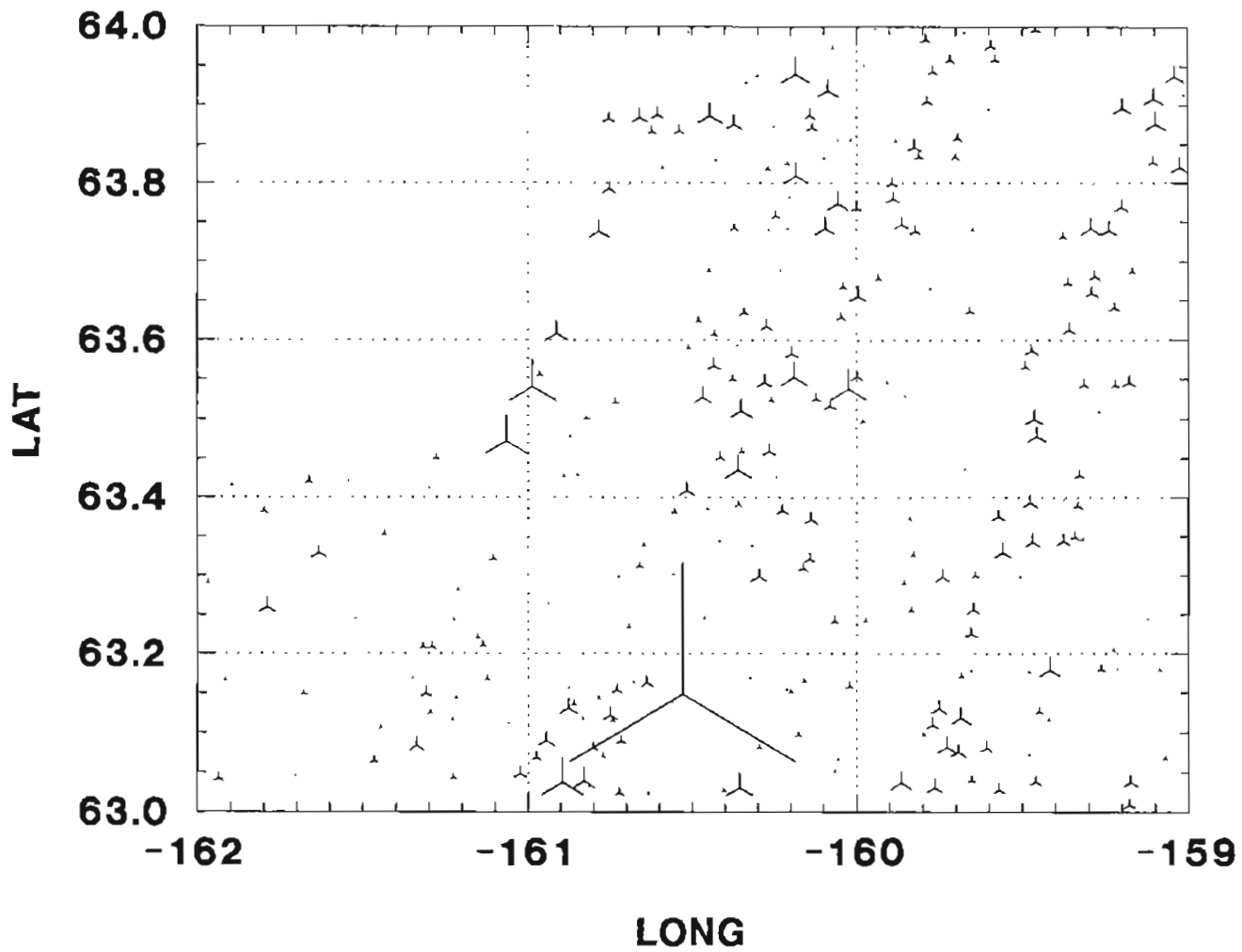
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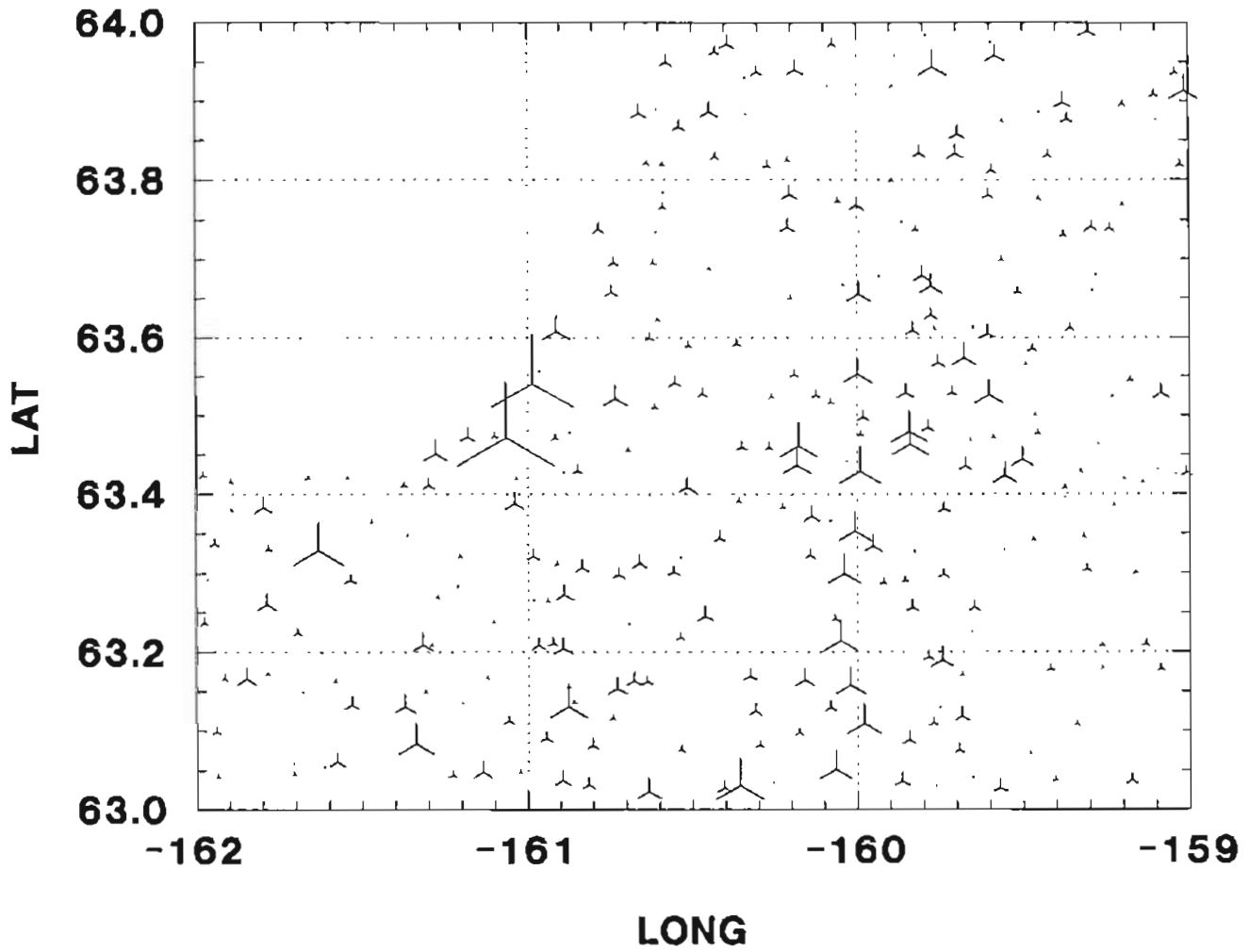
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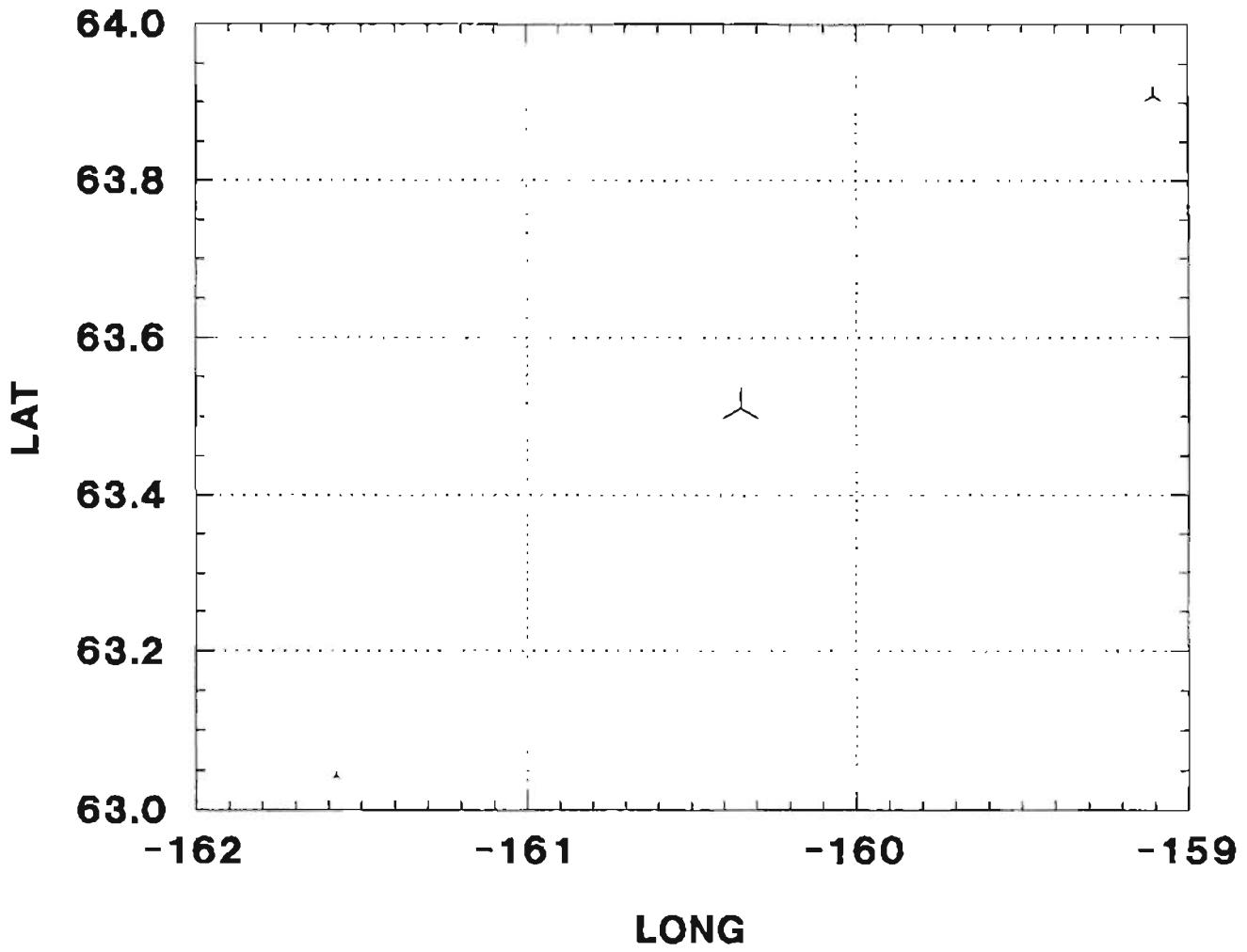
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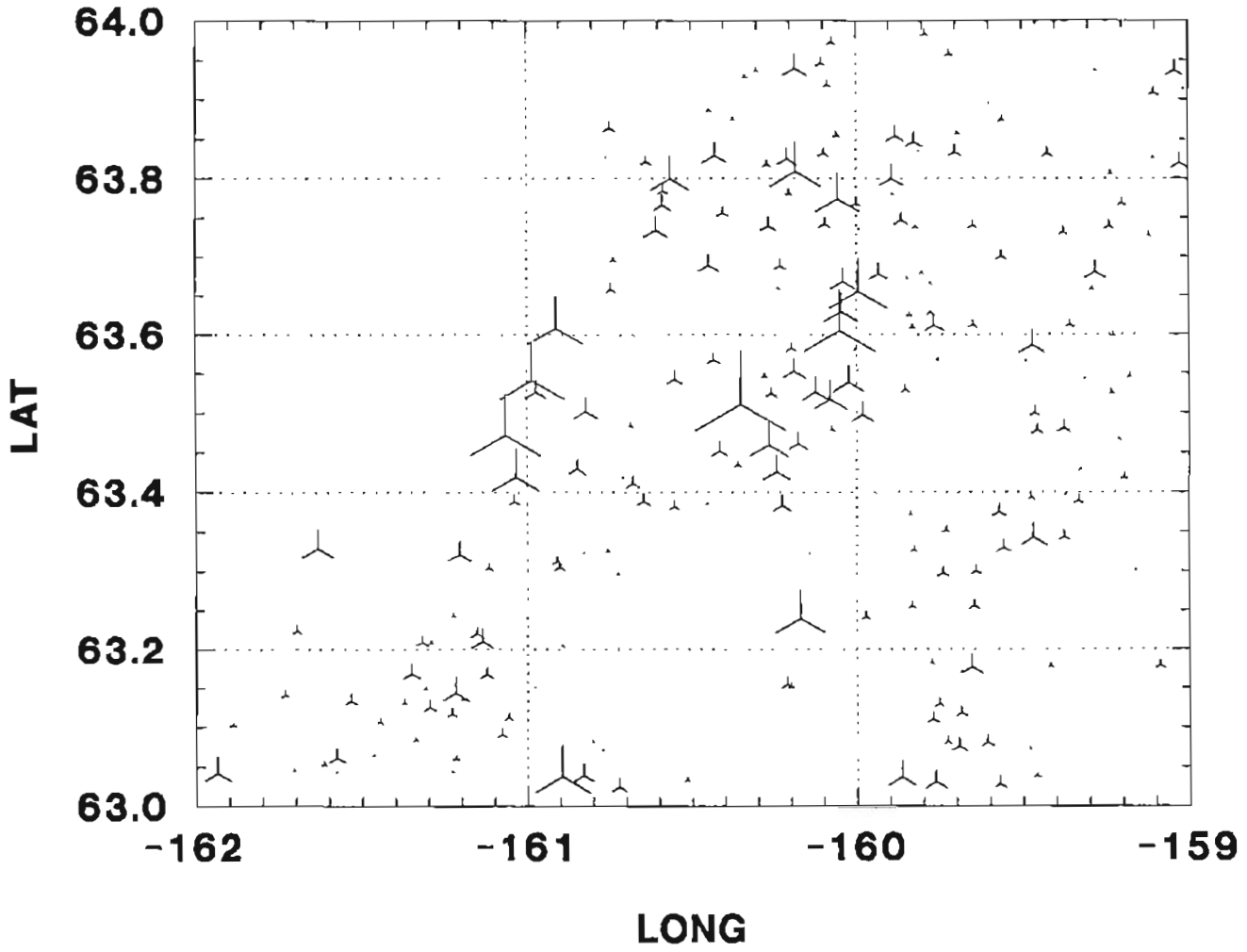
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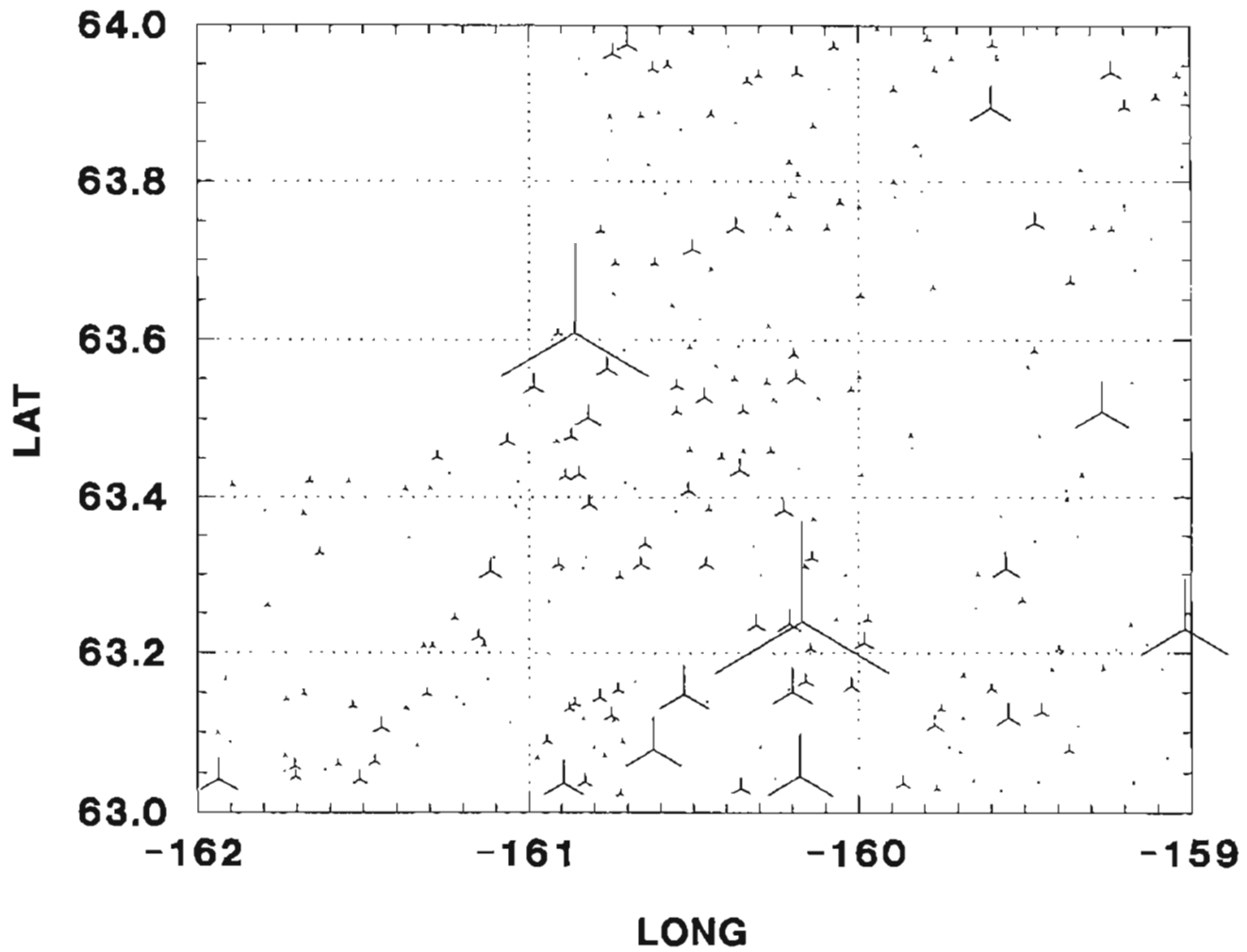
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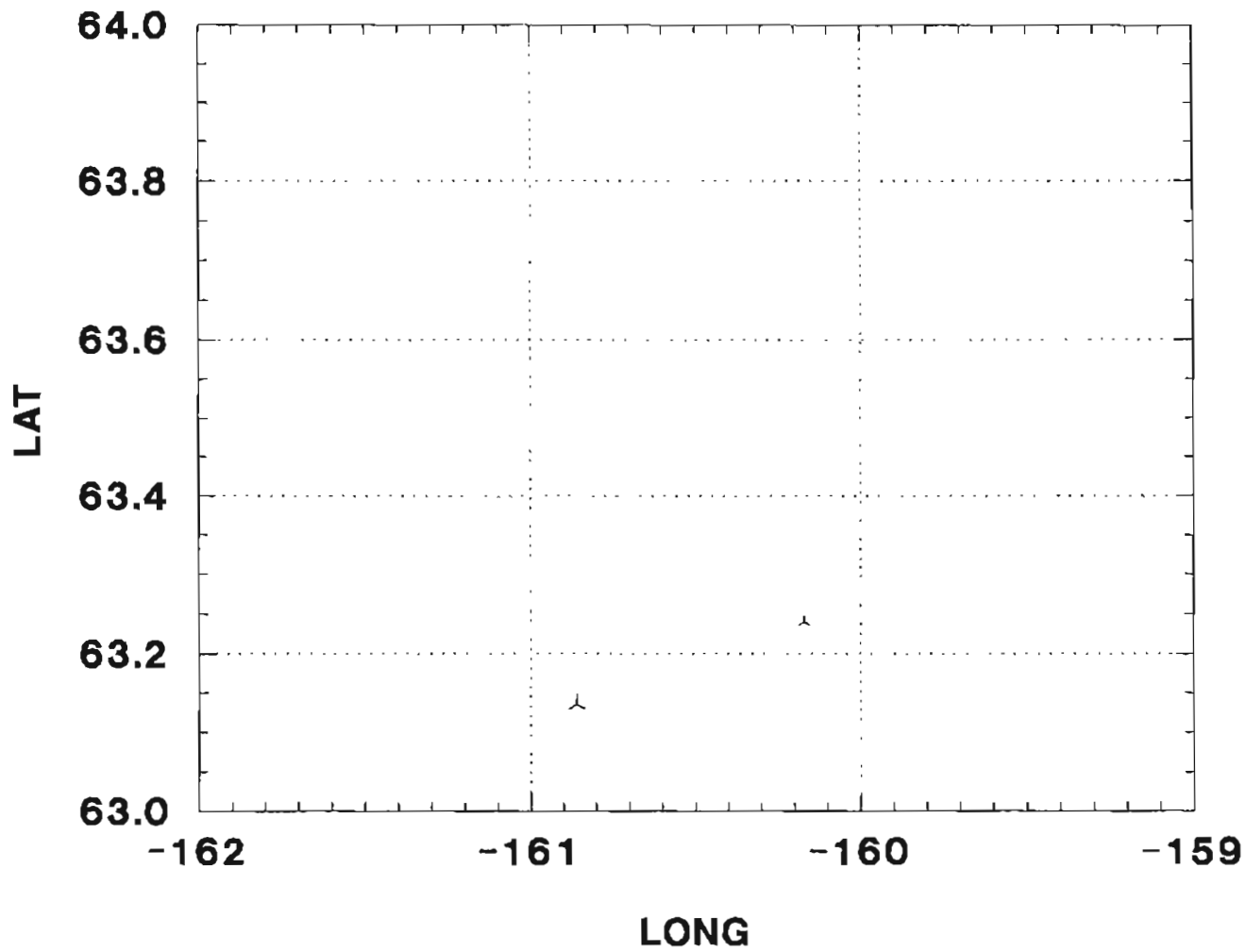
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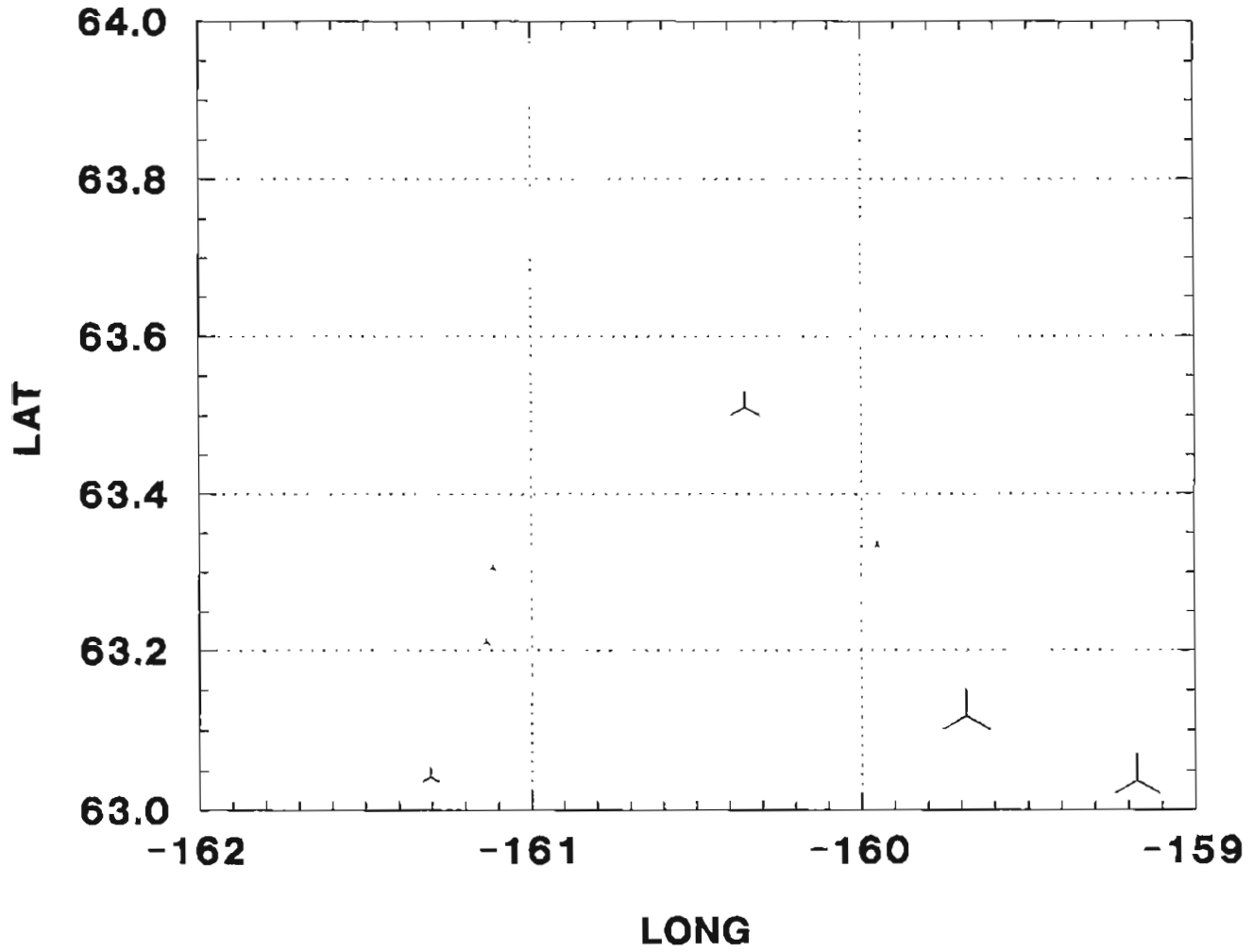
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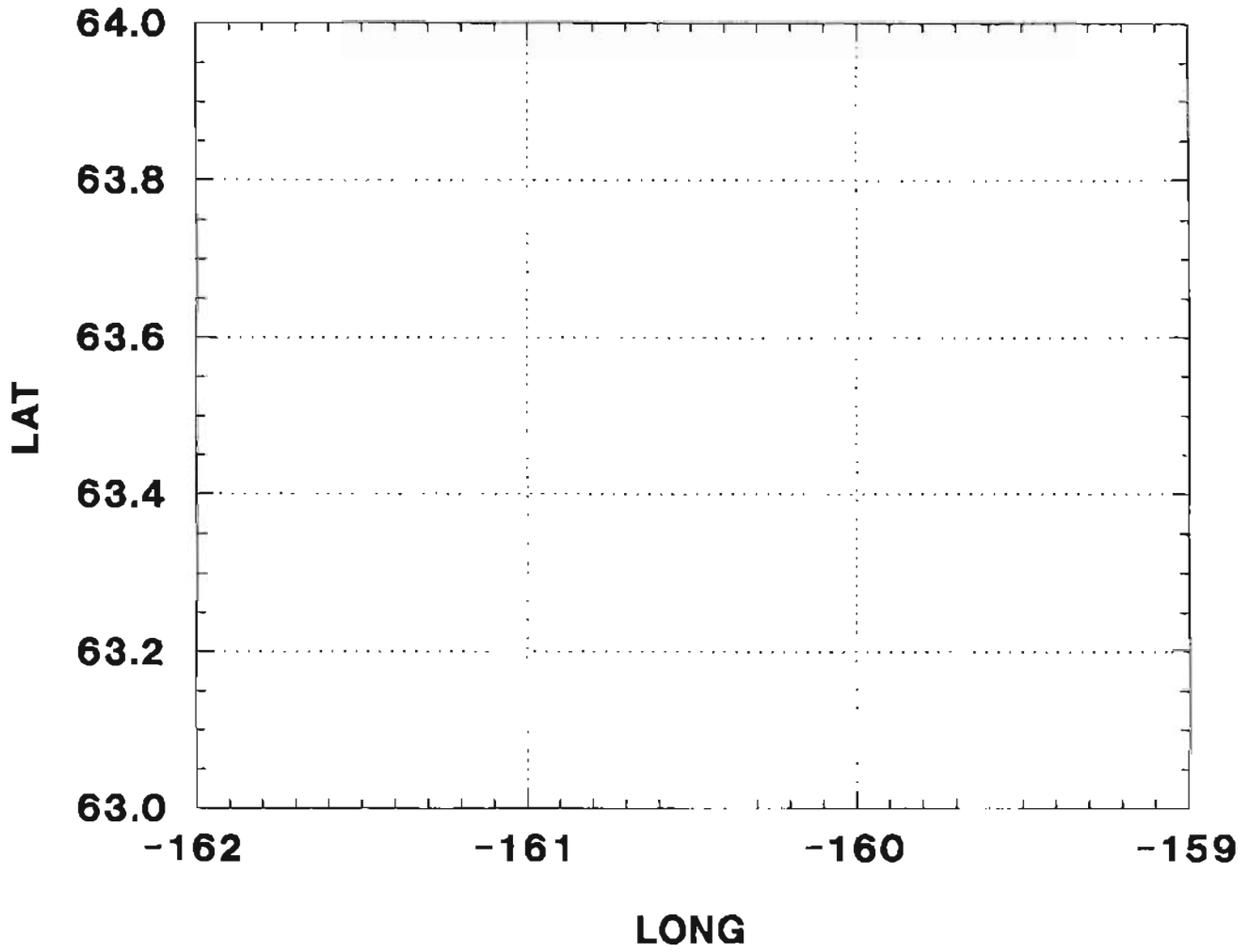
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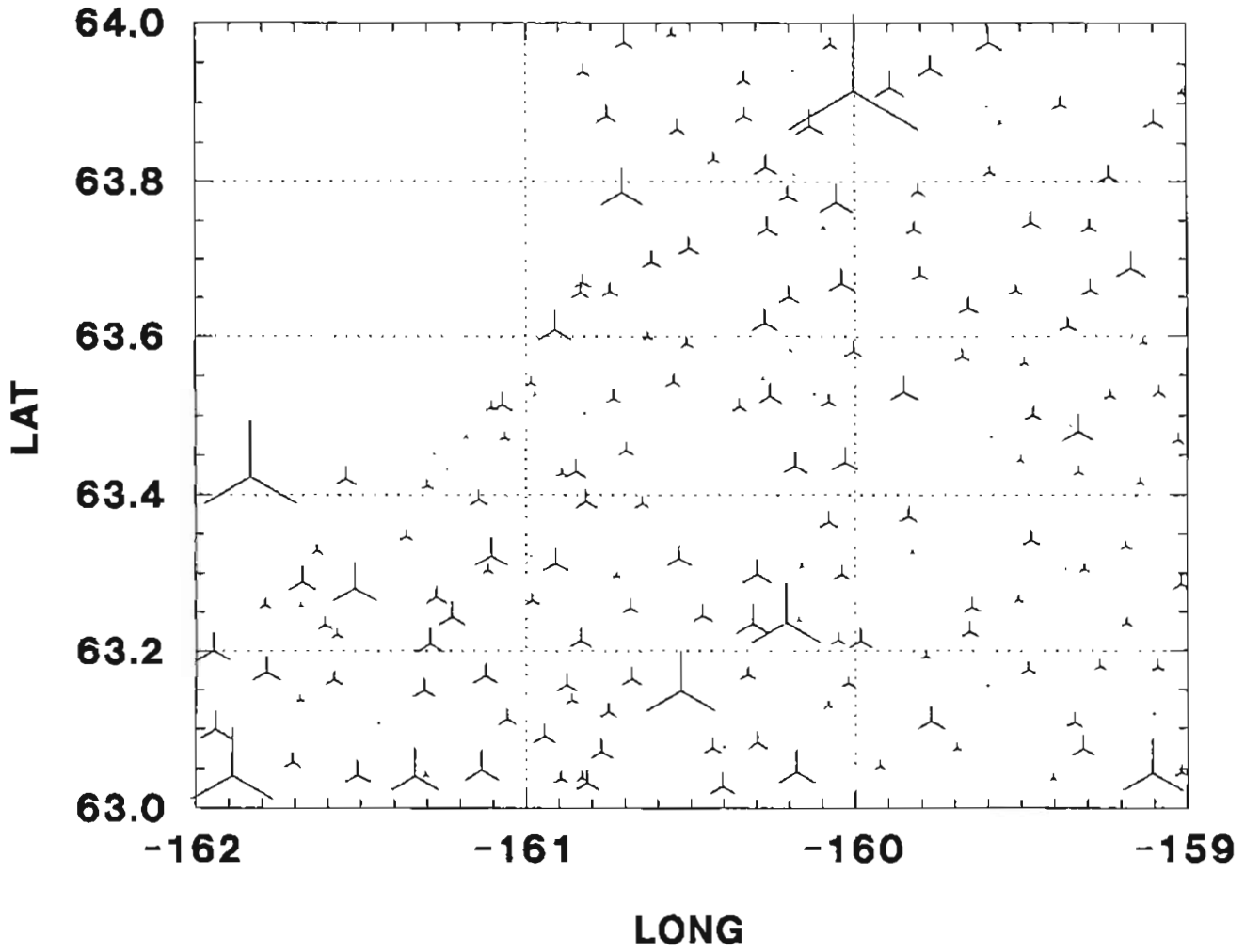
