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**RADAR THICKNESS MEASUREMENTS OVER THE
SOUTHERN PART OF THE GREENLAND ICE SHEET**

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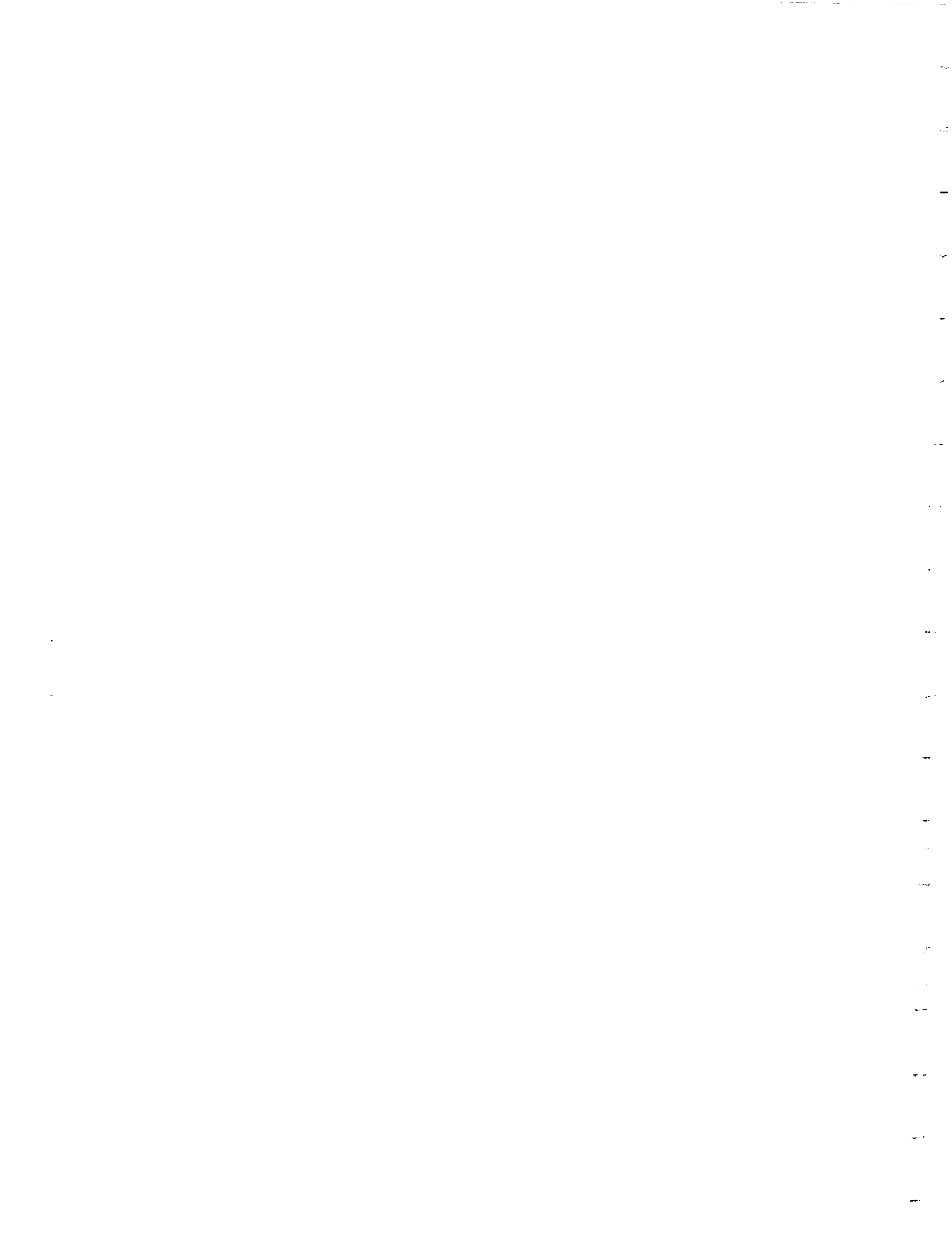


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Abstract—We performed ice thickness measurements over the southern part of the Greenland ice sheet during June and July 1993. We used an airborne coherent radar depth sounder for these measurements. The radar was operated from a NASA P-3 aircraft equipped with GPS receivers. Radar data were collected in conjunction with laser altimeter and microwave altimeter measurements of ice surface elevation. This report provides radio echograms and thickness profiles from data collected during 1993.

1.0 Introduction

In 1991, NASA initiated a research program to test airborne laser and radar altimeters to measure surface elevation of the Greenland ice sheet in conjunction with a surface-based program to validate airborne data and to interpret satellite microwave data sets. Results from these initial airborne laser measurements showed that surface elevations can be determined to an accuracy of about 20 cm [Krabill et al., 1995a, 1995b]. In 1993 the airborne program was expanded to include a radio echo sounder operated by The University of Kansas for determining ice thickness along with laser surface elevations.

We collected ice thickness data along several flights with an airborne coherent radar operating at 150 MHz during 1993 and performed in-flight tests to isolate system problems. The radar data are tagged with the Global Positioning System (GPS) information for accurate location. This report presents results from the 1993 mission.

2.0 Radar System and Experiment Description

We used The University of Kansas radar depth sounder [Raju et al., 1990] for thickness measurements during this experiment. It is a coherent pulse compression radar that operates at a center frequency of 150 MHz. Two complementary Surface Acoustic Wave (SAW) dispersive delay lines are used for pulse expansion and compression. The system uses a high-gain low-noise receiver to amplify and coherently detect the received signal. The detected signals are digitized using two 8-bit A/D converters. The digital signal processor performs coherent and incoherent integrations on the detected signal. The output from the digital signal processor is displayed on a monitor in real time and recorded, along with GPS information, on Bernoulli cartridges for subsequent analysis. The system operation is controlled by a personal computer. Two four-element dipole arrays, one mounted under the left wing and the other under the right wing of the P-3

aircraft, are used for transmission and reception. Table 1 shows important radar system parameters.

Table 1. Radar System Parameters

Description	Characteristic	Units
	Pulse Compression	
	150	MHz
	18.75	MHz
	1.6	μ s
	60	ns
	200	W
	1, 2, 4, 8 (selectable)	KHz
	70	dB
	selectable to 64000	
	selectable to 1024	
	8.5	MHz
	8-bit, 48	dB
	53.3 (18.75 MHz)	μ s
	selectable; accurate to 100 ns	
	4.494	m
	4-element dipole arrays	

Radar data are collected with the aircraft flying at an altitude of about 500 m and a speed of about 100 m/s over the flight lines shown in Figure 1. Since one of the objectives of the experiment is to evaluate radar performance, we made in-flight tests on the system during that time we could not collect data. Also we had to replace a defective amplifier with a gain of 43 dB with a lower-gain (30 dB) amplifier in the field. This reduced radar

sensitivity resulting in a loss of bottom echoes in the percolation zone when ice thickness exceeded about 1.8 km.

3.0 Description of Data

Data are processed in two steps: (1) raw echograms, with their intensity scaled to enhance the visibility of the bottom echoes, are first generated to display measured intensity as a function of time or location and range; and (2) thickness information is derived from these intensity data using adaptive thresholding and smoothing techniques.

The data are arranged according to experiment date. First, a map of the flight line where data were collected is presented. Second, a radio-echogram is given for each 1000 samples in a file. A few vertical black strips in these echograms are from the VHF radio interference signal when pilot was communicating with airbase. The geo-locations, spaced by 100 columns, are printed at the bottom of each echogram. Finally thickness derived from the radar data are presented. The ice thickness is computed by calculating the number of pixels between the top and bottom echoes and multiplying this by 4.494m. In some thickness profiles, the thickness is smoothed using the conventional moving-average method.

References

G. Raju, Xin, W. Xin, and R. K. Moore, "Design, Development, Field Observations, and Preliminary Results of the Coherent Antarctic Radar Depth Sounder (CARDS) of the University of Kansas, U.S.A.," *Journal of Glaciology*, 36(123), pp. 247-254, 1990.

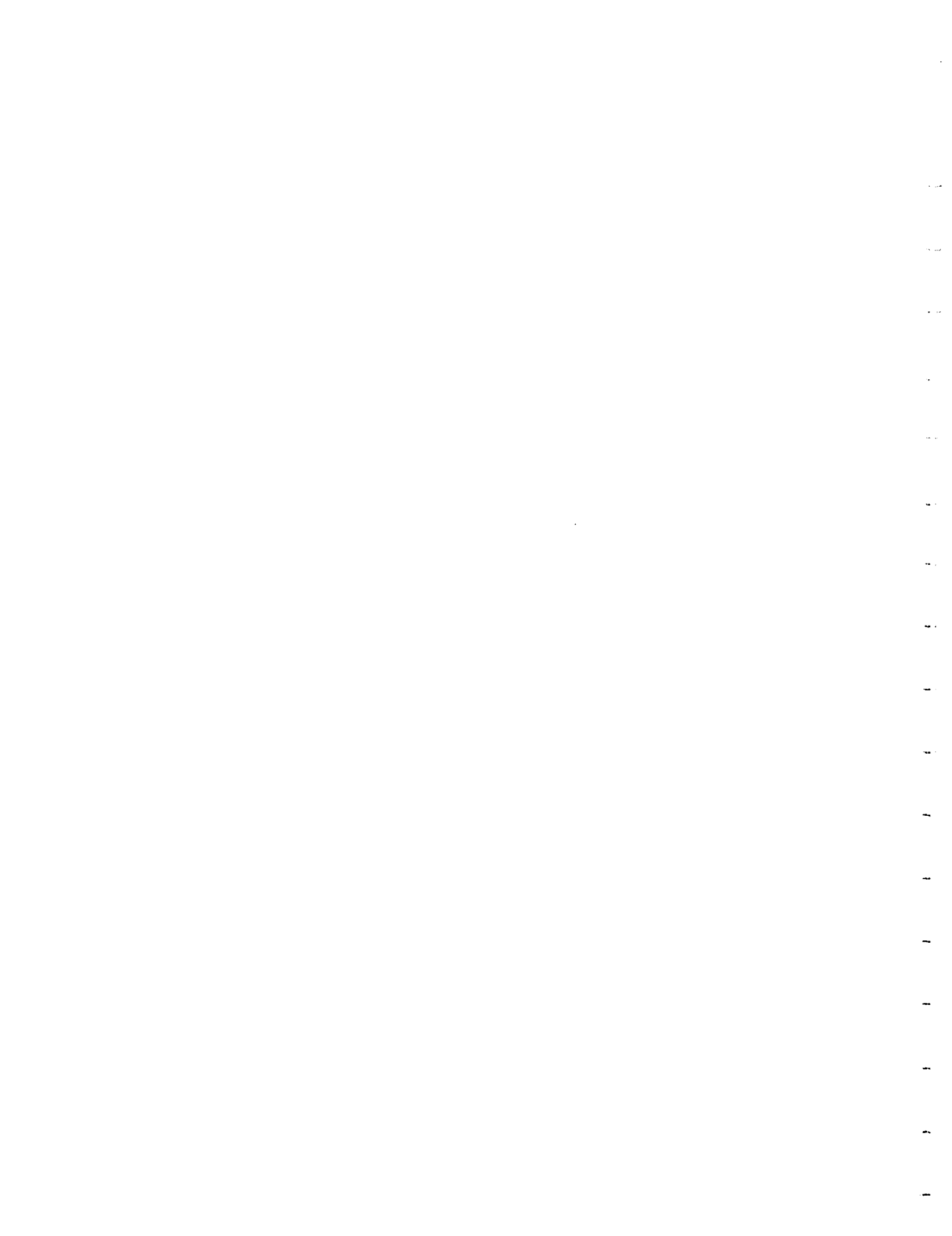
Krabill, W., R. Thomas, C. Martin, R. Swift, and E. Fredrick, "Accuracy of Laser Altimetry over the Greenland Ice Sheet," *Int. J. Rem. Sens.*, 16(7), pp.1211-1222, 1995a.

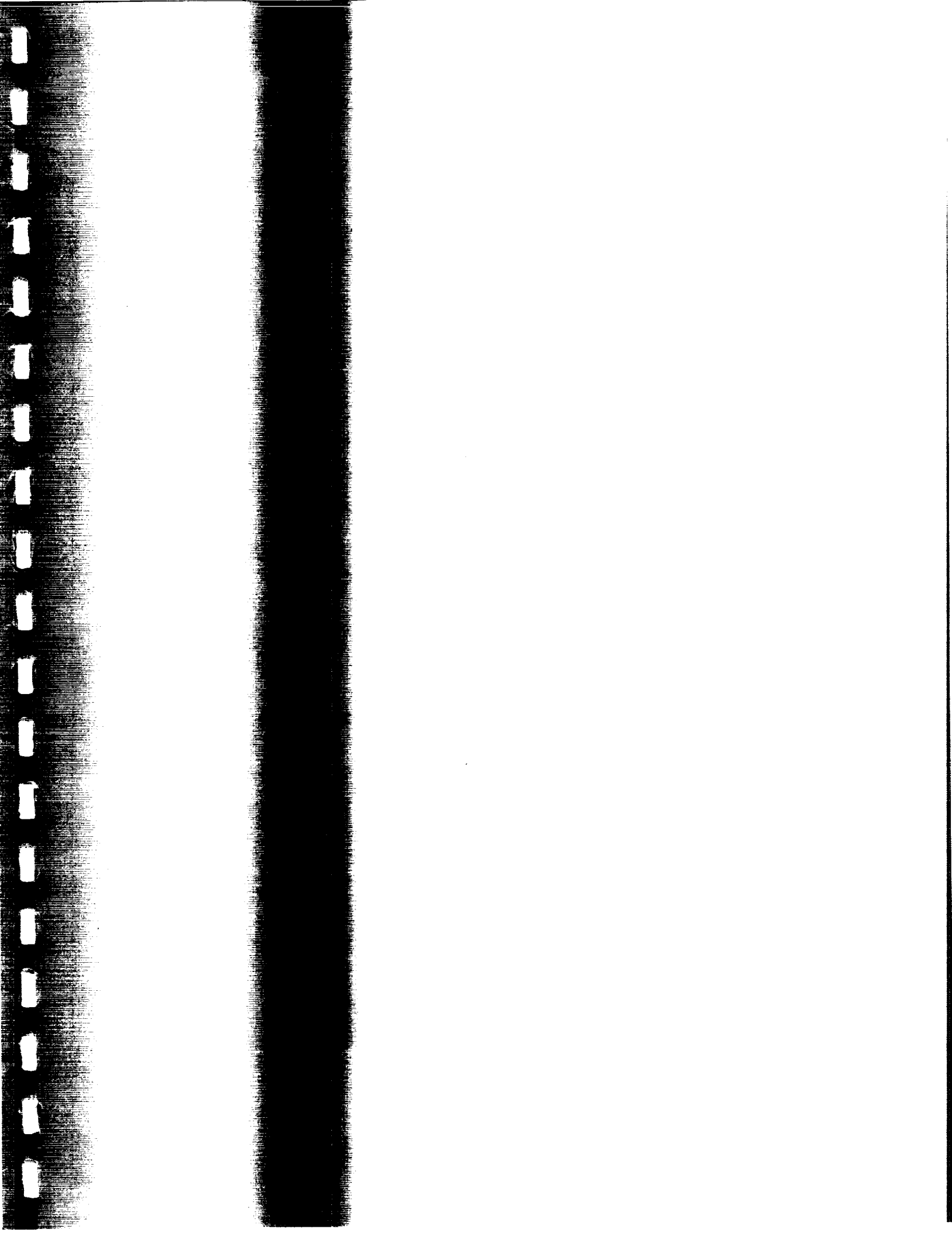
Krabill, W., R. Thomas, K. Jezek, K. Kuivinen, and S. Manizade, "Greenland Ice Sheet Thickness Changes Measured by Laser Altimetry," *Geophys. Res. Let.*, 22(17), pp.2341-2344, 1995b.