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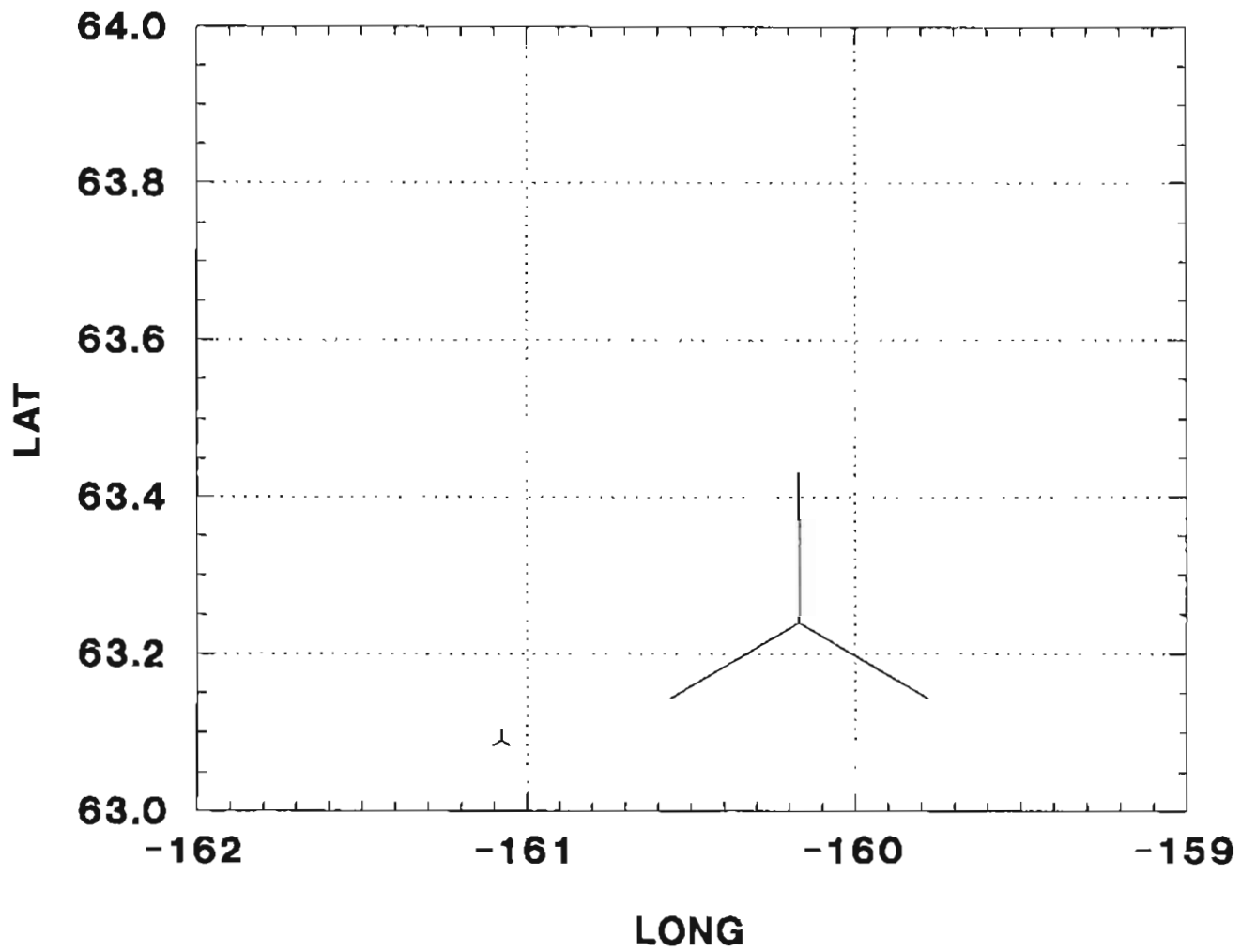
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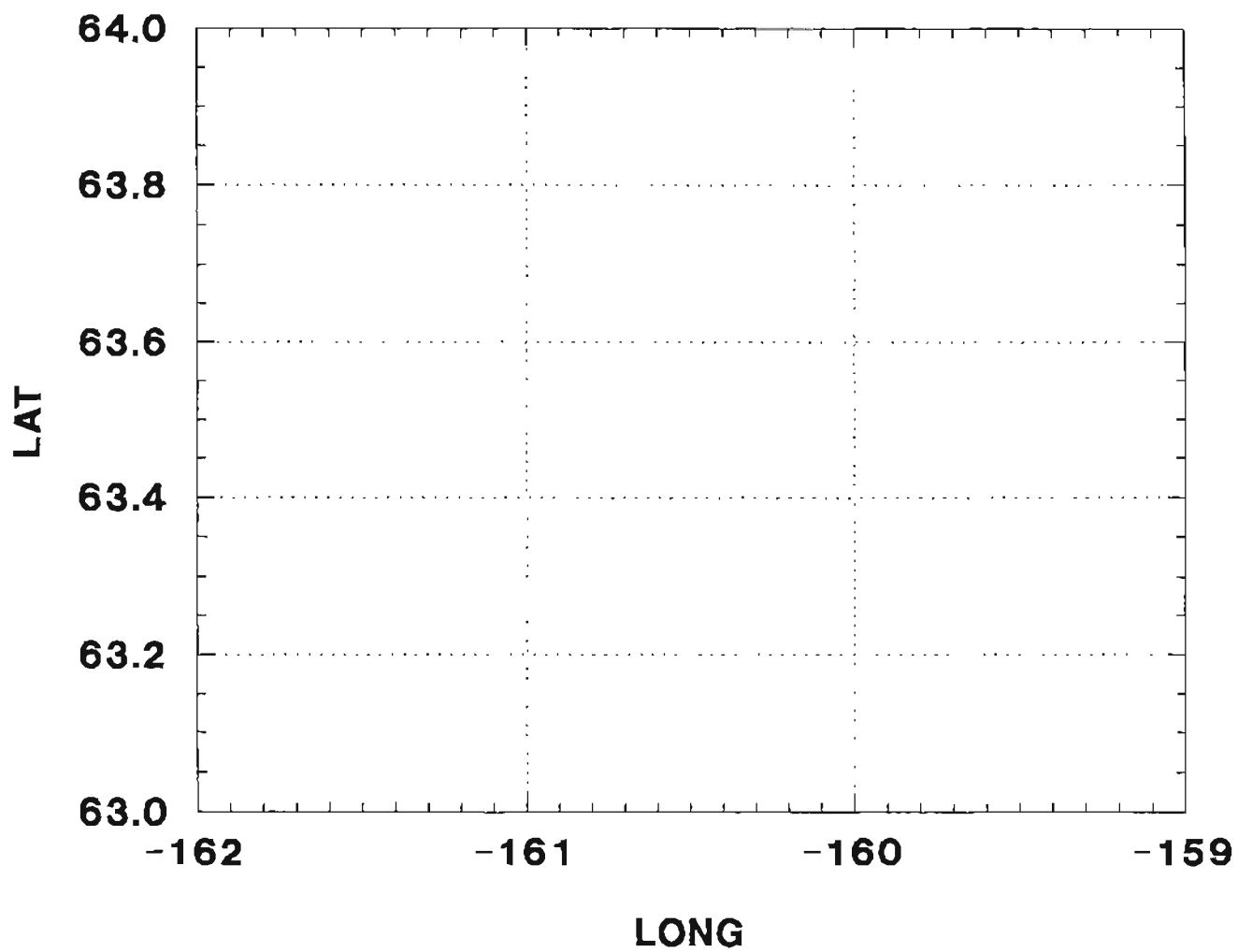
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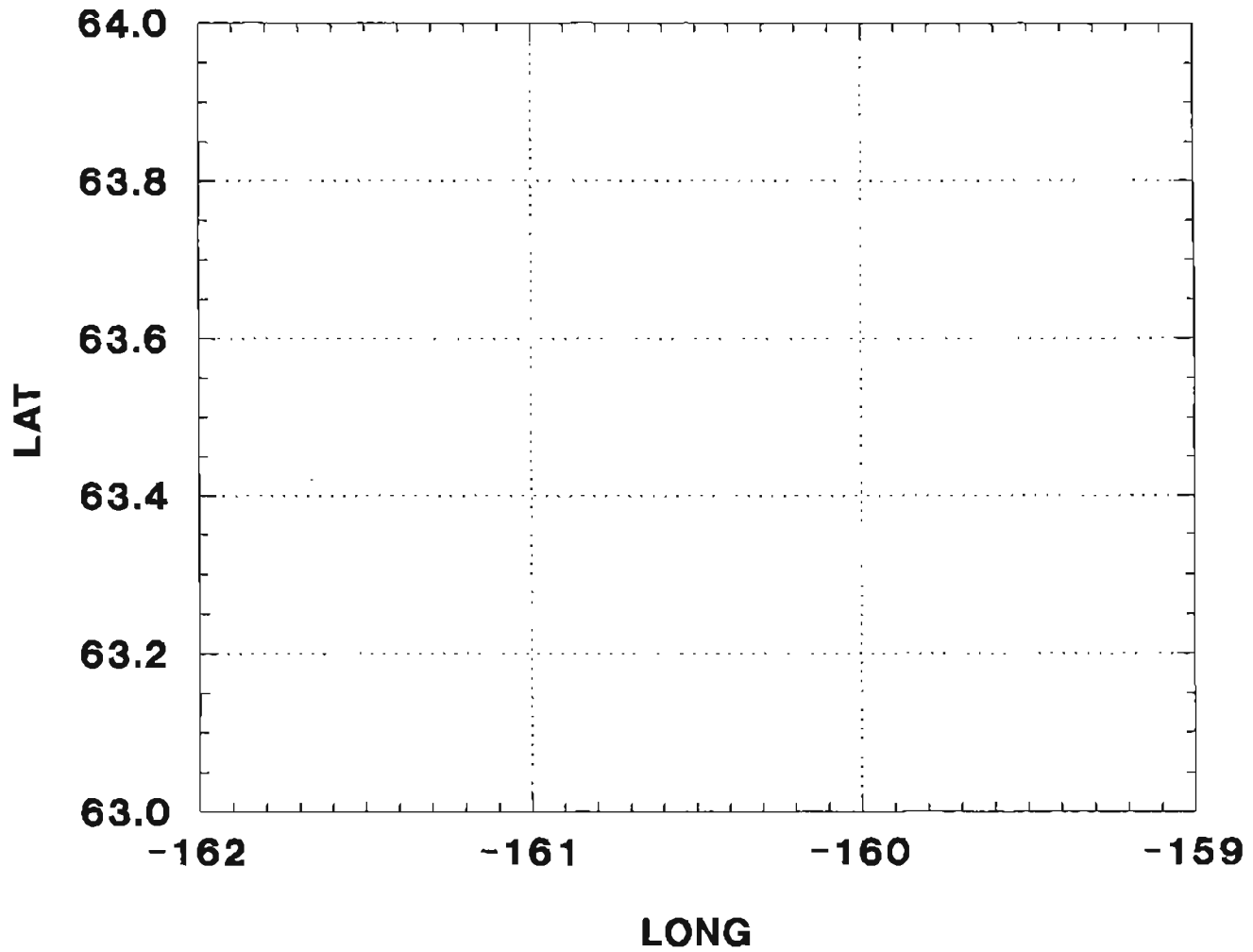
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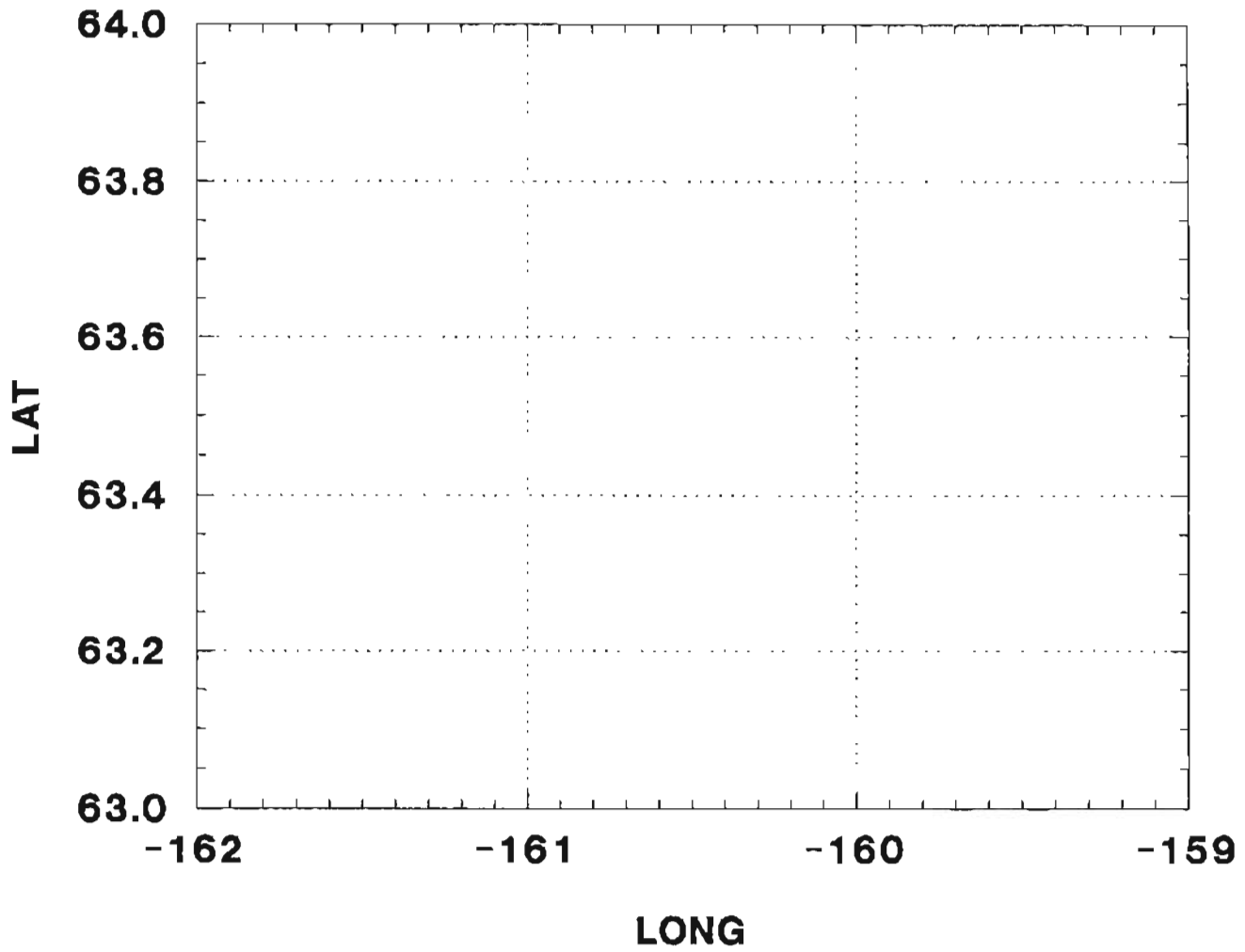
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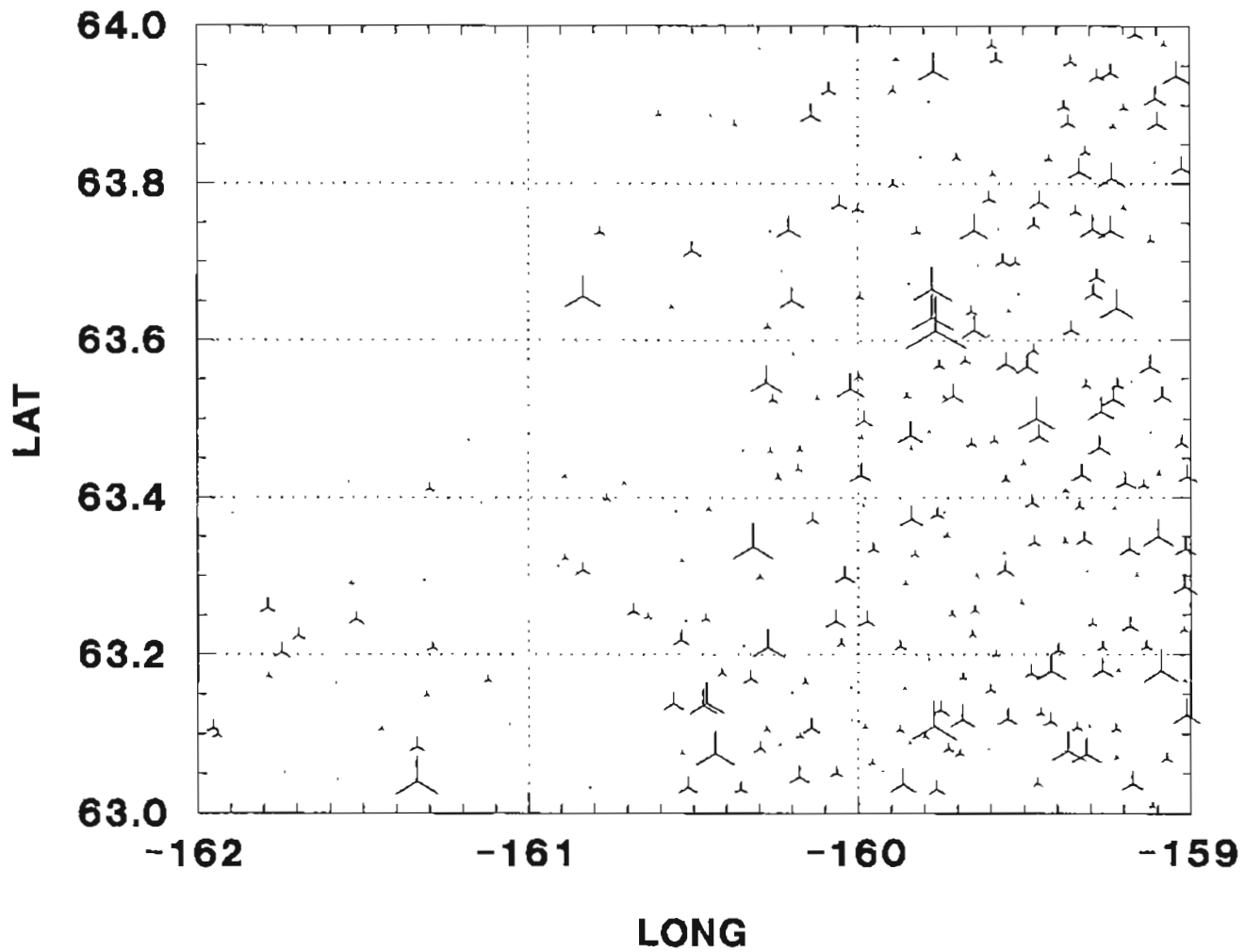
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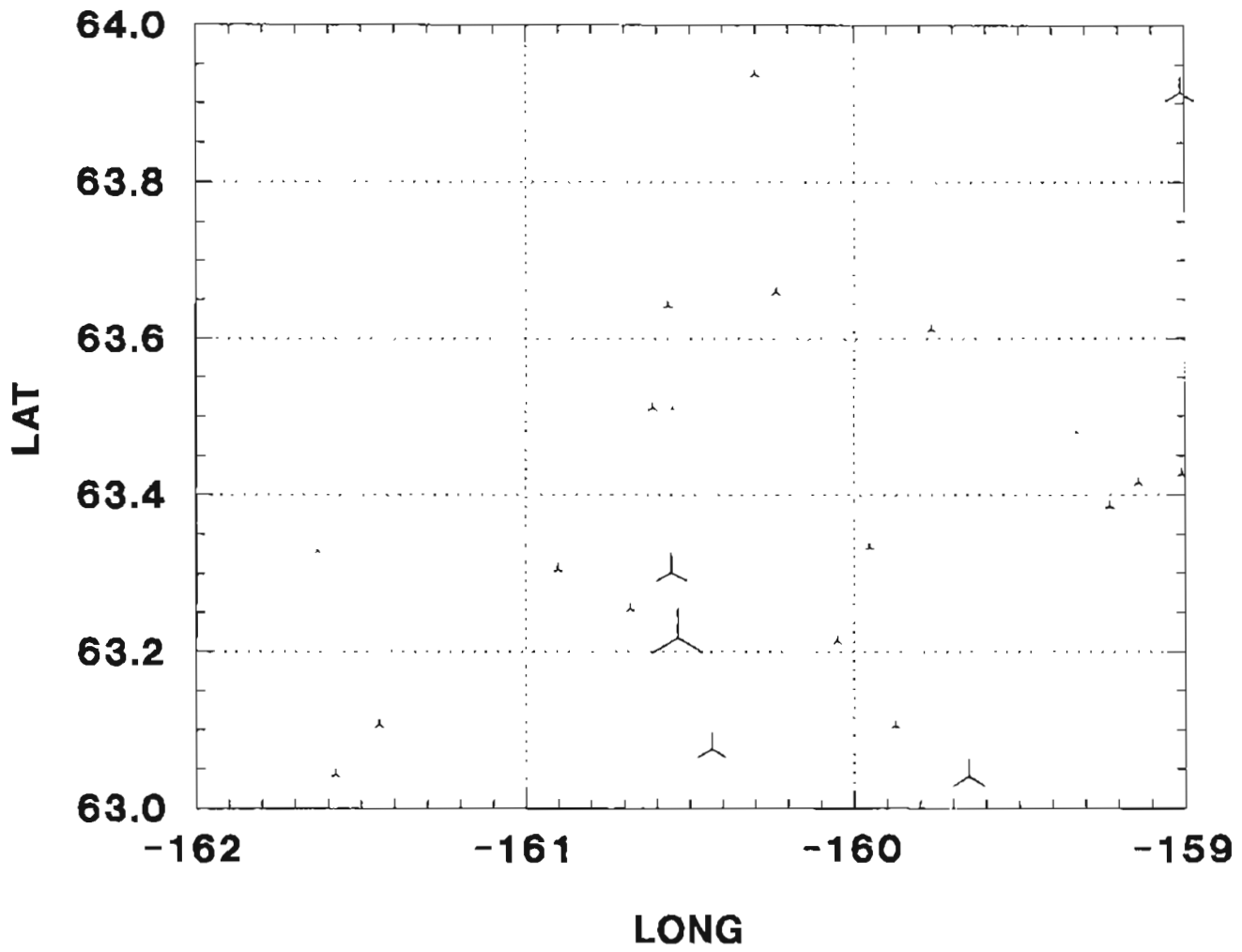
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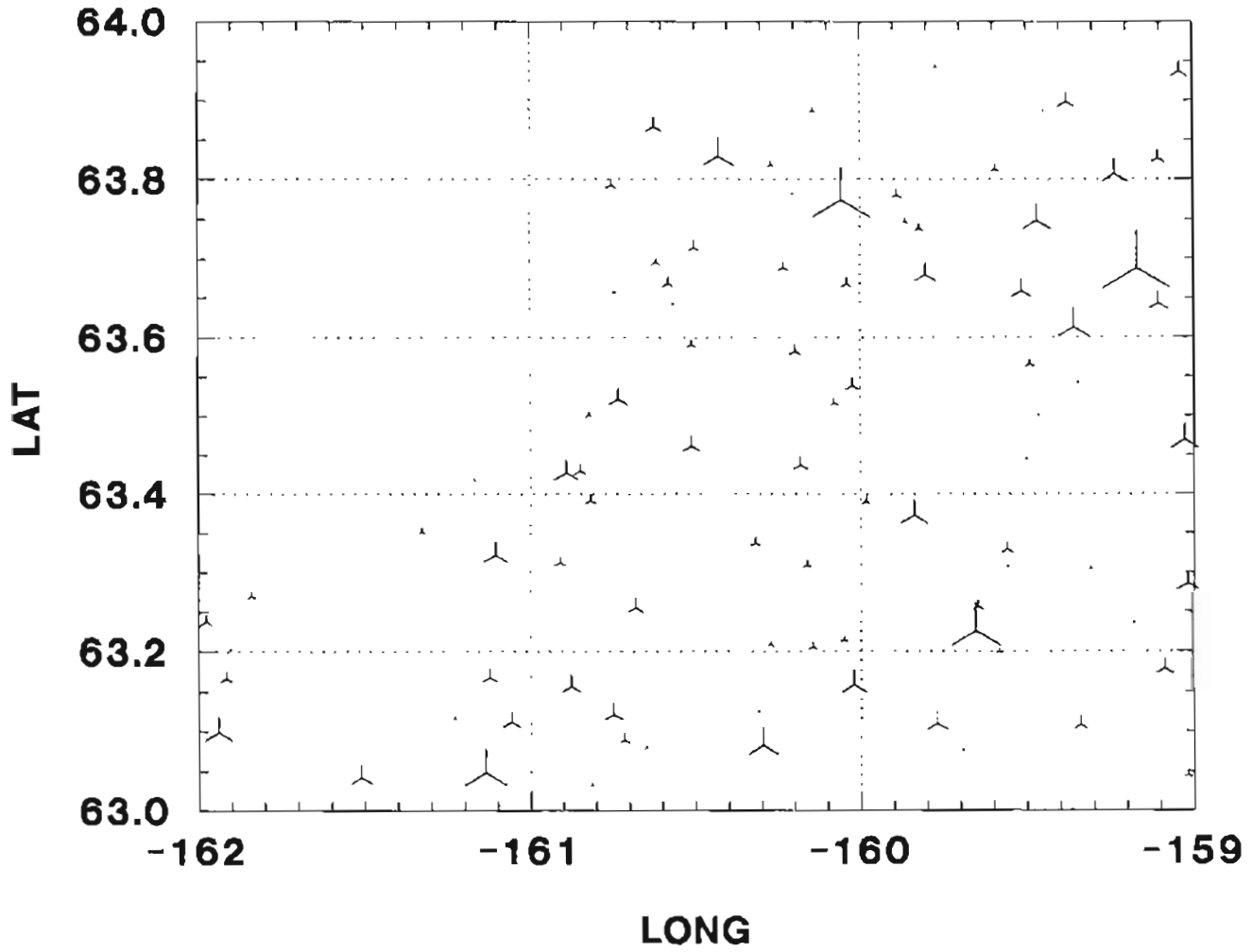
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APPENDIX A

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.

<u>KEY NO.</u>	<u>SOURCE / MEDIUM / TREATMENT</u>