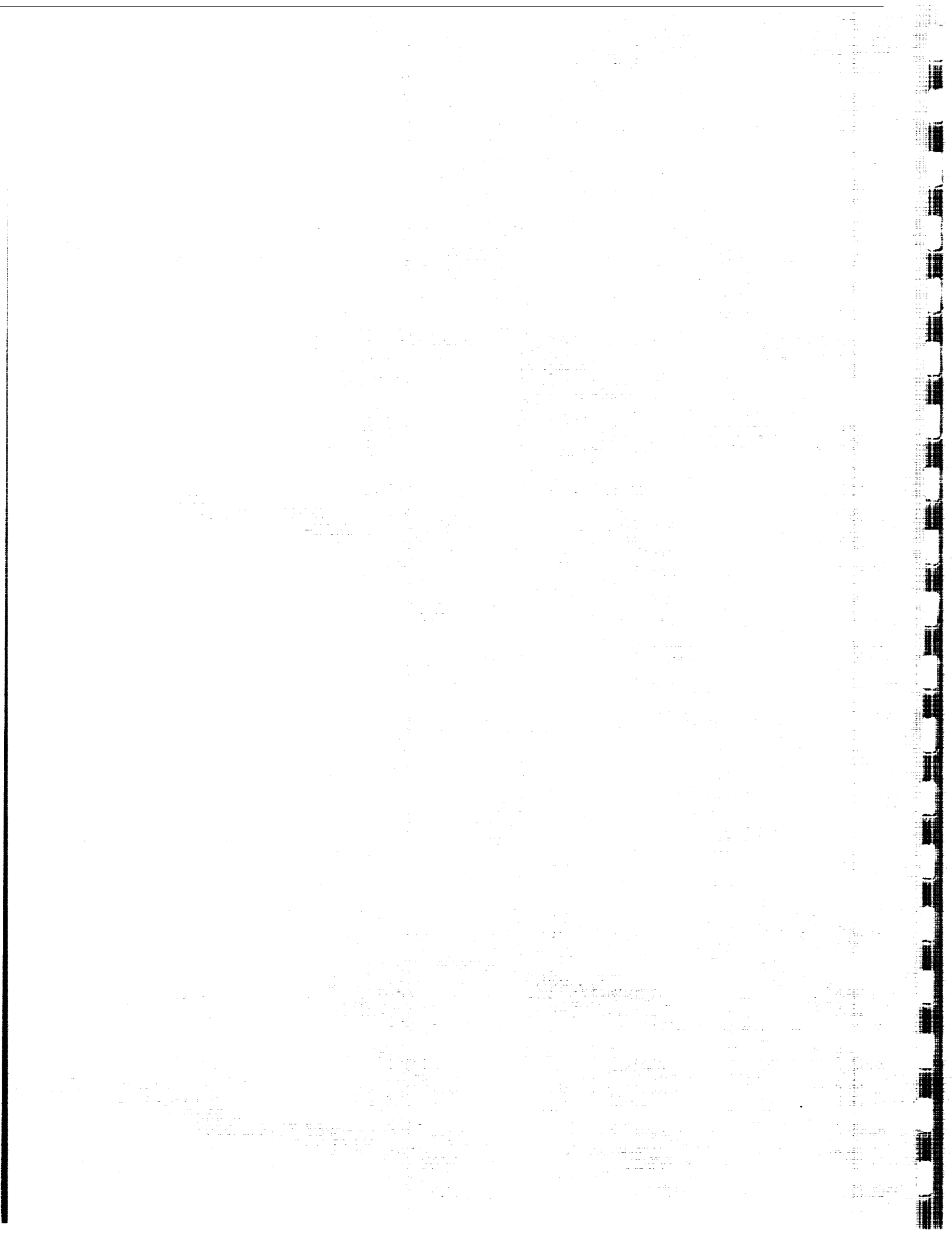
Results

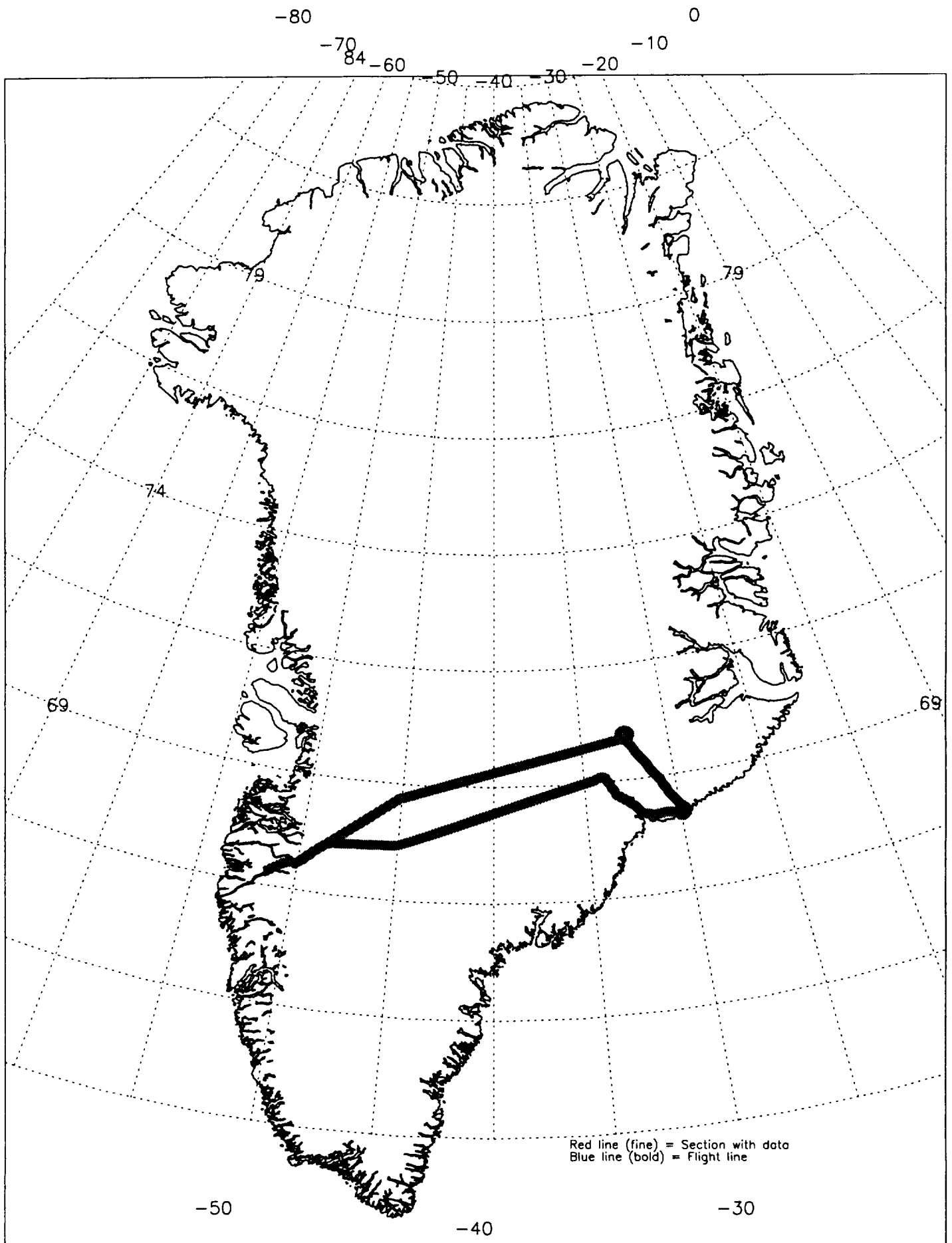
Appendix A

June 23, 1993

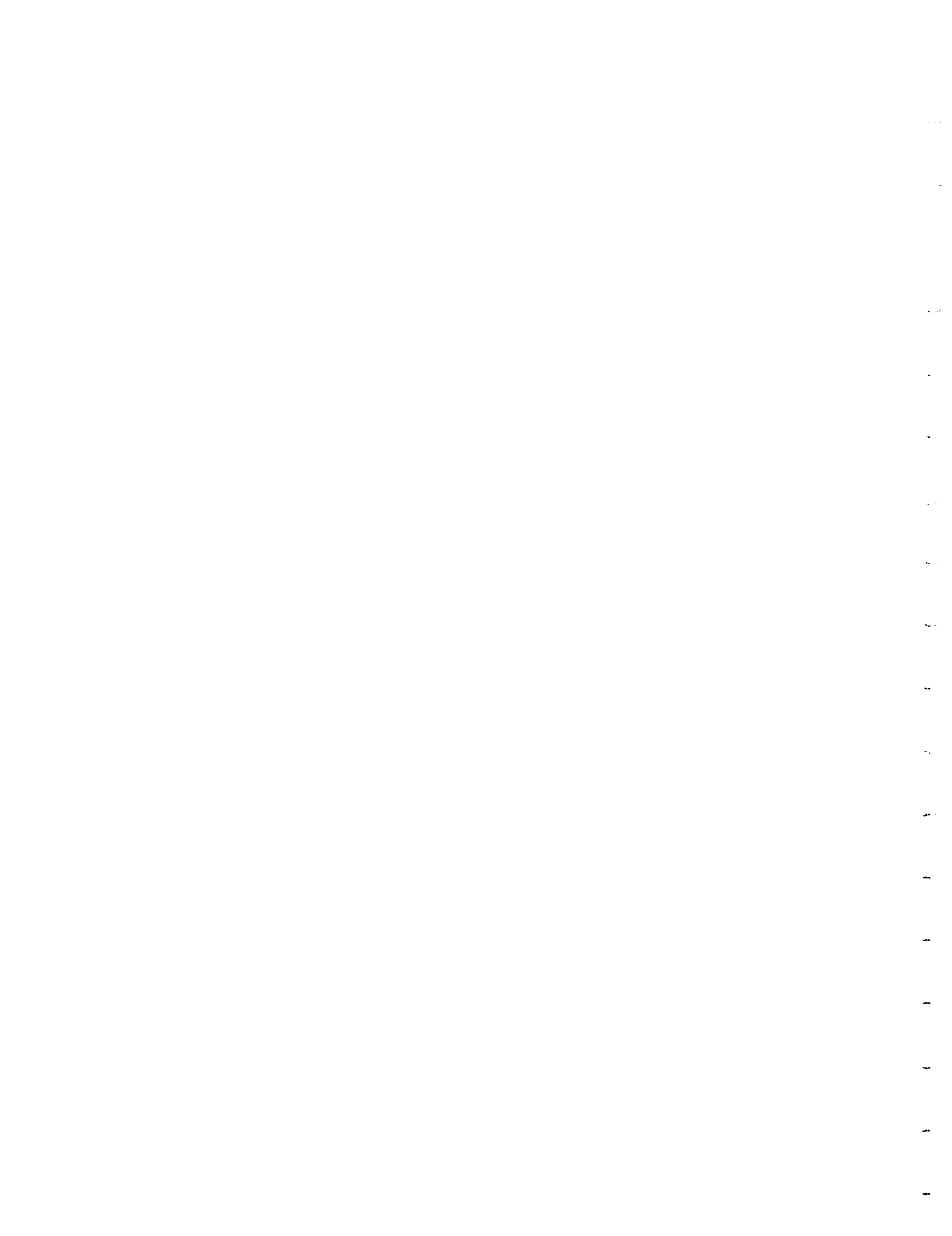




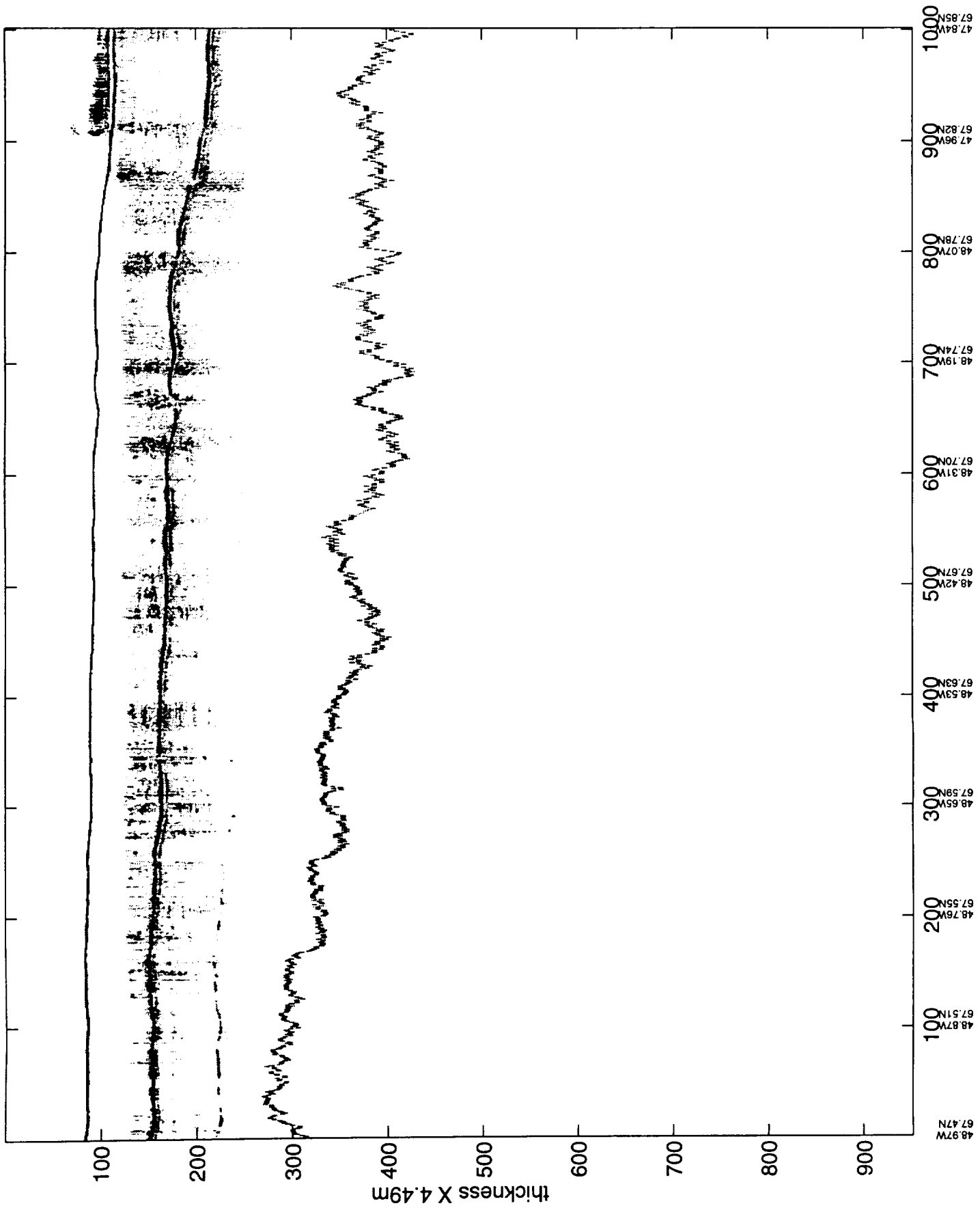




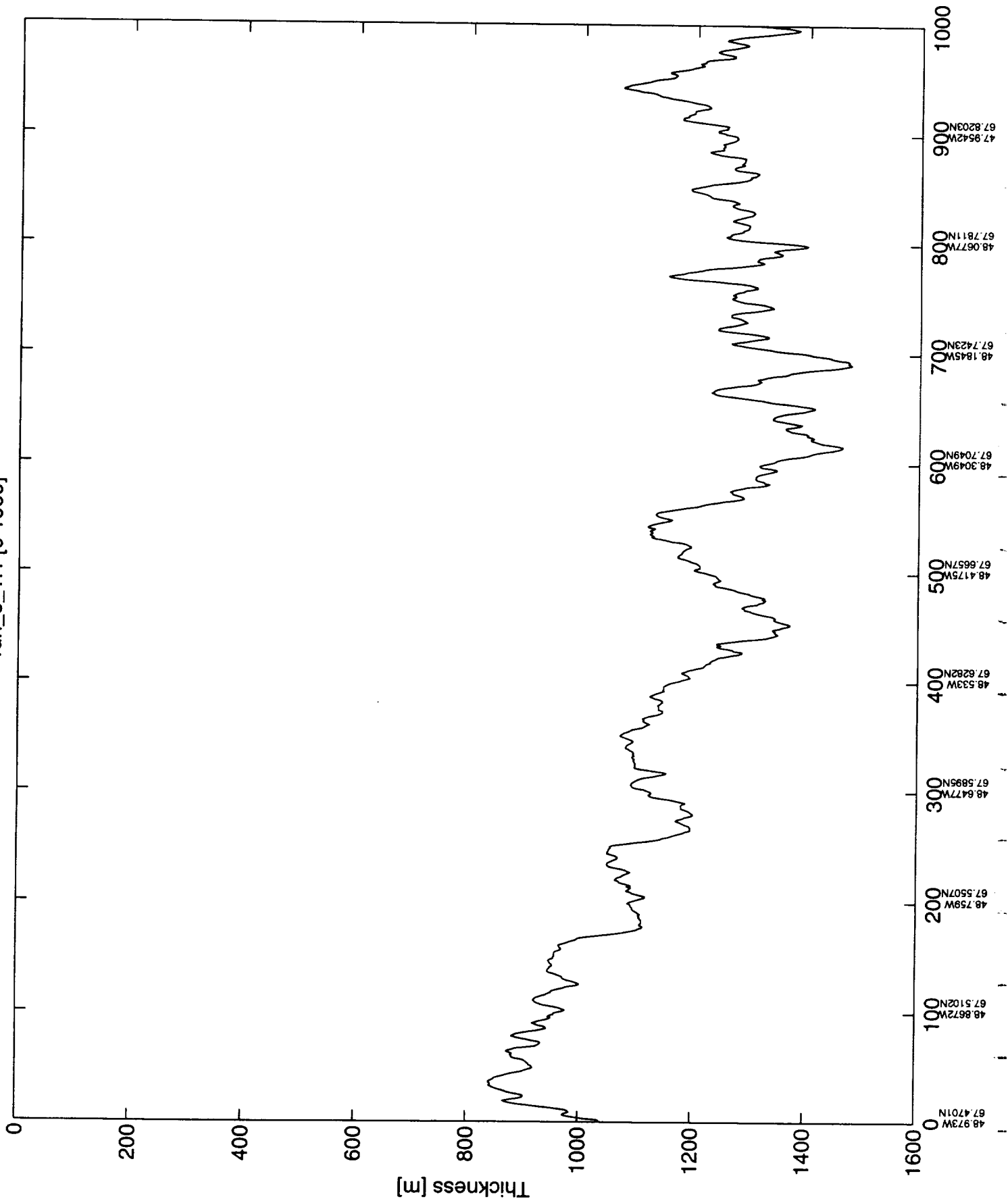
June 23, 1993 (r_6)



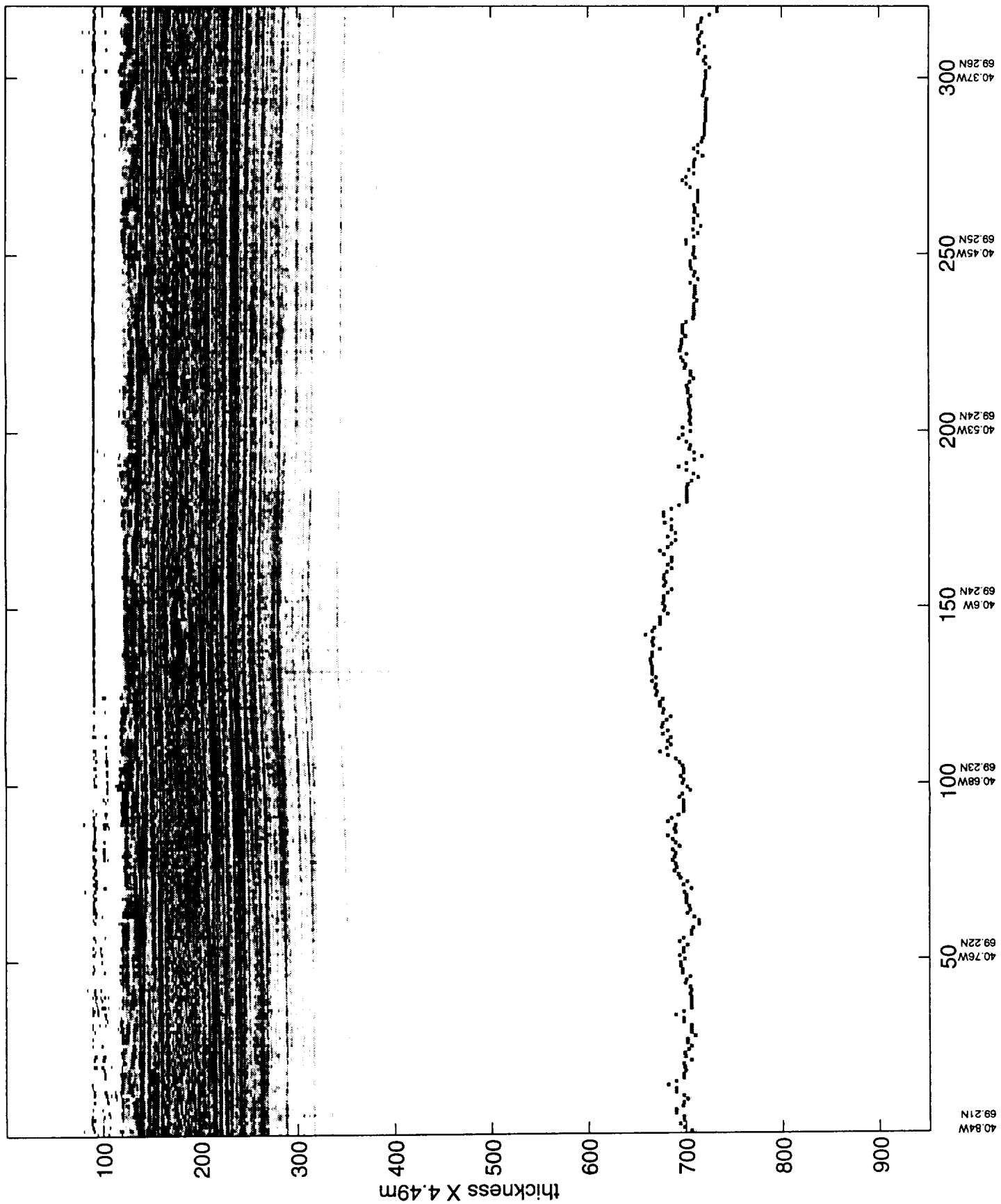
1un_6_1.1 (1) [u-10uu]



run_6_1.1 [0 1000]

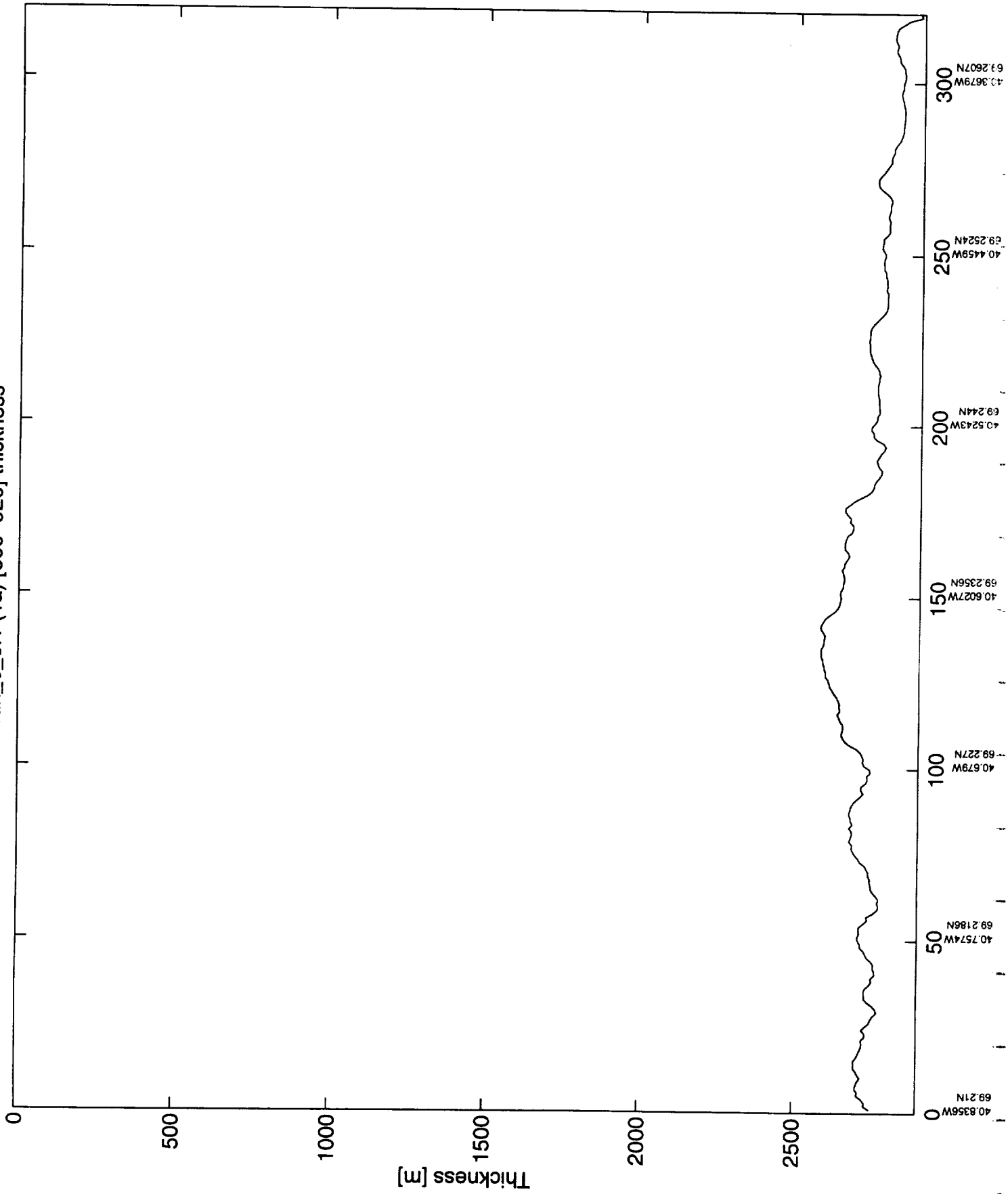


un_0.1 (m, 60d-0z0)



40.84W 69.21N
40.76W 69.22N
40.68W 69.23N
40.6W 69.24N
40.53W 69.24N
40.45W 69.25N
40.37W 69.26N

run_6_6.1 (1a) [600-920] thickness



40.8356W
69.21N

40.7574W
69.2186N

40.679W
69.227N

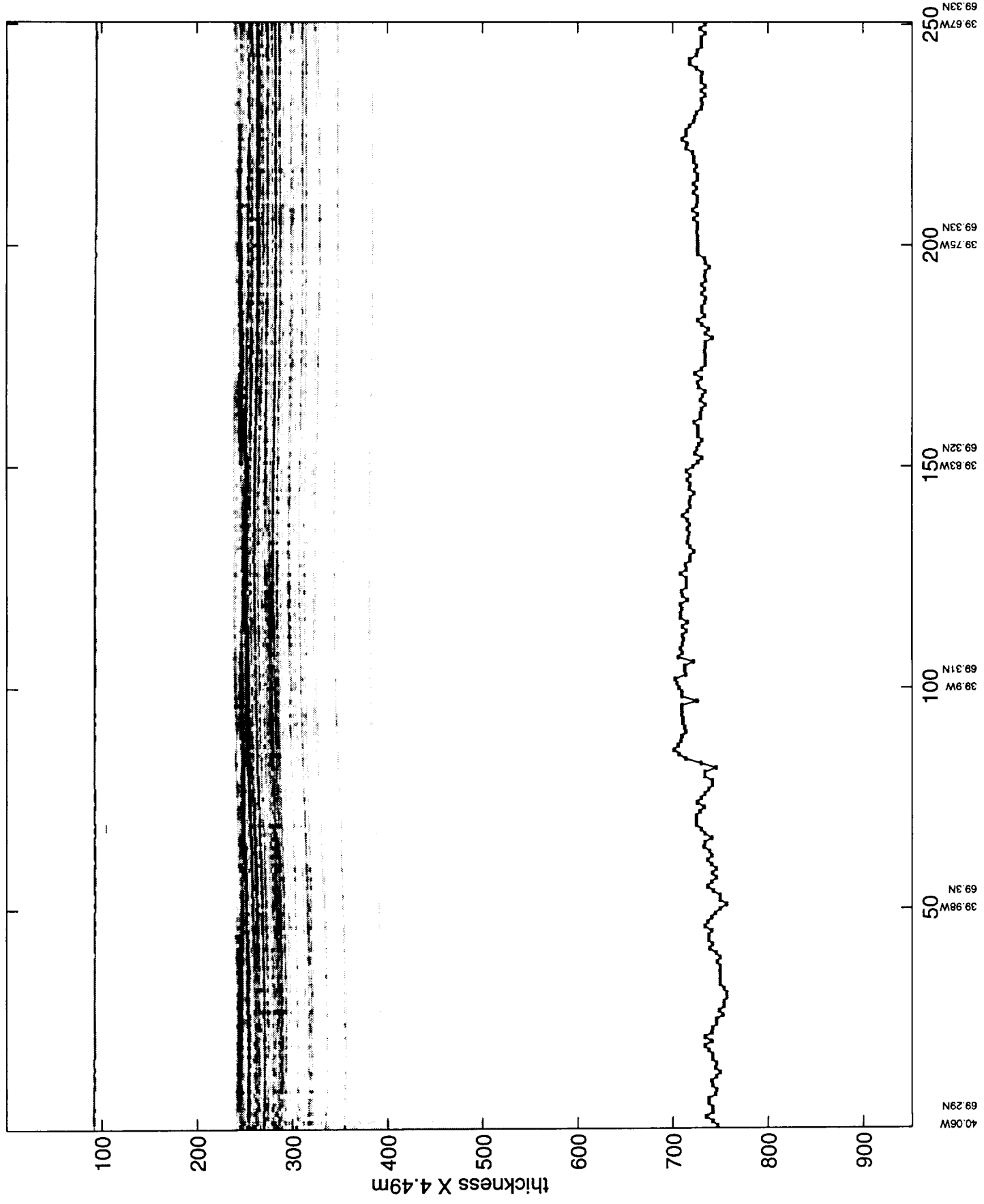
40.6027W
69.2356N

40.5243W
69.244N

40.4459W
69.2524N

40.3679W
69.2607N

ruh_o_6.1 (<a) [1100-13bu]



40.06W

69.29N

39.98W

69.3N

39.9W

69.31N

39.83W

69.32N

39.83W

69.31N

39.9W

69.31N

39.98W

69.3N

39.9W

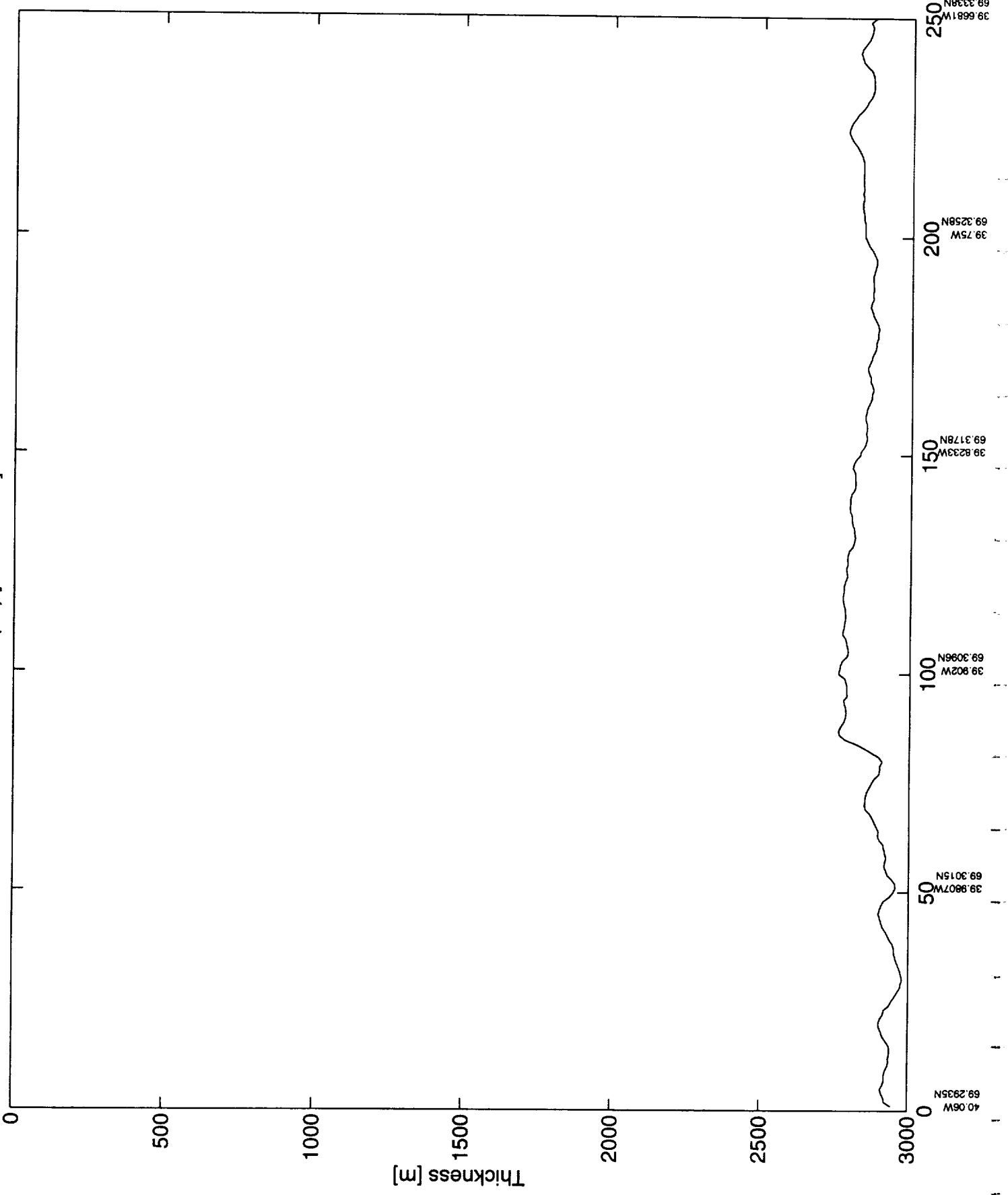
69.31N

39.83W

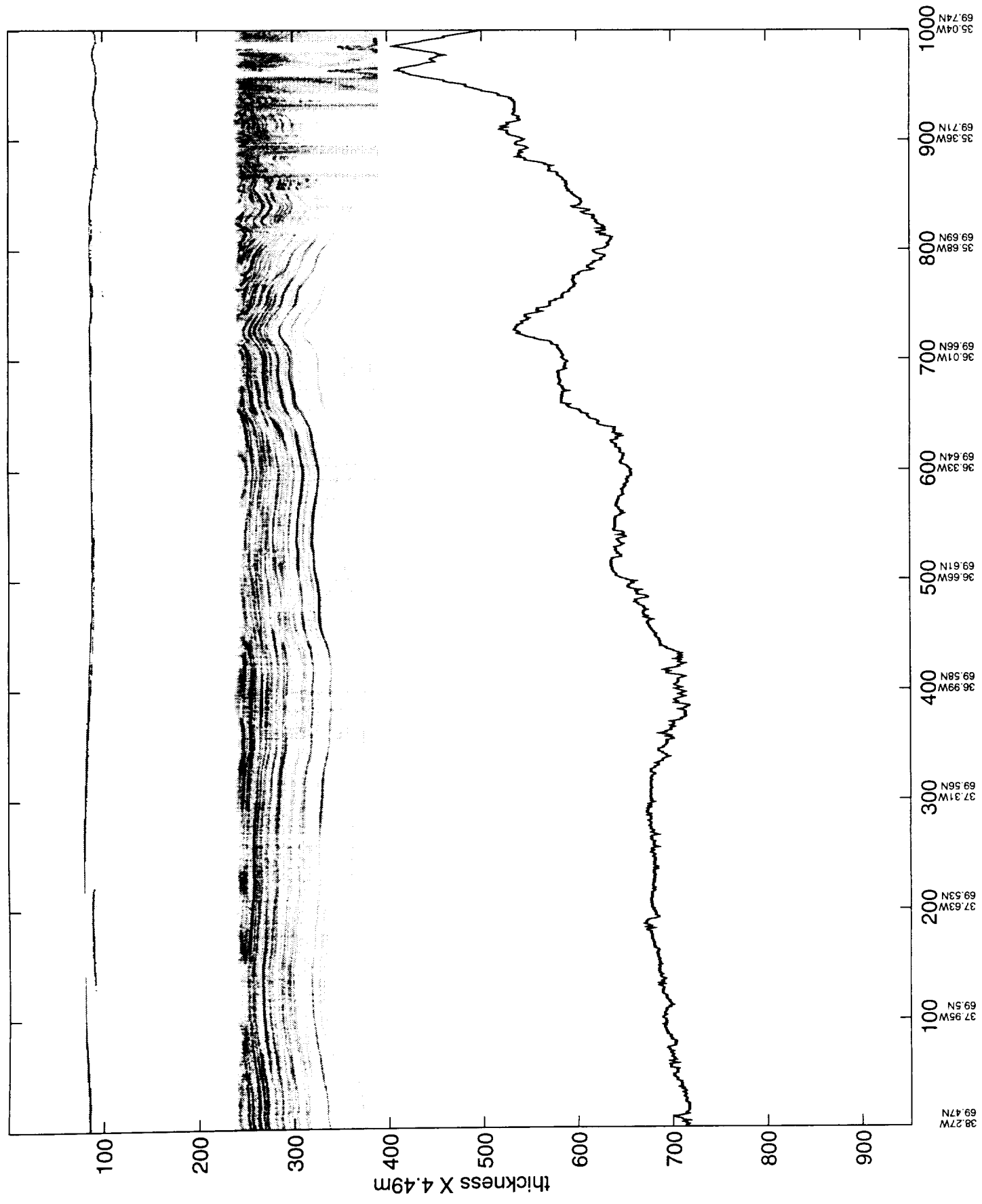
69.32N

39.83W

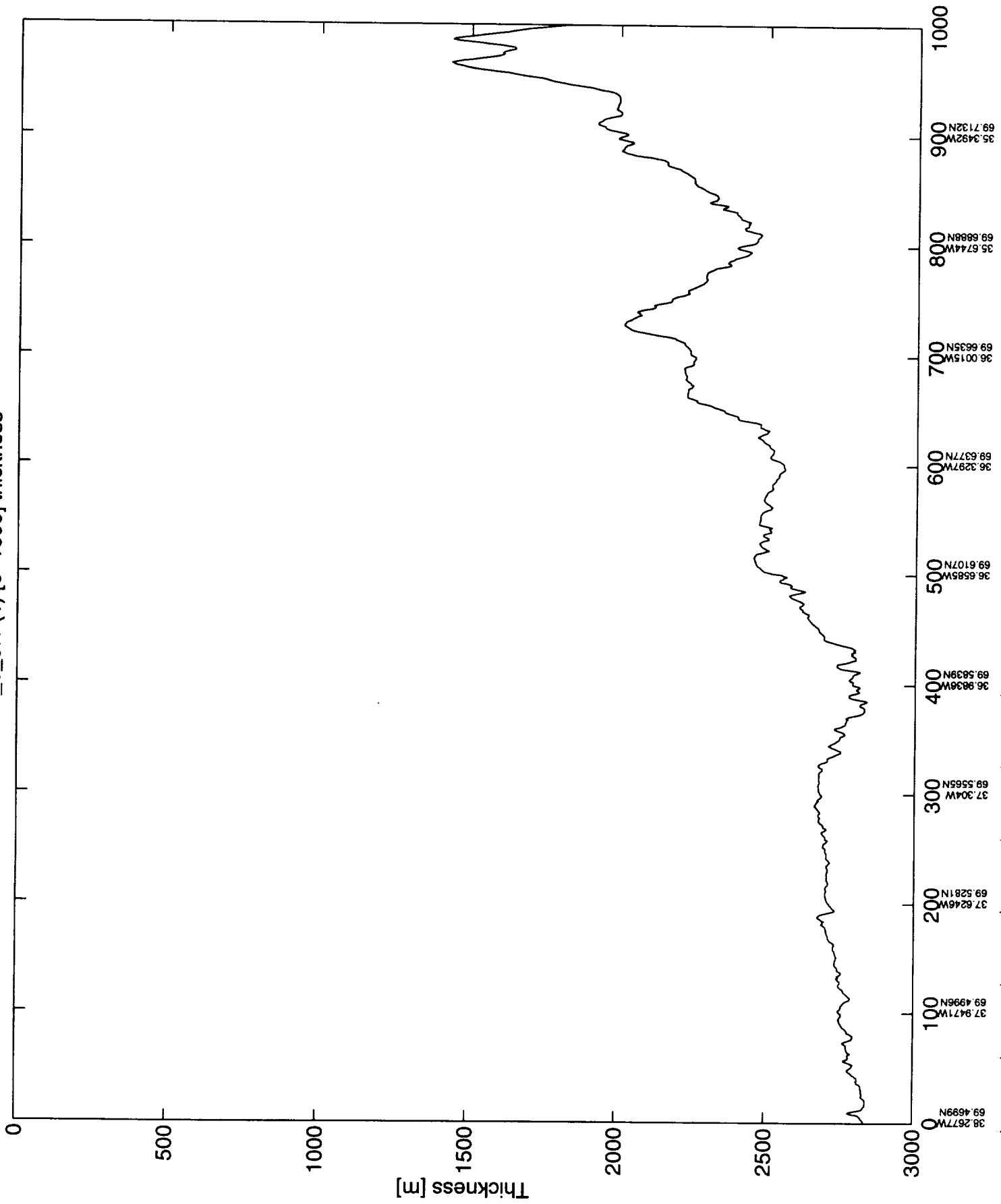
run_6_6.1 (2a) [1100-1350] thickness



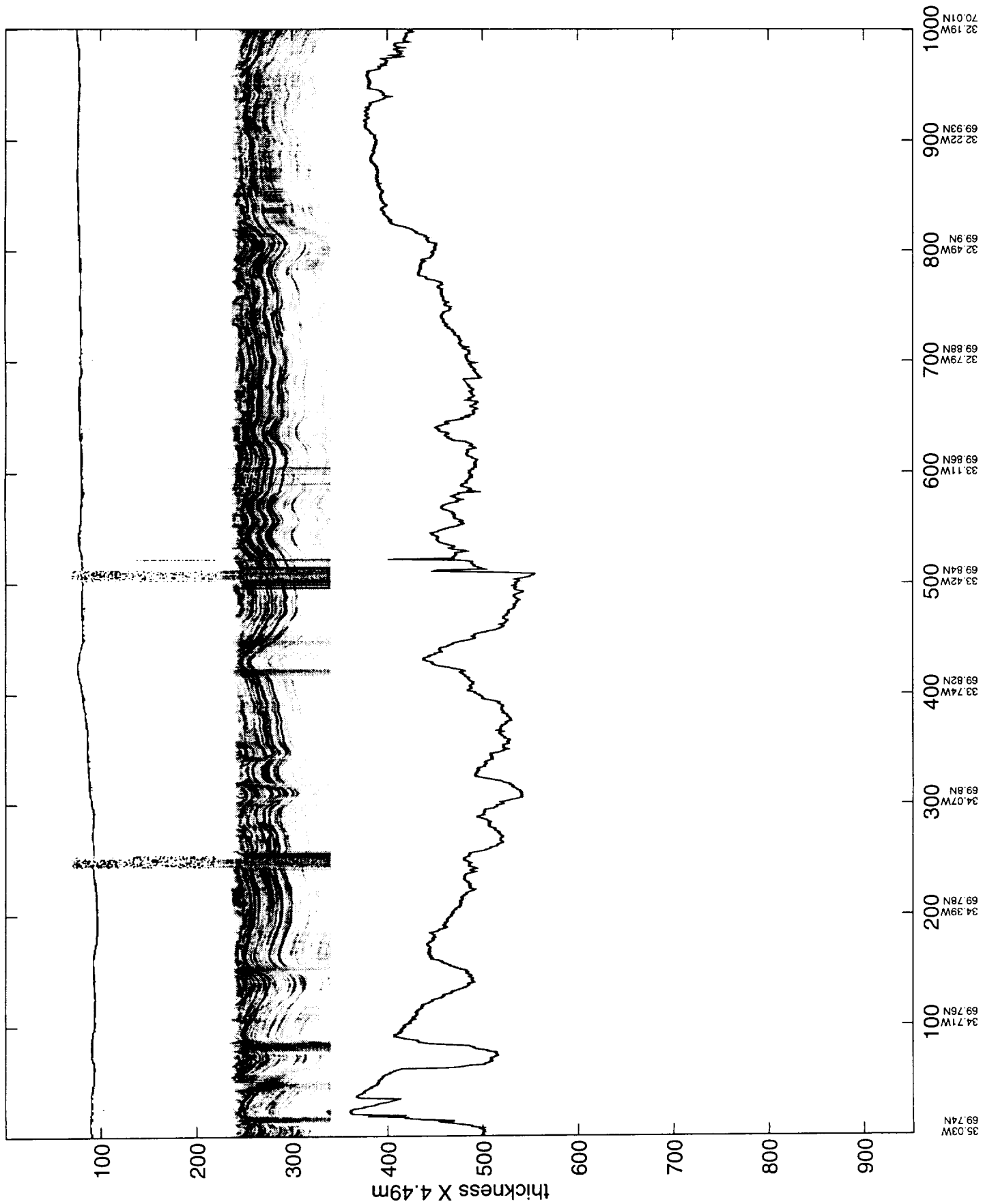
run_o_9.1' (1) [0-1000]