01	- <u>Spring water</u> sample <u>untreated</u> .
02	- <u>Stream water</u> sample <u>untreated</u> .
03	- <u>Well water</u> sample <u>untreated</u> .
04	- <u>Natural pond water</u> sample <u>untreated</u> .
05	- <u>Artificial pond water</u> sample <u>untreated</u> .
06	- <u>Spring water</u> sample <u>filtered</u> through a 0.45- μ membrane filter <u>and acidified</u> to a pH of ≤ 1 with reagent-grade nitric acid (HNO_3).
07	- <u>Stream water</u> sample <u>filtered</u> through a 0.45- μ membrane filter <u>and acidified</u> to a pH of ≤ 1 with reagent-grade nitric acid (HNO_3).
08	- <u>Well water</u> sample <u>filtered</u> through a 0.45- μ membrane filter <u>and acidified</u> to a pH of ≤ 1 with reagent-grade nitric acid (HNO_3).
09	- <u>Natural pond water</u> sample <u>filtered</u> through a 0.45- μ membrane filter <u>and acidified</u> to a pH of ≤ 1 with reagent-grade nitric acid (HNO_3).
10	- <u>Artificial pond water</u> sample <u>filtered</u> through a 0.45- μ membrane filter <u>and acidified</u> to a pH of ≤ 1 with reagent-grade nitric acid (HNO_3).
11	- <u>Wet spring sediment</u> sample <u>dried</u> at $\leq 100^\circ\text{C}$ and <u>sieved to -100 mesh</u> through stainless steel sieves.
12	- <u>Wet stream sediment</u> sample <u>dried</u> at $\leq 100^\circ\text{C}$ <u>and sieved to -100 mesh</u> through stainless steel sieves.
13	- <u>Wet natural pond sediment</u> sample <u>dried</u> at $\leq 100^\circ\text{C}$ <u>and sieved to -100 mesh</u> through stainless steel sieves.

- 14 - Wet artificial pond sediment sample dried at $\leq 100^{\circ}\text{C}$ and sieved to -100 mesh through stainless steel sieves.