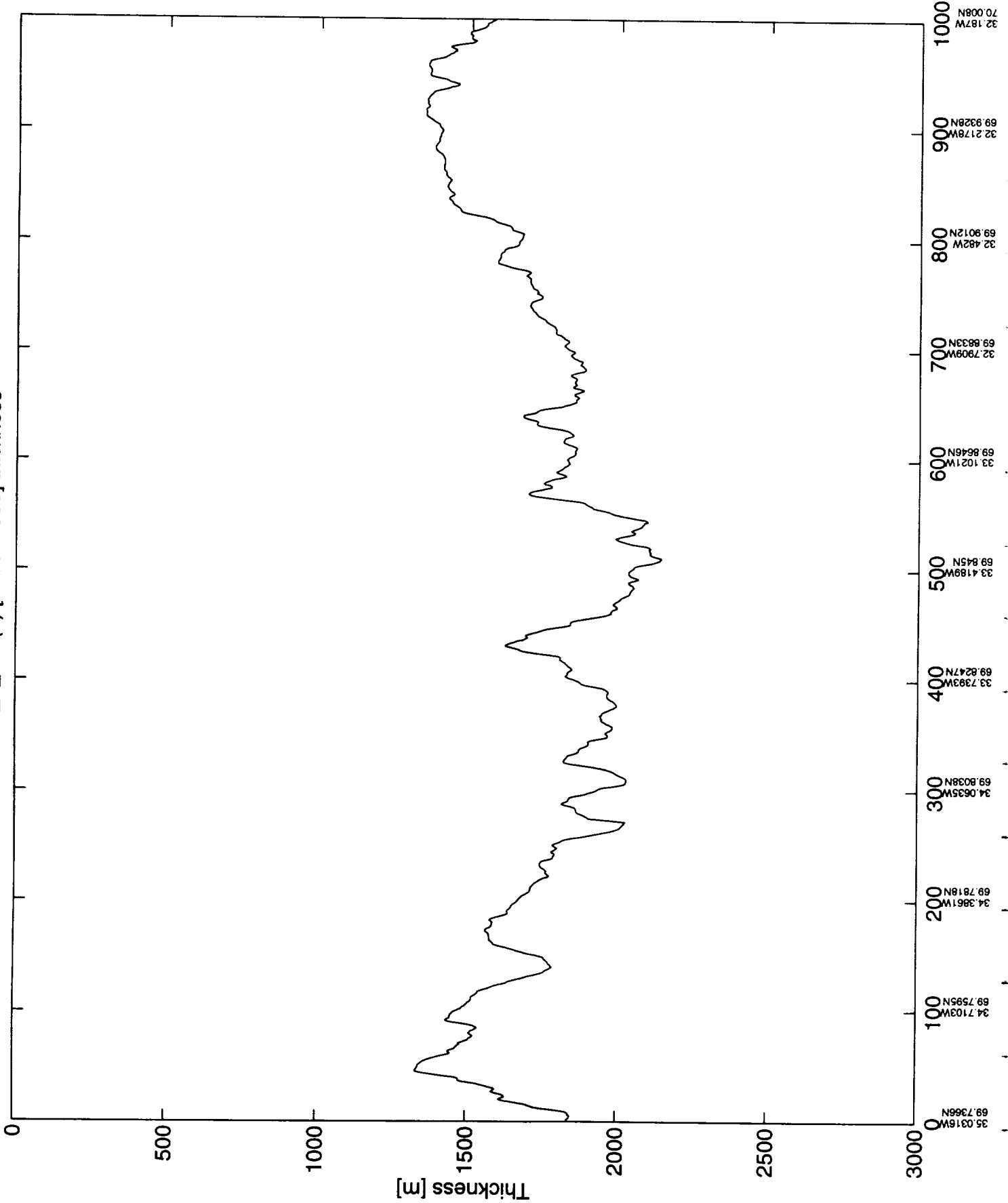
run_6_9.1 (1) [0-1000] thickness



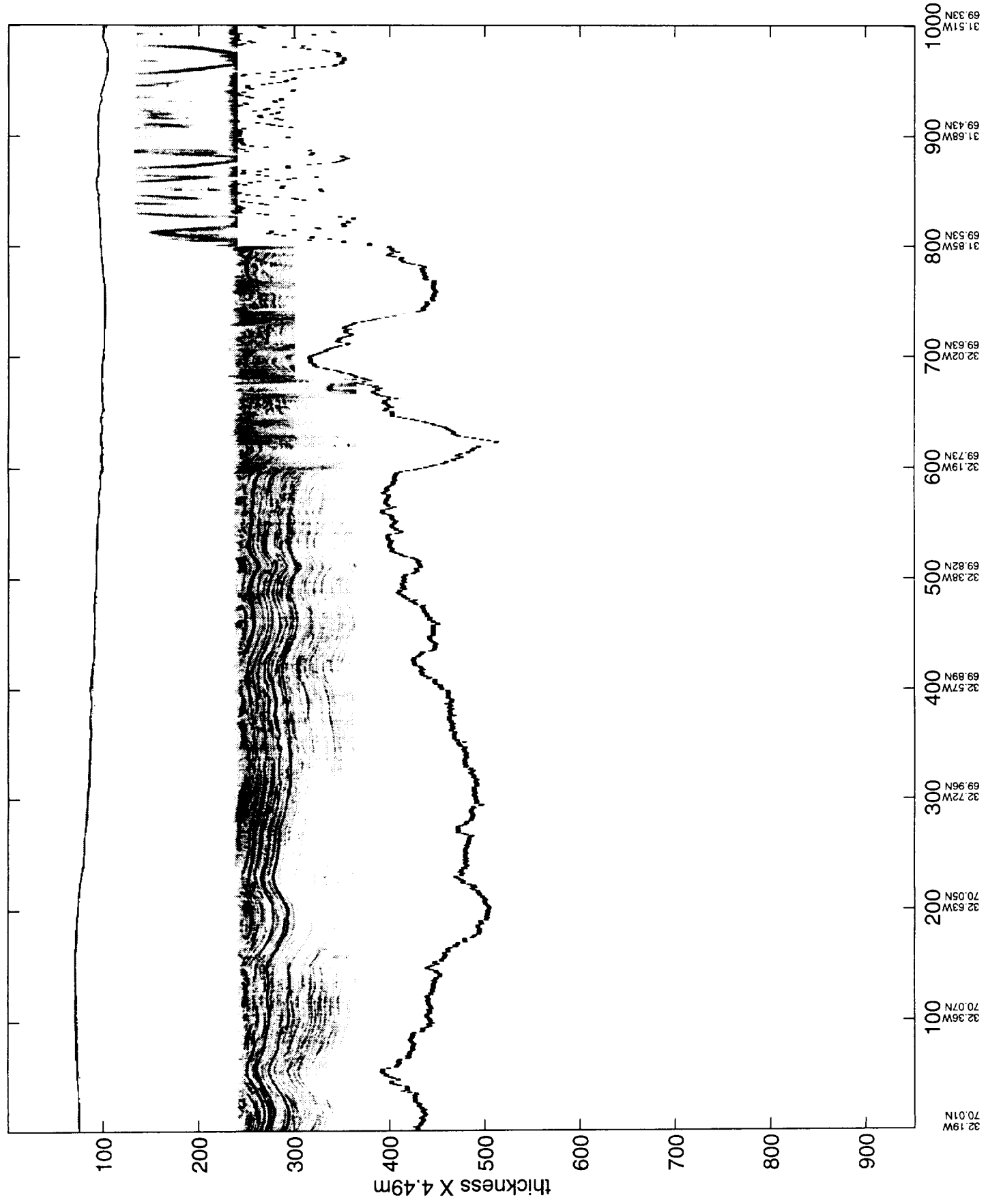
run_0_0.1 (z_11006-z000)



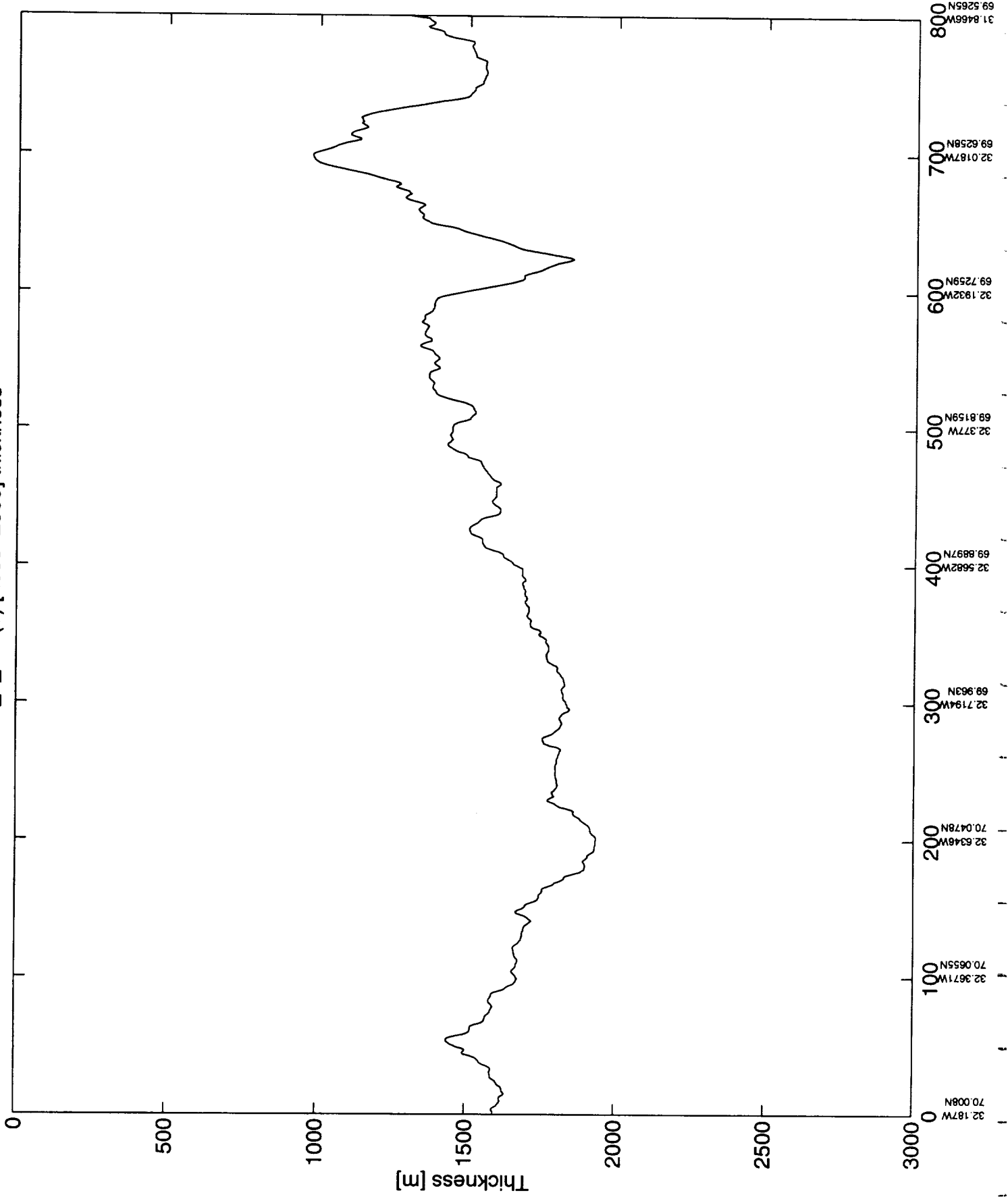
run_6_9.1 (2) [1000-2000] thickness



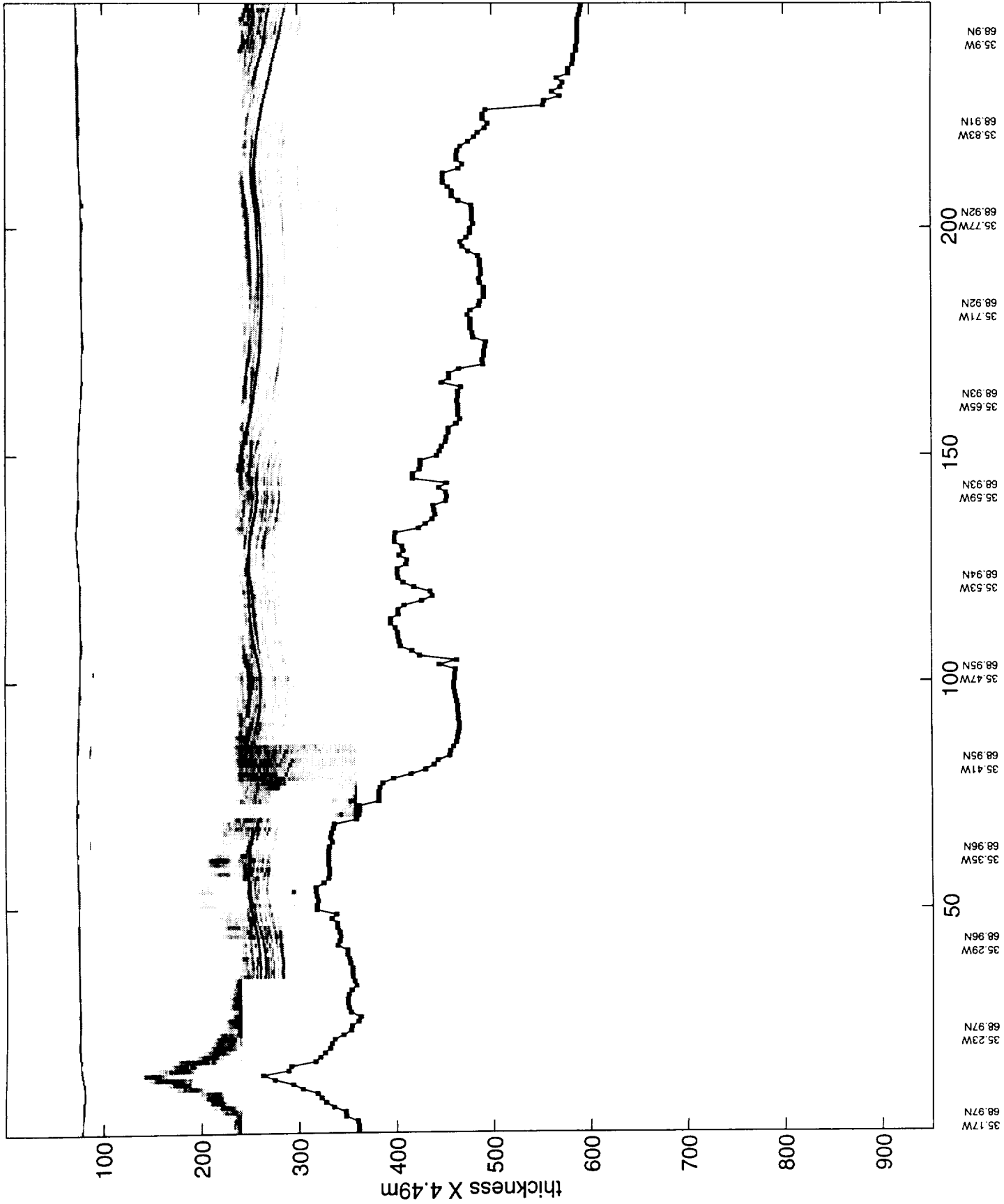
run_o_9.1(5) [2000-3000]



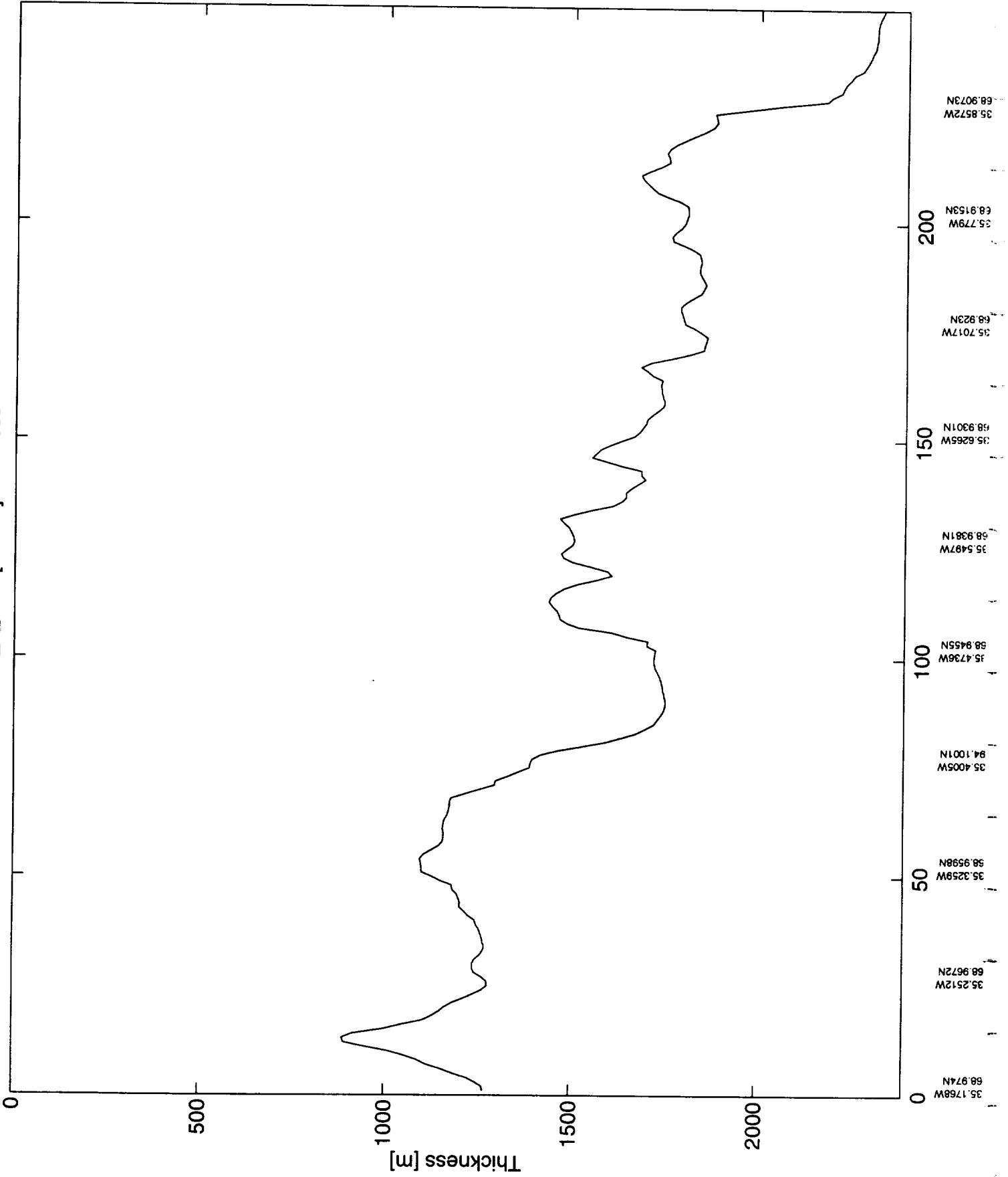
run_6_9.1 (3) [2000-2800] thickness



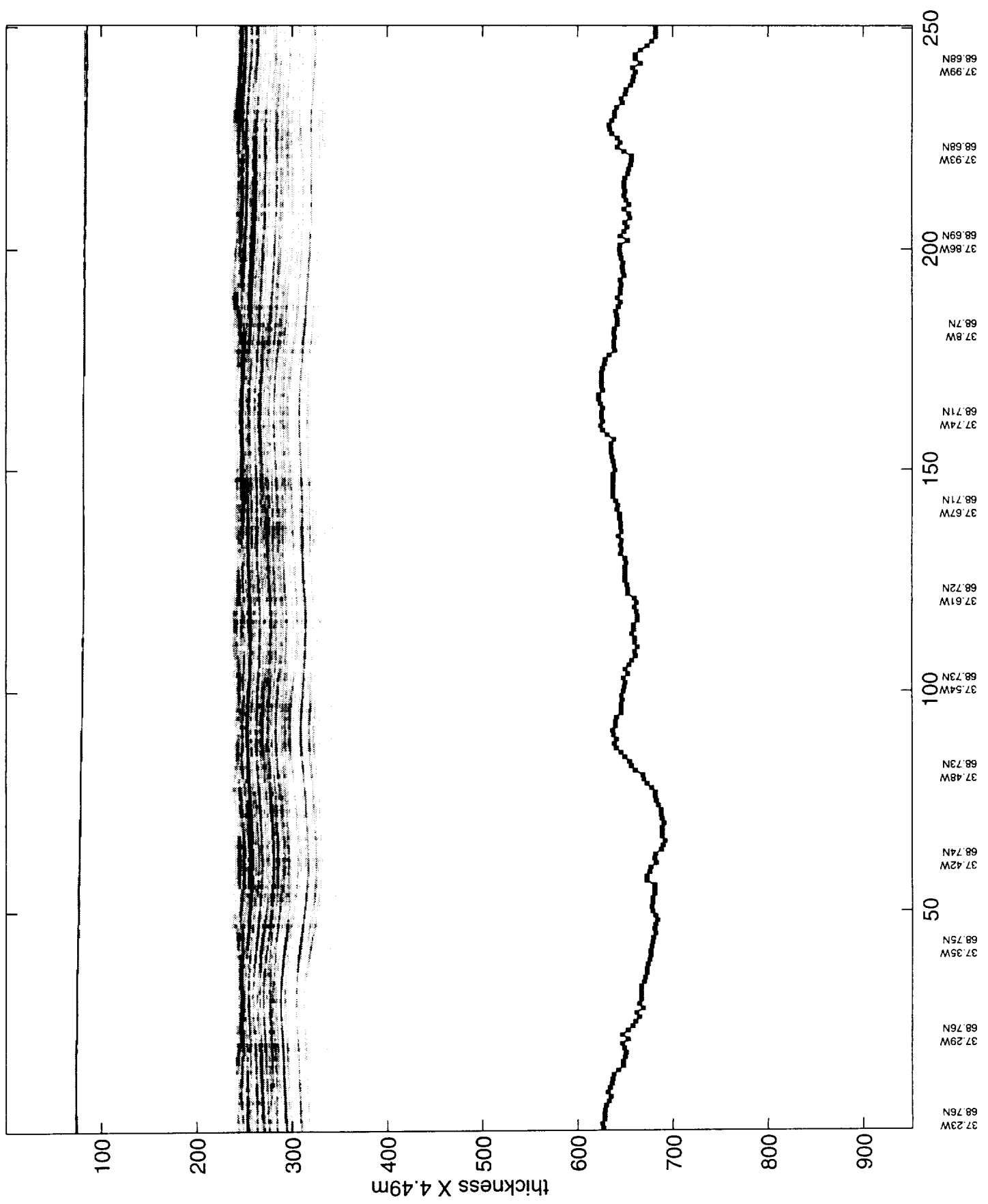
ru_0_12.1 0-247



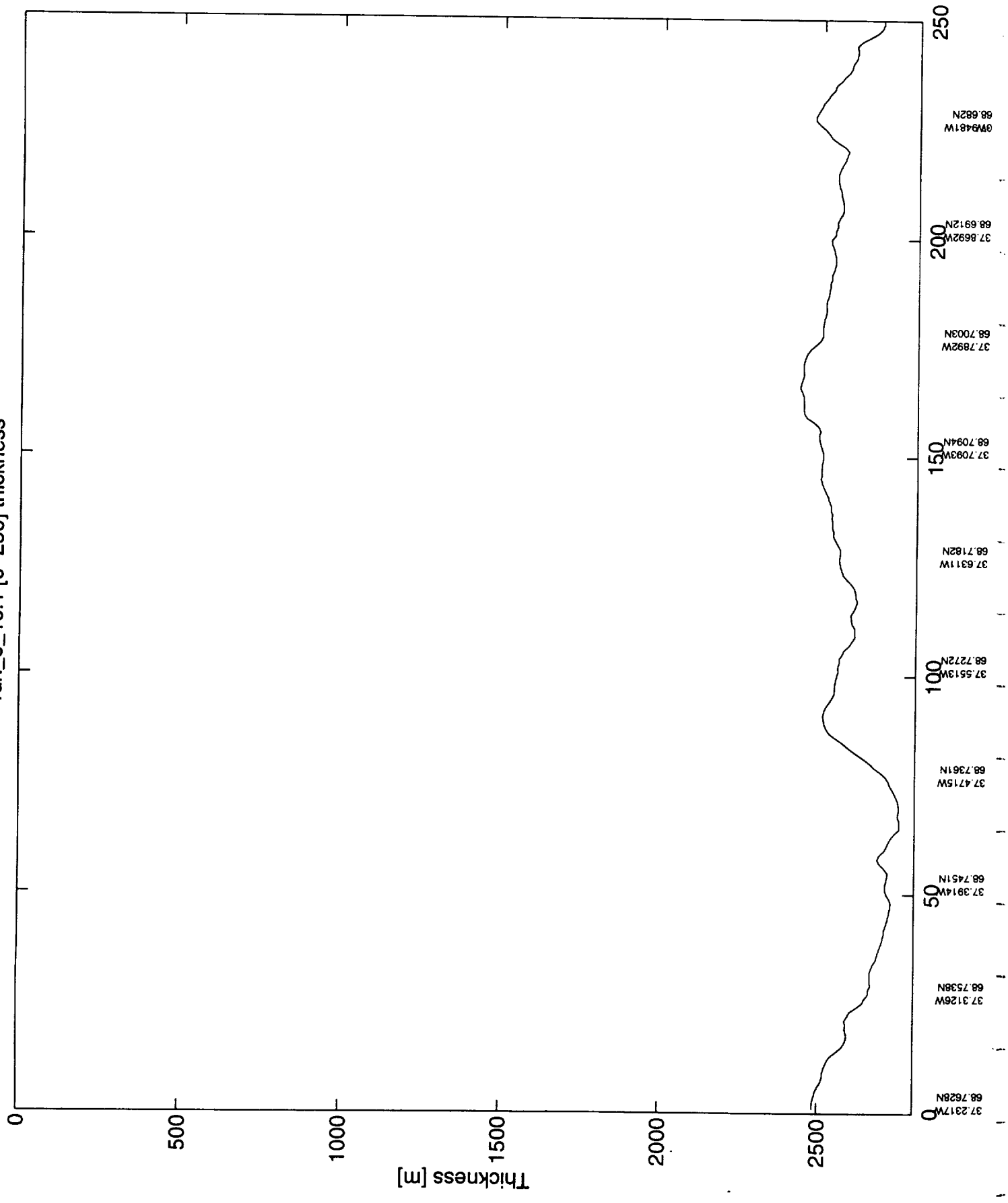
run_6_12.1 [0-249] thickness



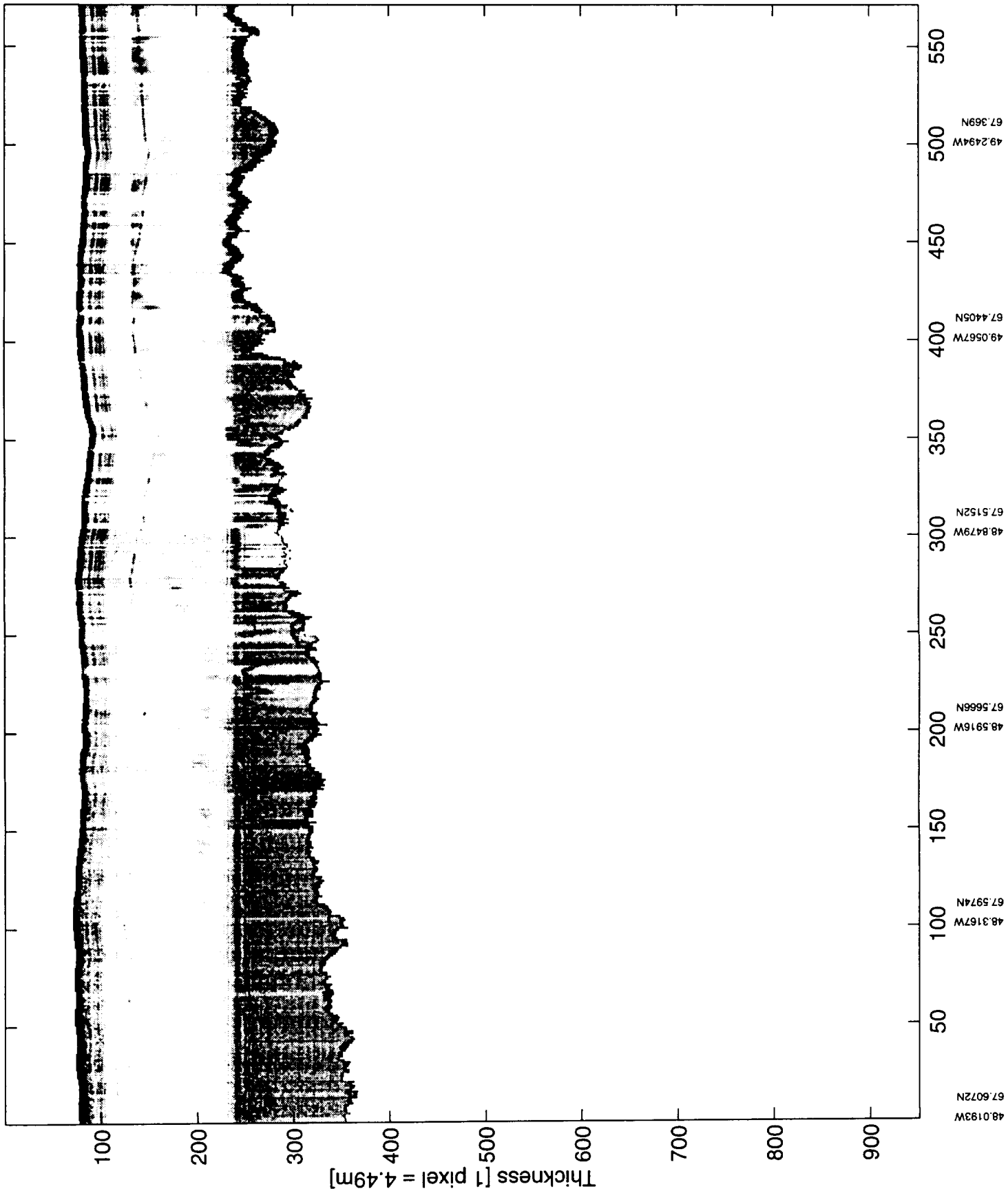
ru1_v_16: 1v-25vj



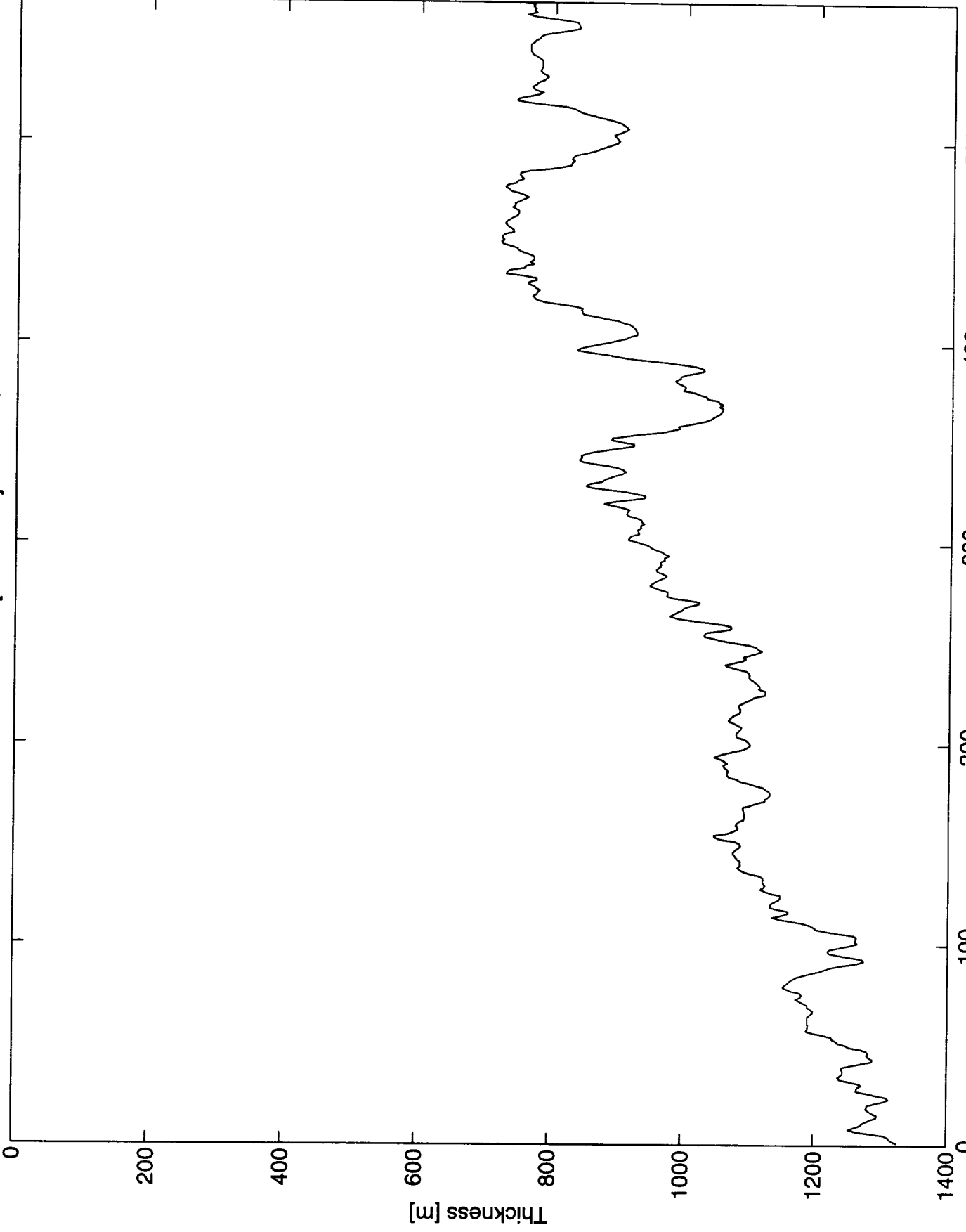
run_6_16.1 [0-250] thickness



run_6_28.1-2[950-1520]