- 15 - Dry stream sediment sample dried at $\leq 100^{\circ}\text{C}$ (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 $\leq 100^{\circ}\text{C}$ and sieved to -40 mesh through stainless steel sieves.
- 32 - Wet stream sediment sample dried at $\leq 100^{\circ}\text{C}$ and sieved to -40 mesh through stainless steel sieves.
- 33 - Wet natural lake sediment sample dried at $\leq 100^{\circ}\text{C}$ and sieved to -40 mesh through stainless steel sieves.
- 35 - Dry stream sediment sample dried at $\leq 100^{\circ}\text{C}$ and sieved to -40 mesh through stainless steel sieves.
- 41 - Wet spring sediment sample dried at $\leq 100^{\circ}\text{C}$ and sieved to -80 mesh through stainless steel sieves.
- 42 - Wet stream sediment sample dried at $\leq 100^{\circ}\text{C}$ and sieved to -80 mesh through stainless steel sieves.
- 43 - Wet natural lake sediment sample dried at $\leq 100^{\circ}\text{C}$ and sieved to -80 mesh through stainless steel sieves.
- 45 - Dry stream sediment sample dried at $\leq 100^{\circ}\text{C}$ and sieved to -80 mesh through stainless steel sieves.
- 51 - Wet spring sediment sample dried at $\leq 100^{\circ}\text{C}$ and sieved to -170 mesh through stainless steel sieves.
- 52 - Wet stream sediment sample dried at $\leq 100^{\circ}\text{C}$ and sieved to -170 mesh through stainless steel sieves.
- 53 - Wet natural lake sediment sample dried at $\leq 100^{\circ}\text{C}$ and sieved to -170 mesh through stainless steel sieves.
- 55 - Dry stream sediment sample dried at $\leq 100^{\circ}\text{C}$ and sieved to -170 mesh through stainless steel sieves.