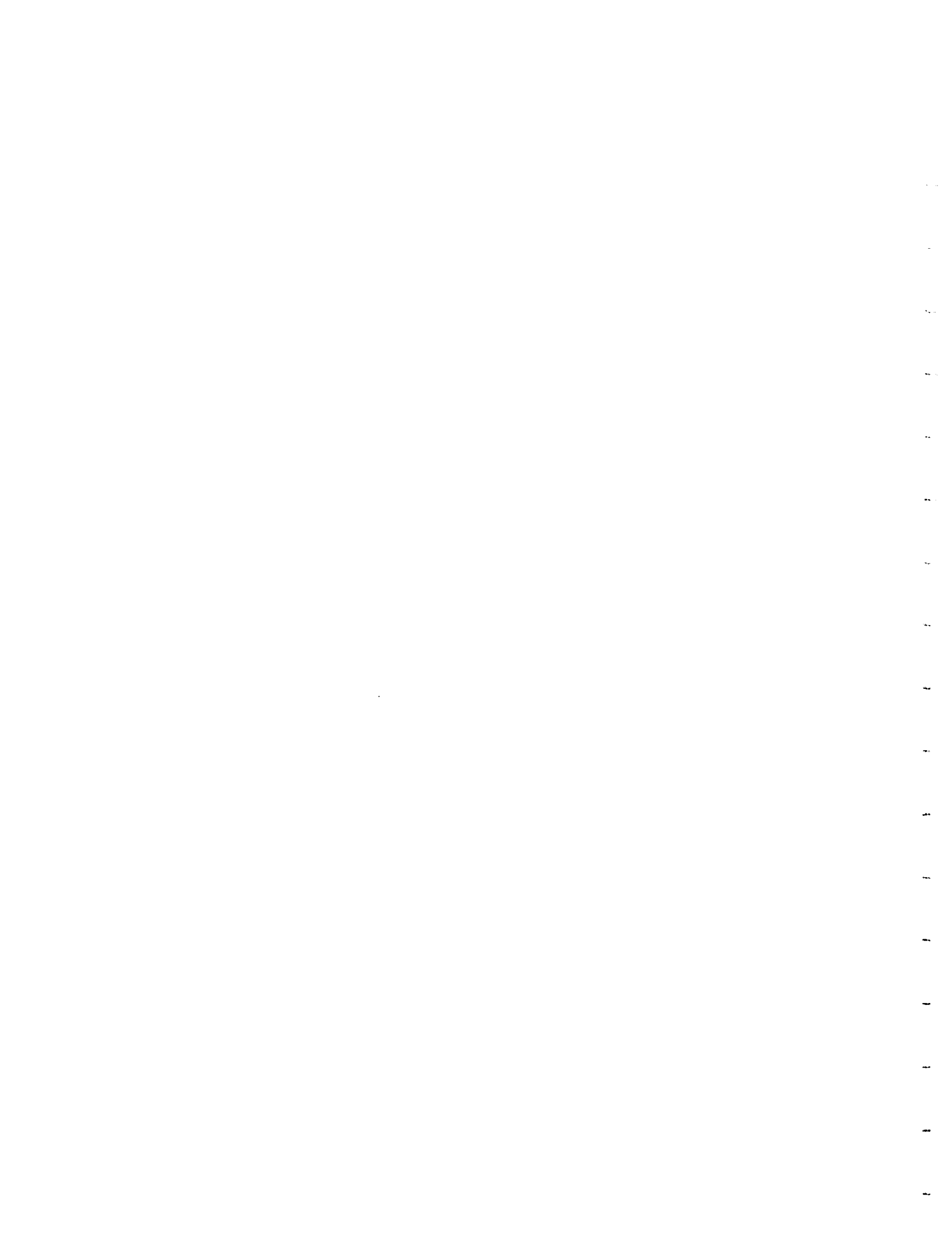
run_6_28.1-2 [950-1520] thickness

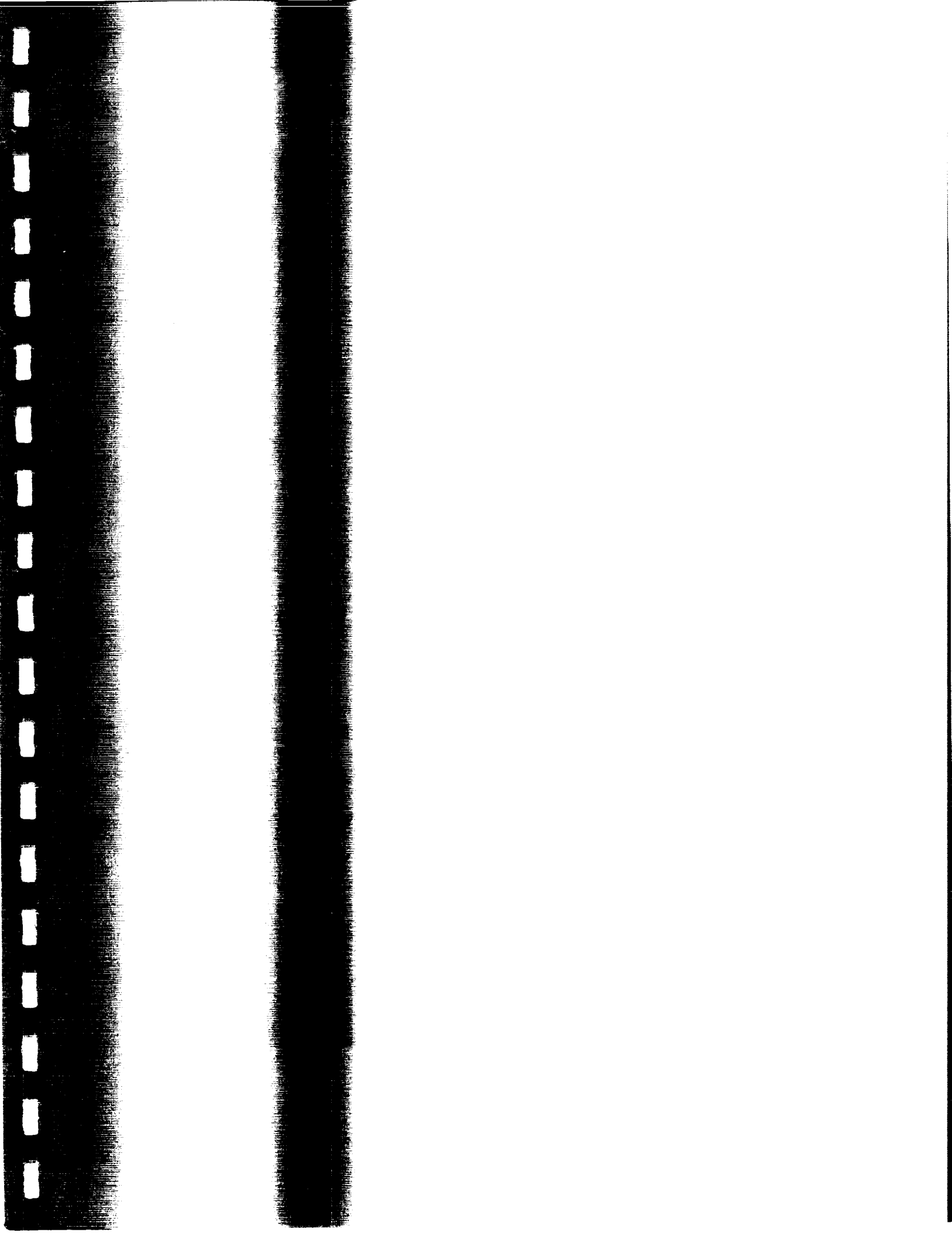


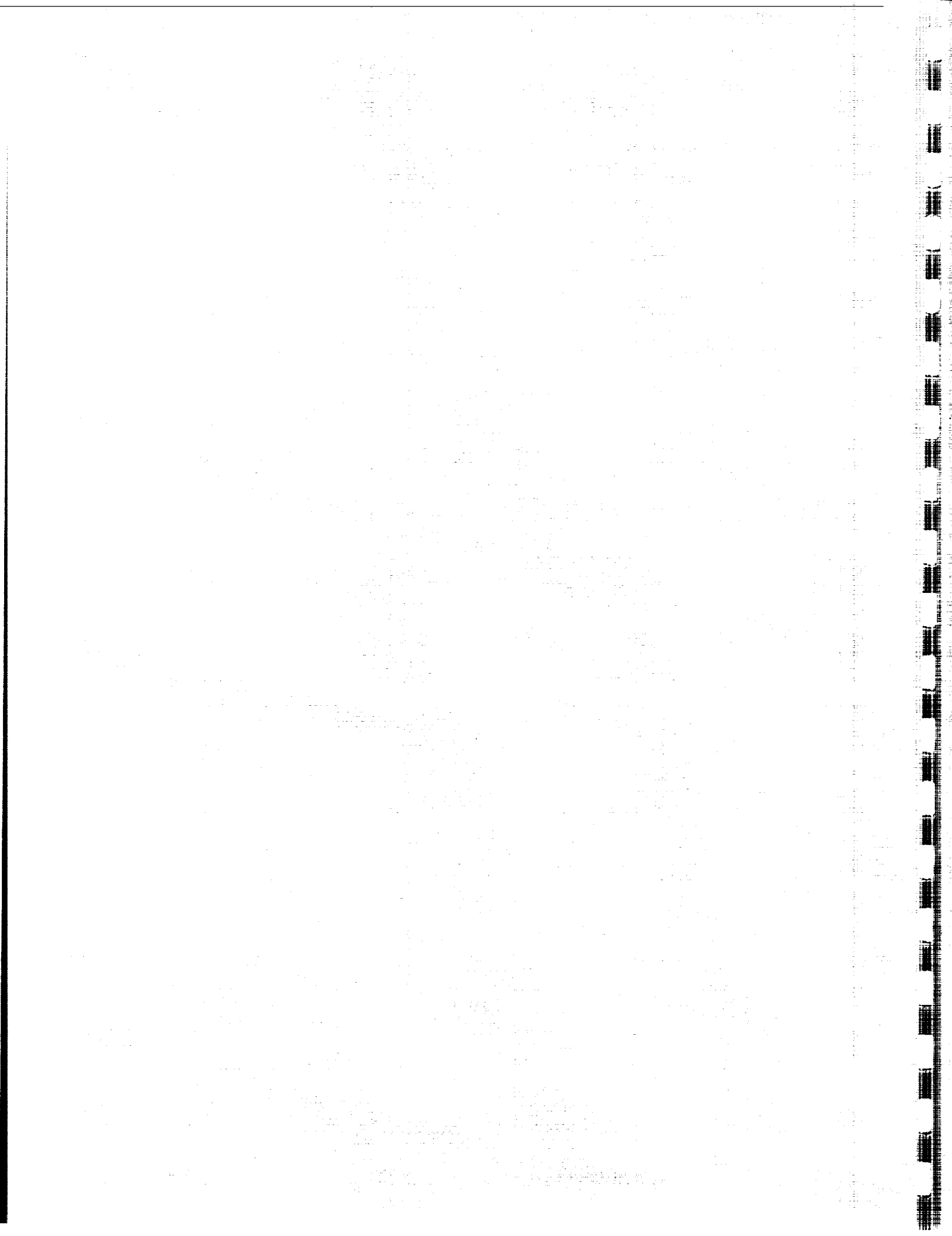
3132N
9072N
48 3167W
57 5974N
5916W
5566N
3479W
5152N
4367W
674405N
3494W
369N

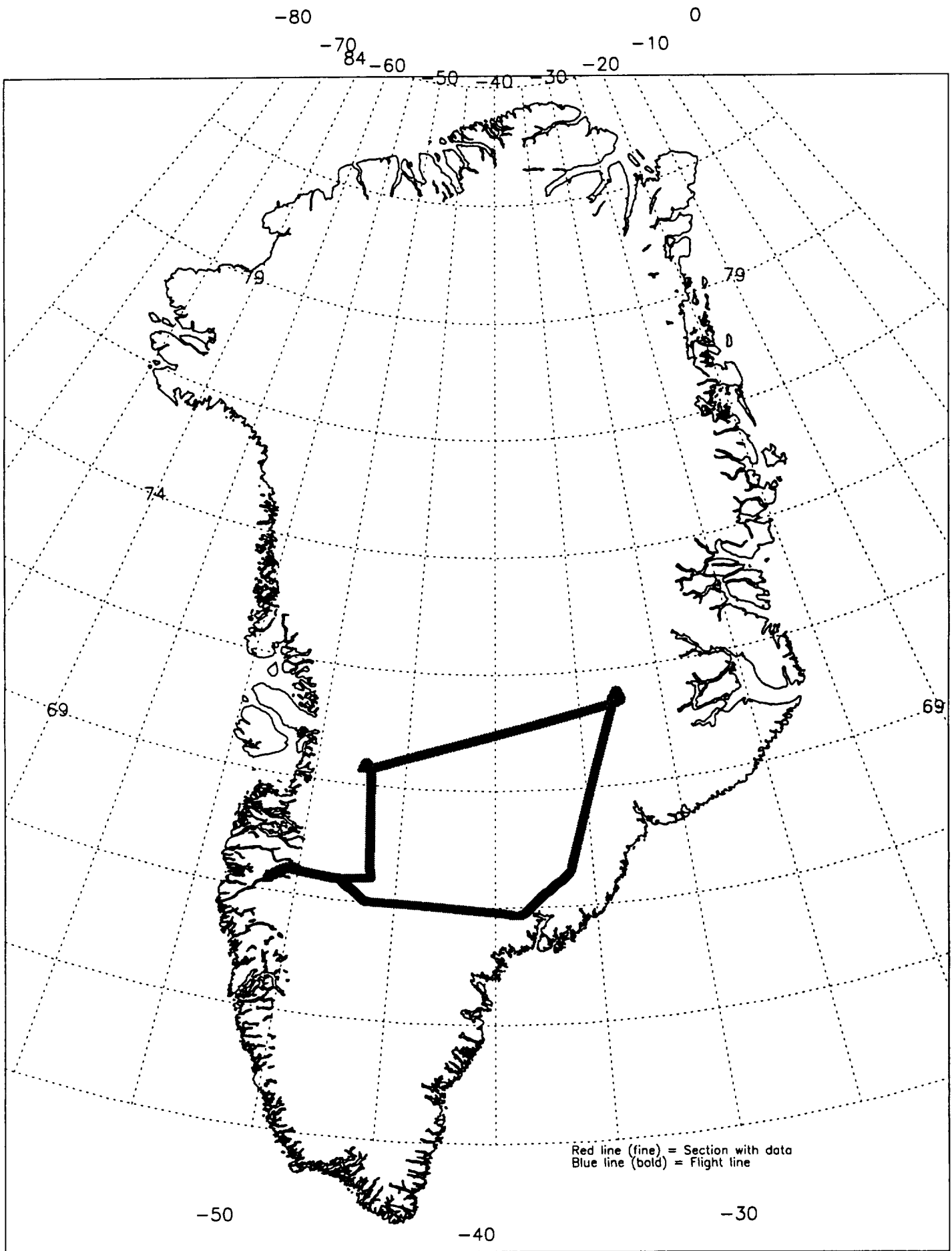
Appendix B

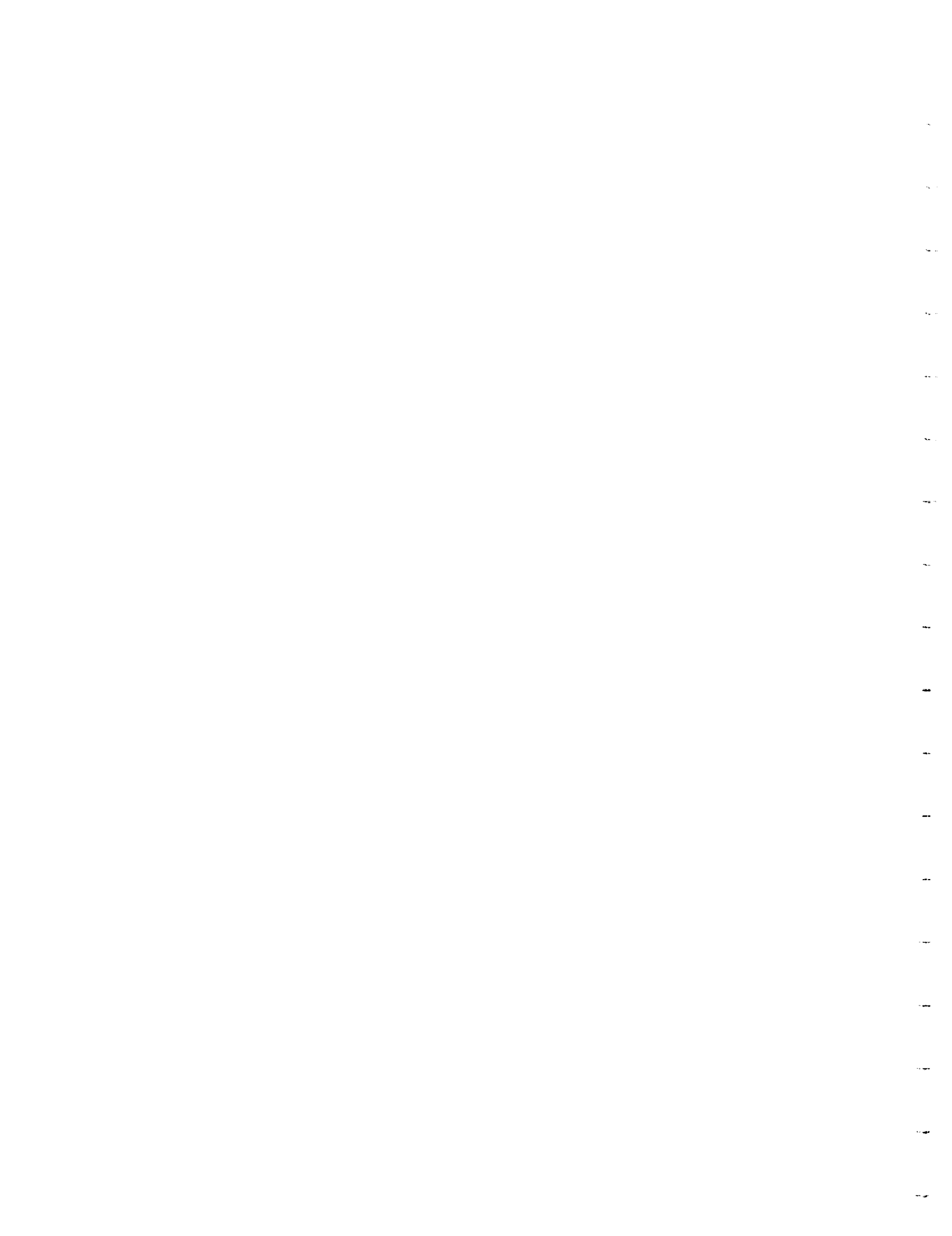
June 24, 1993



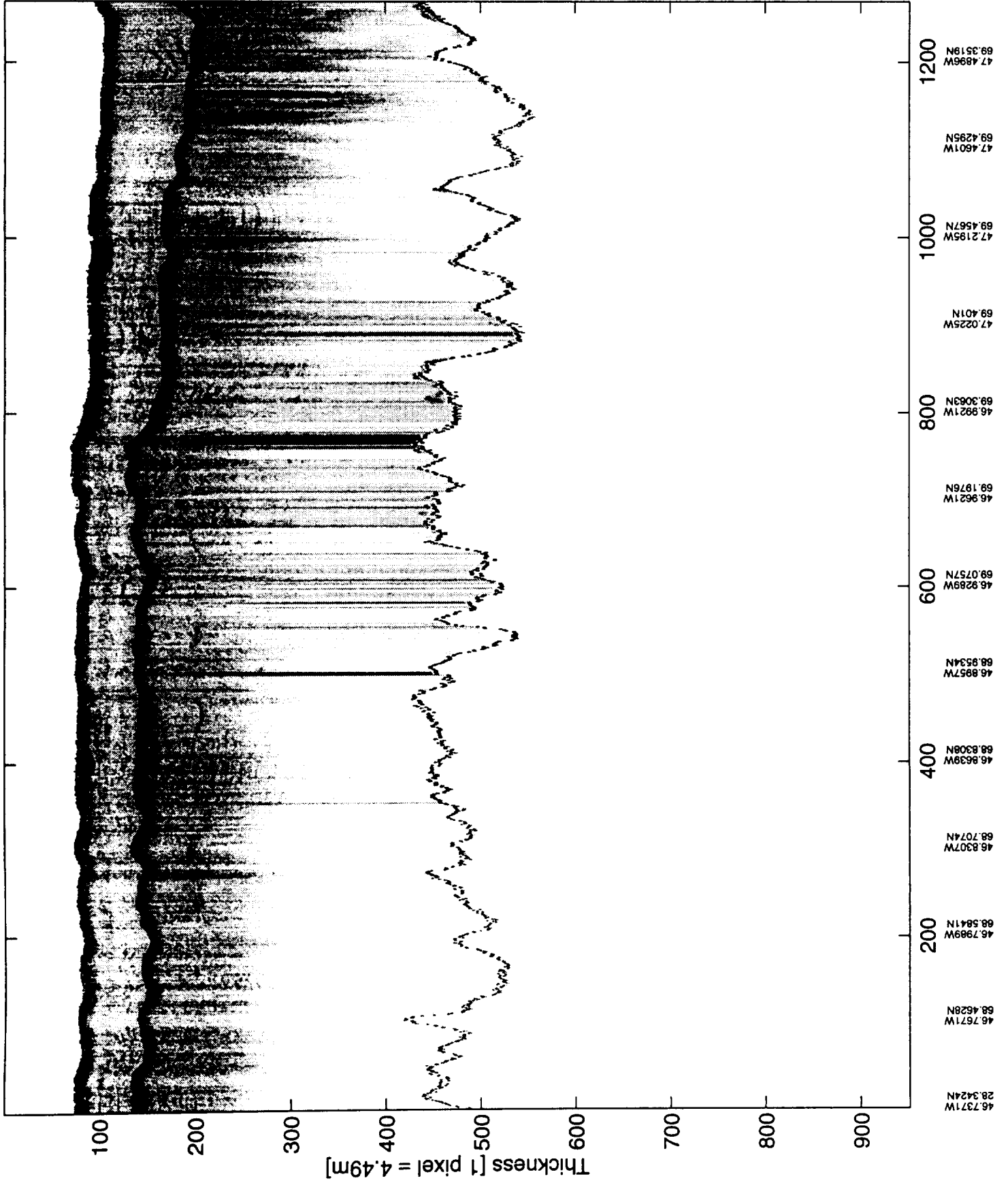




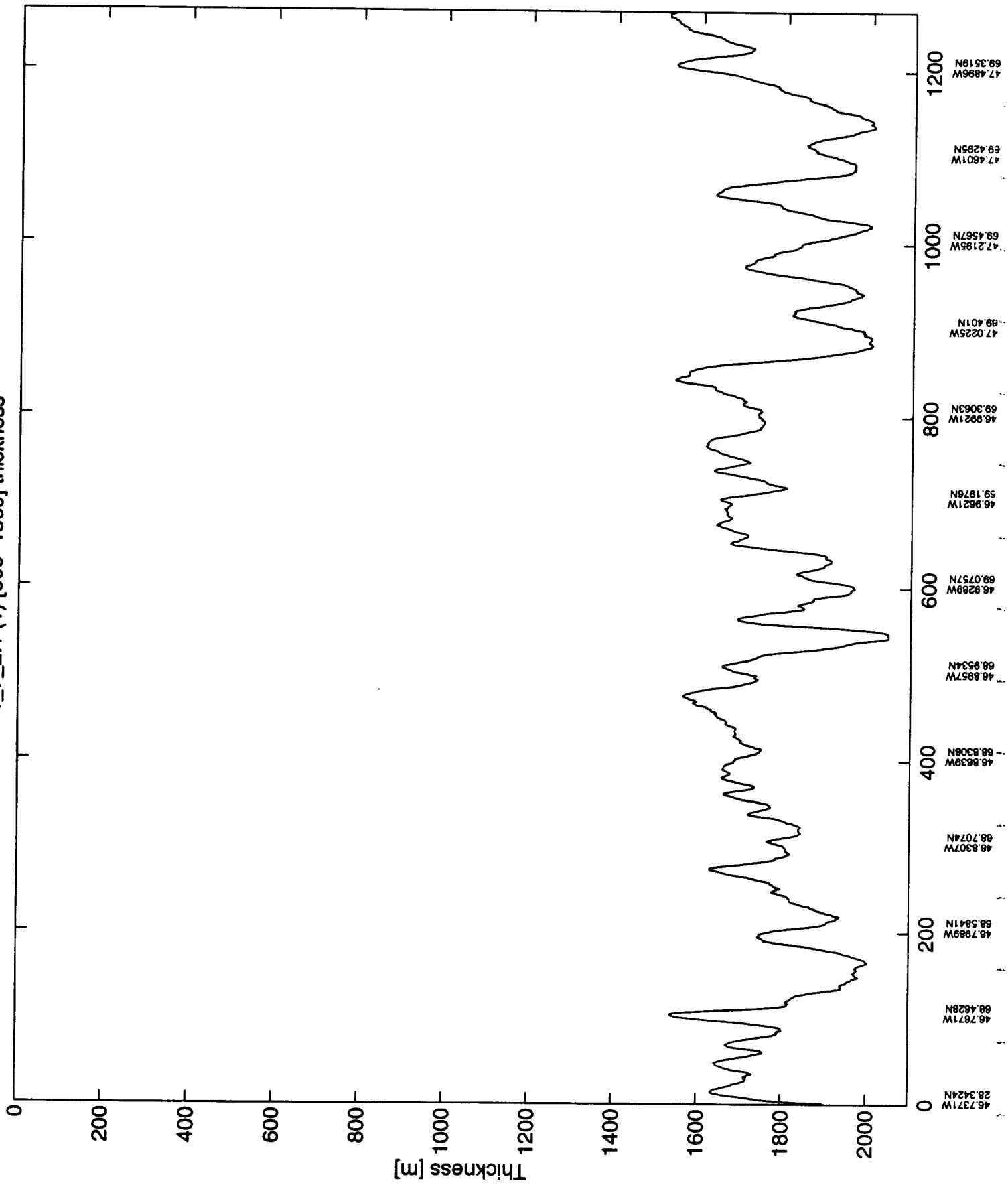




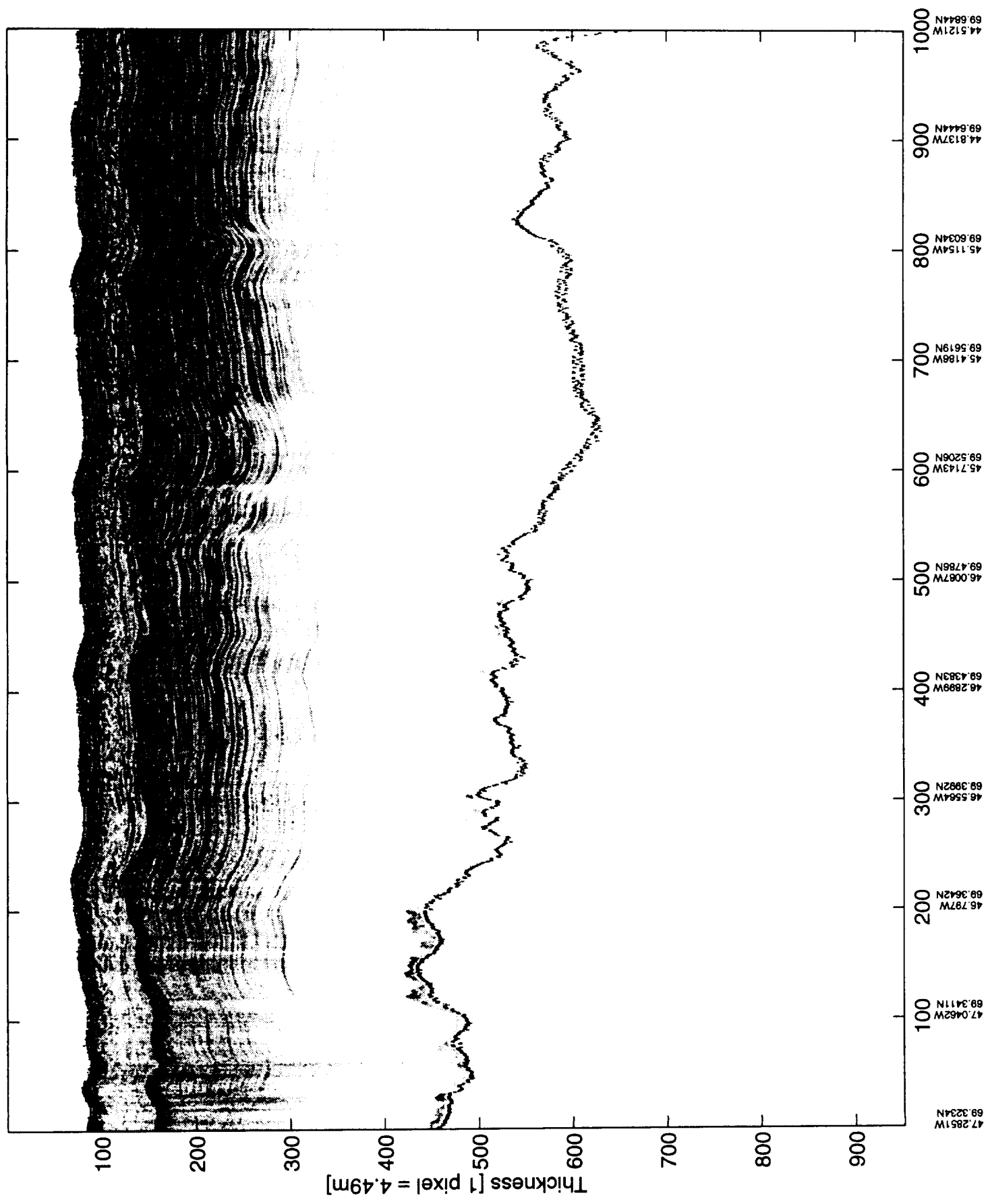
r_7_2.1 (1) [300 1569]



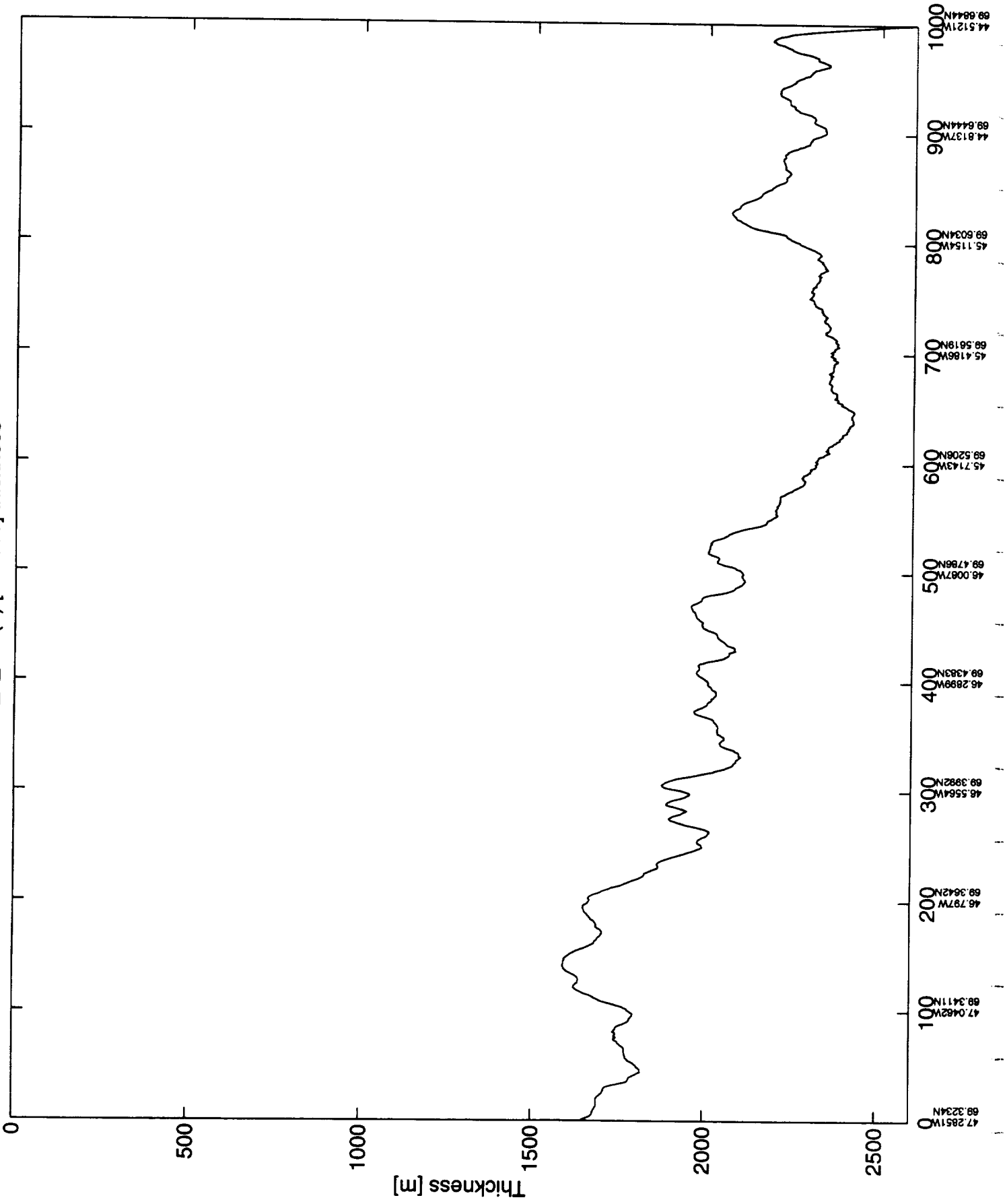
r_7_2.1 (1) [300-1569] thickness

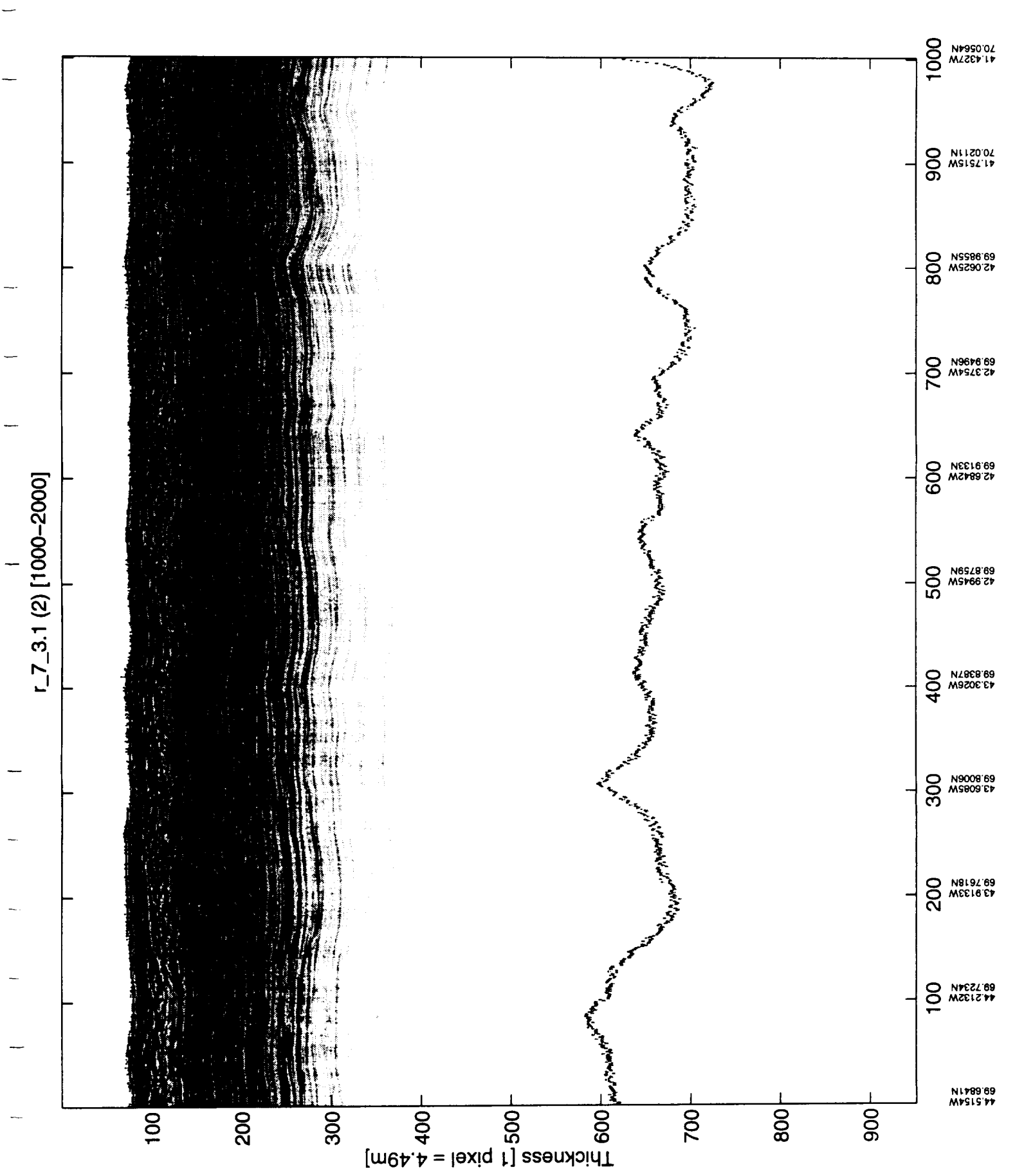


r_7_3.1 (1) [0-1000]