- 61 - Wet spring sediment sample dried at $\leq 100^{\circ}\text{C}$ and sieved to -230 mesh through stainless steel sieves.
- 62 - Wet stream sediment sample dried at $\leq 100^{\circ}\text{C}$ and sieved to -230 mesh through stainless steel sieves.
- 63 - Wet natural lake sediment sample dried at $\leq 100^{\circ}\text{C}$ 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 $\leq 100^{\circ}\text{C}$, and sieved to -40 mesh through stainless steel sieves.
- 72- Sediment sample collected from the stream bank, dried at $\leq 100^{\circ}\text{C}$, and sieved to -80 mesh through stainless steel sieves.
- 73- Sediment sample collected from the stream bank, dried at $\leq 100^{\circ}\text{C}$, and sieved to -100 mesh through stainless steel sieves.
- 74- Sediment sample collected from the stream bank, dried at $\leq 100^{\circ}\text{C}$, and sieved to -170 mesh through stainless steel sieves.
- 75- Sediment sample collected from the stream bank, dried at $\leq 100^{\circ}\text{C}$, and sieved to -230 mesh through stainless steel sieves.
- 96 - Dry natural pond sediment sample dried at $\leq 100^{\circ}\text{C}$ (if necessary) and sieved to -100 mesh through stainless steel sieves.
- 97 - Dry artificial pond sediment sample dried at $\leq 100^{\circ}\text{C}$ (if necessary) and sieved to -100 mesh through stainless steel sieves.
- 98 - Other water 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.
- 99 - Other sediment

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 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 accidentally 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.