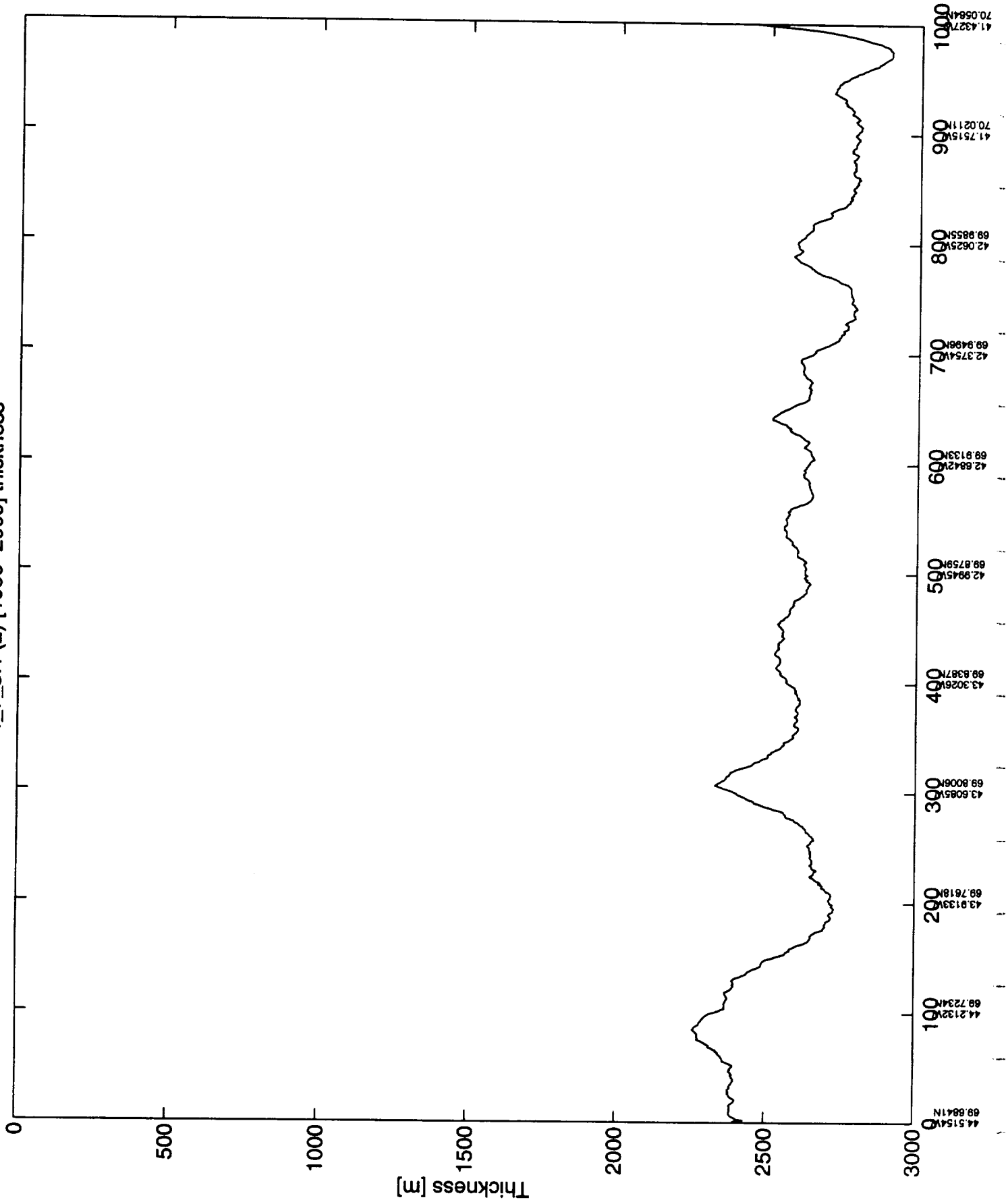


r_7_3.1 (1) [0-1000] thickness

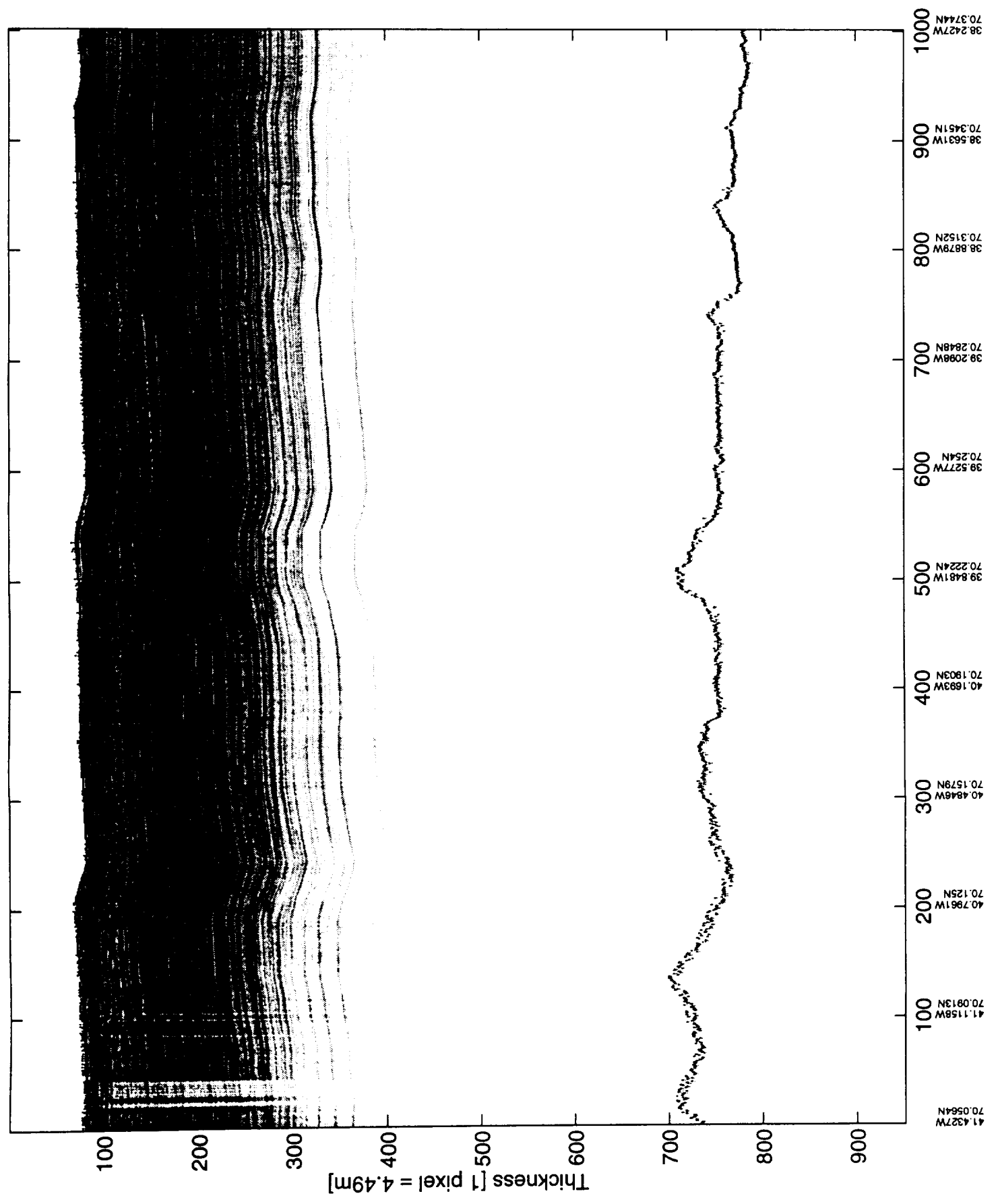




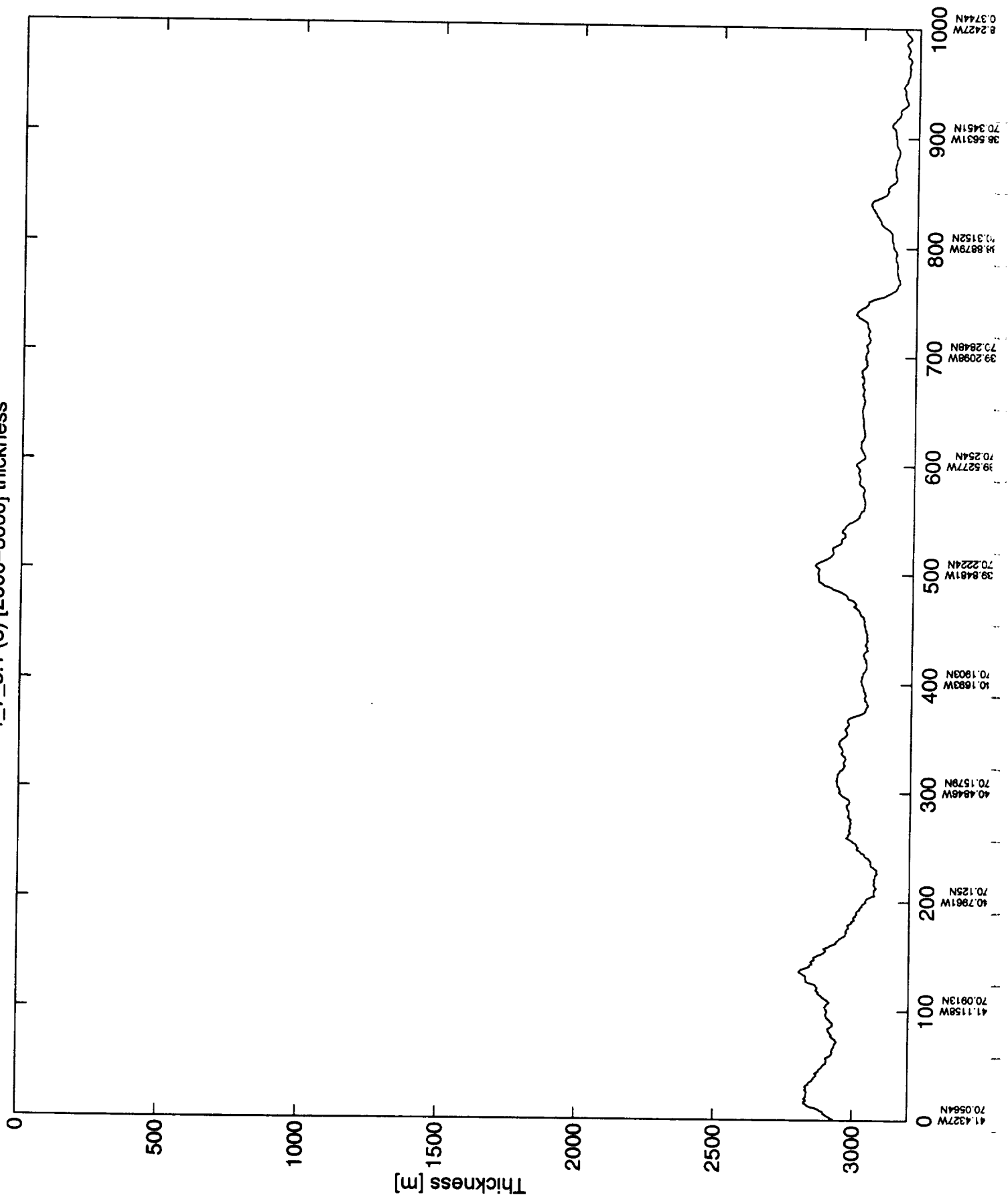
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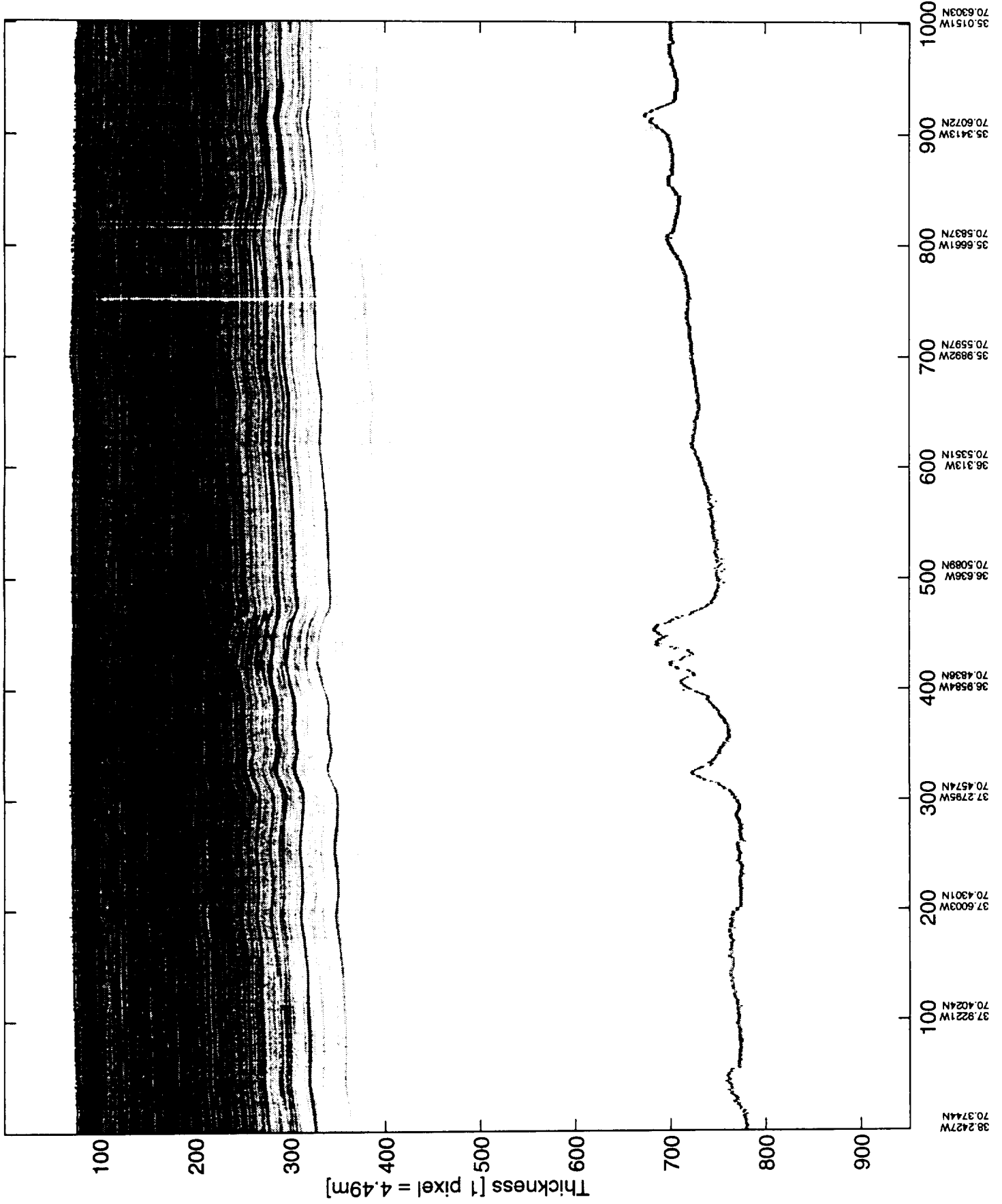
r_7_3.1 (3) [2000-3000]



r_7_3.1 (3) [2000-3000] thickness



r_7_3.1 (4) [3000-4000]



38.2427N
70.3744E

37.9221W
70.4024N

37.6003W
70.4301N

37.2795W
70.4574N

36.9584W
70.4838N

36.636W
70.5089N

36.313W
70.5351N

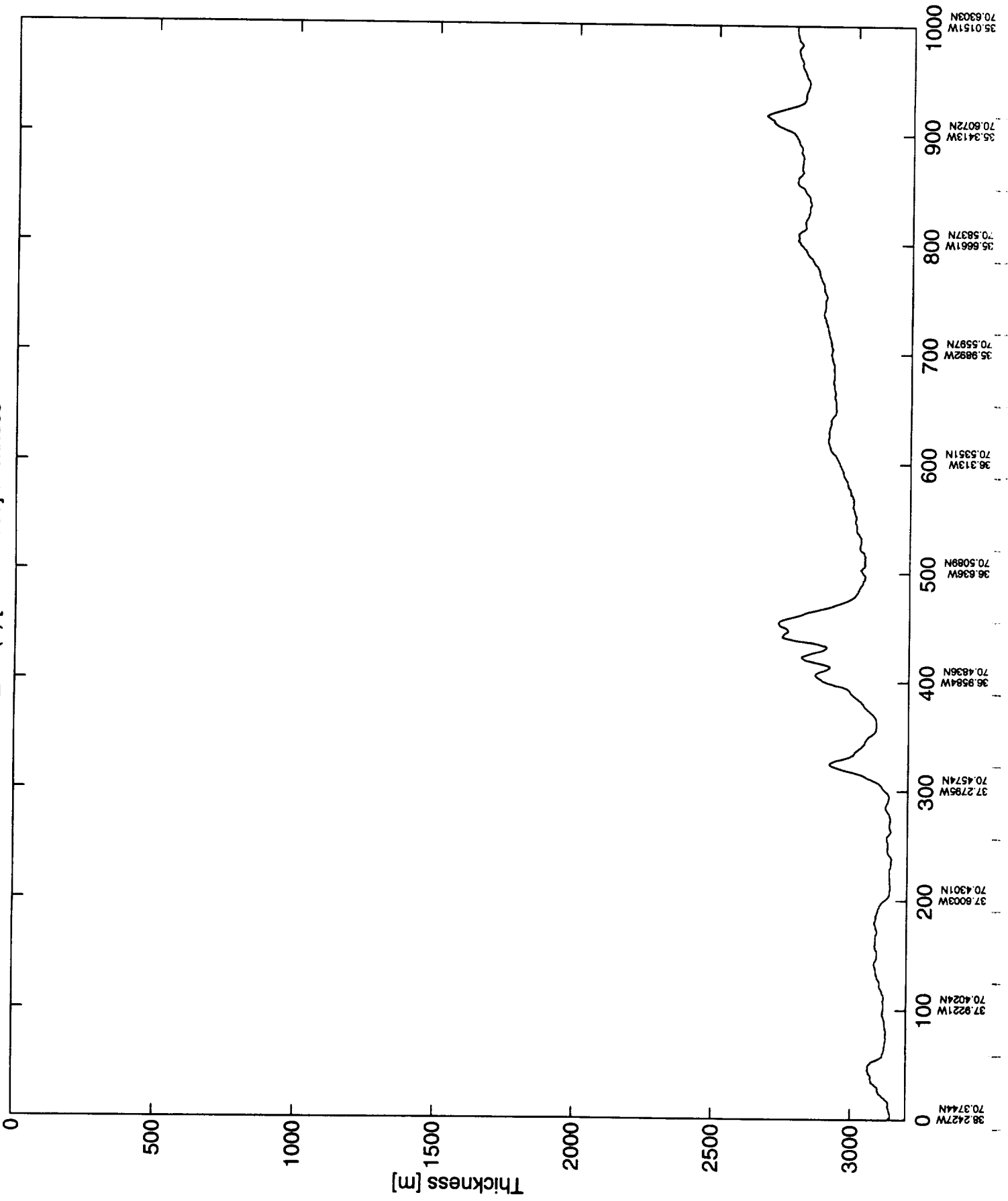
35.9892W
70.5597N

35.6661W
70.5837N

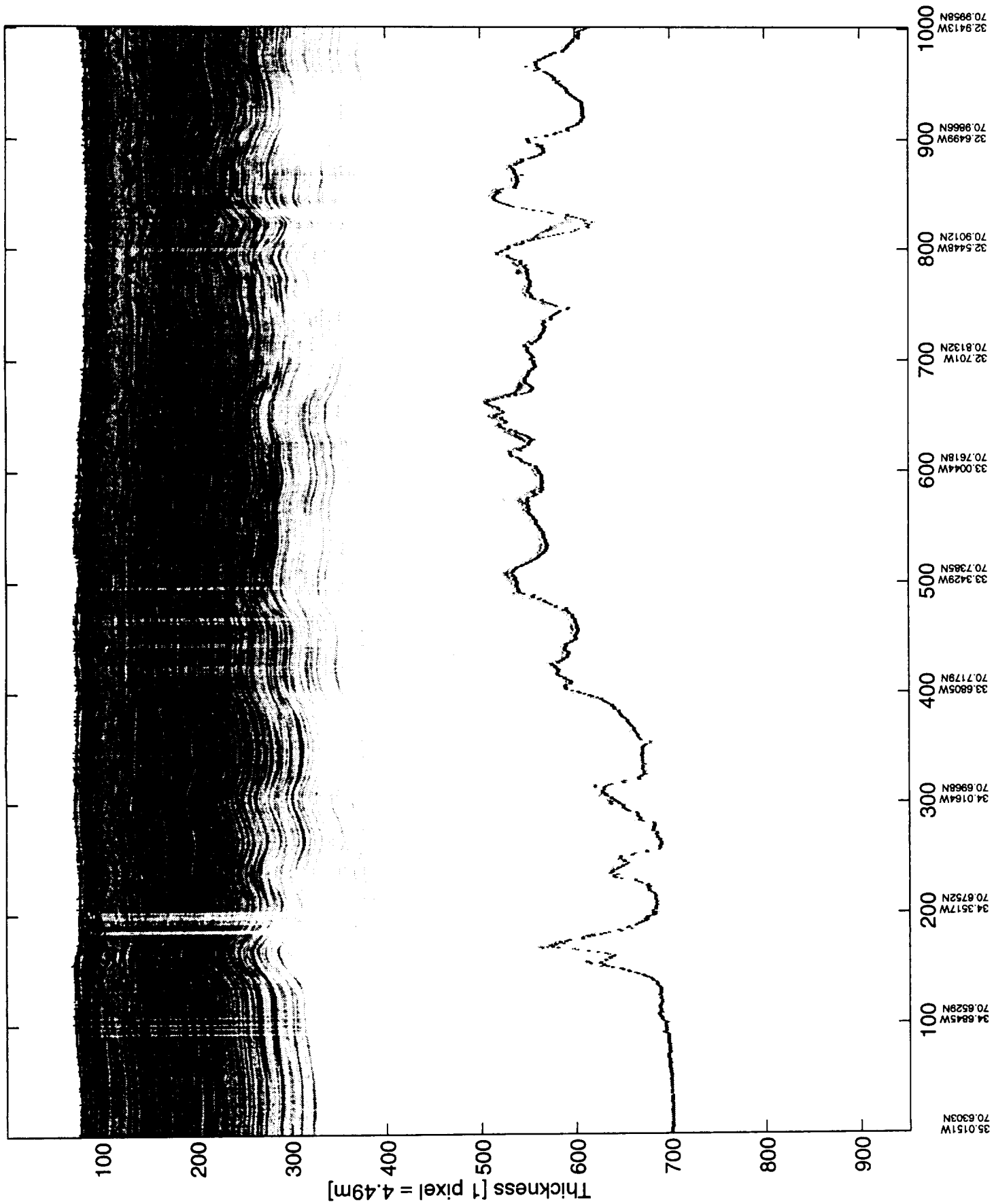
35.3413W
70.6072N

35.0151W
70.6303N

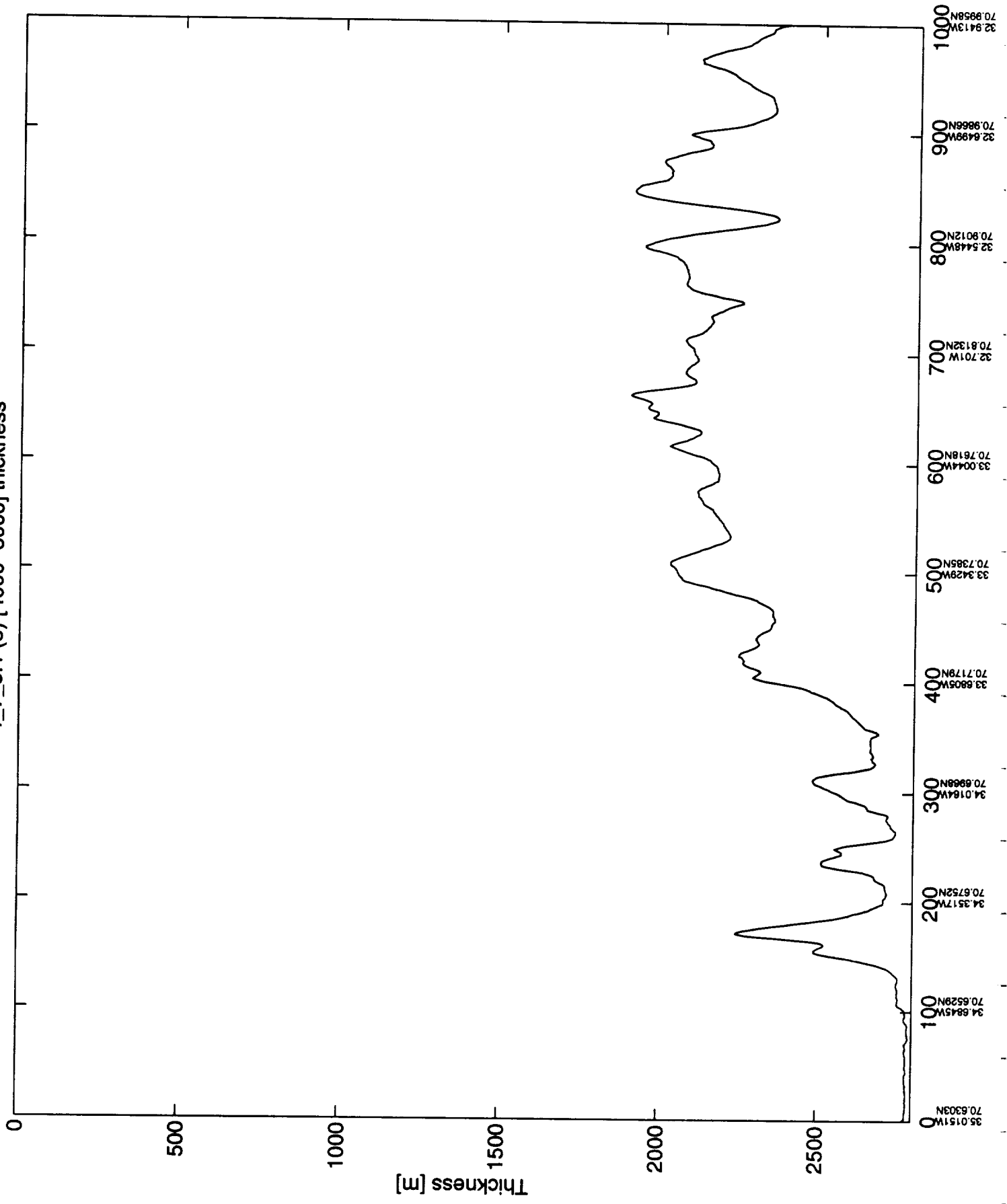
r_7_3.1 (4) [3000-4000] thickness



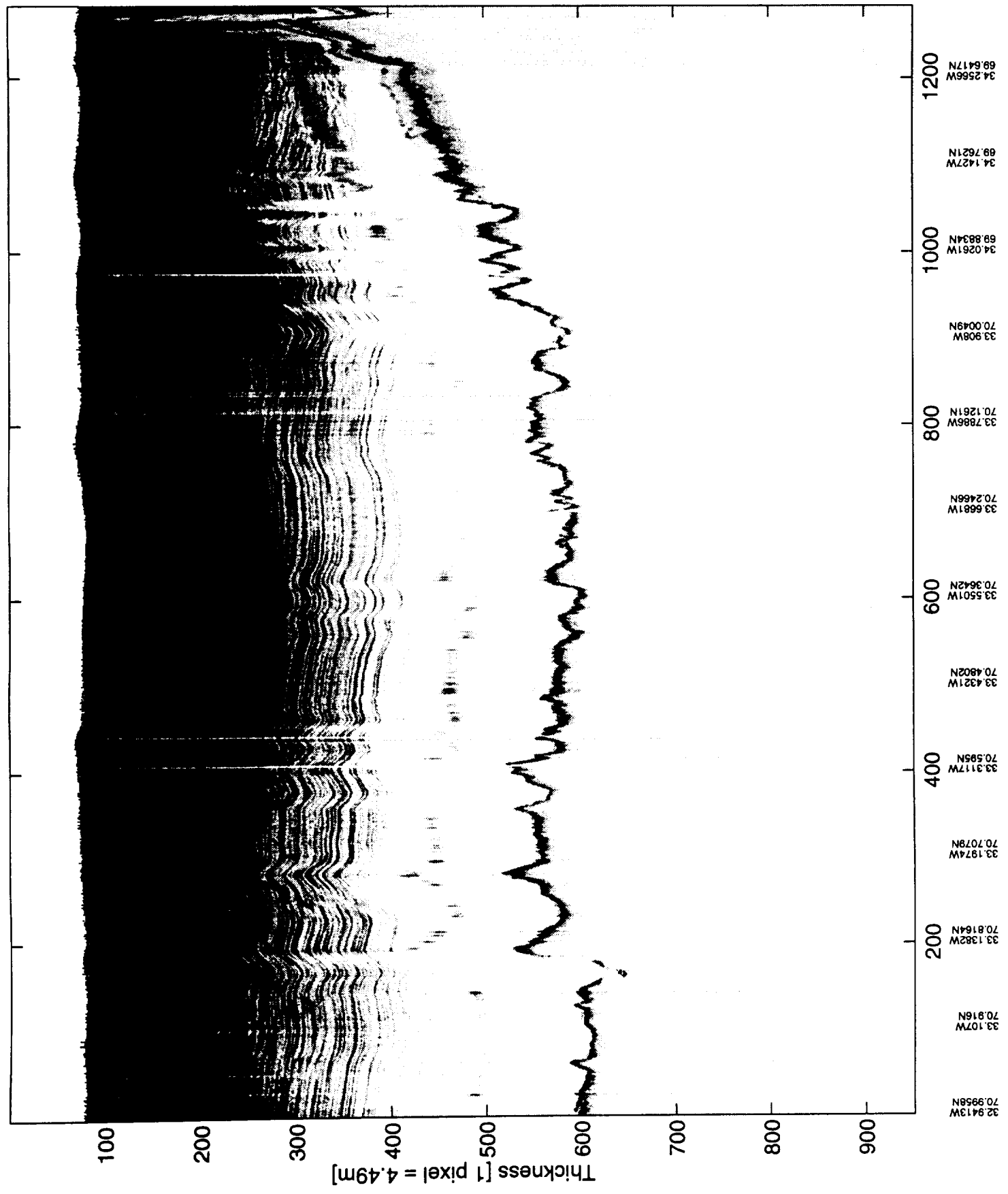
r_7_3.1 (5) [4000-5000]



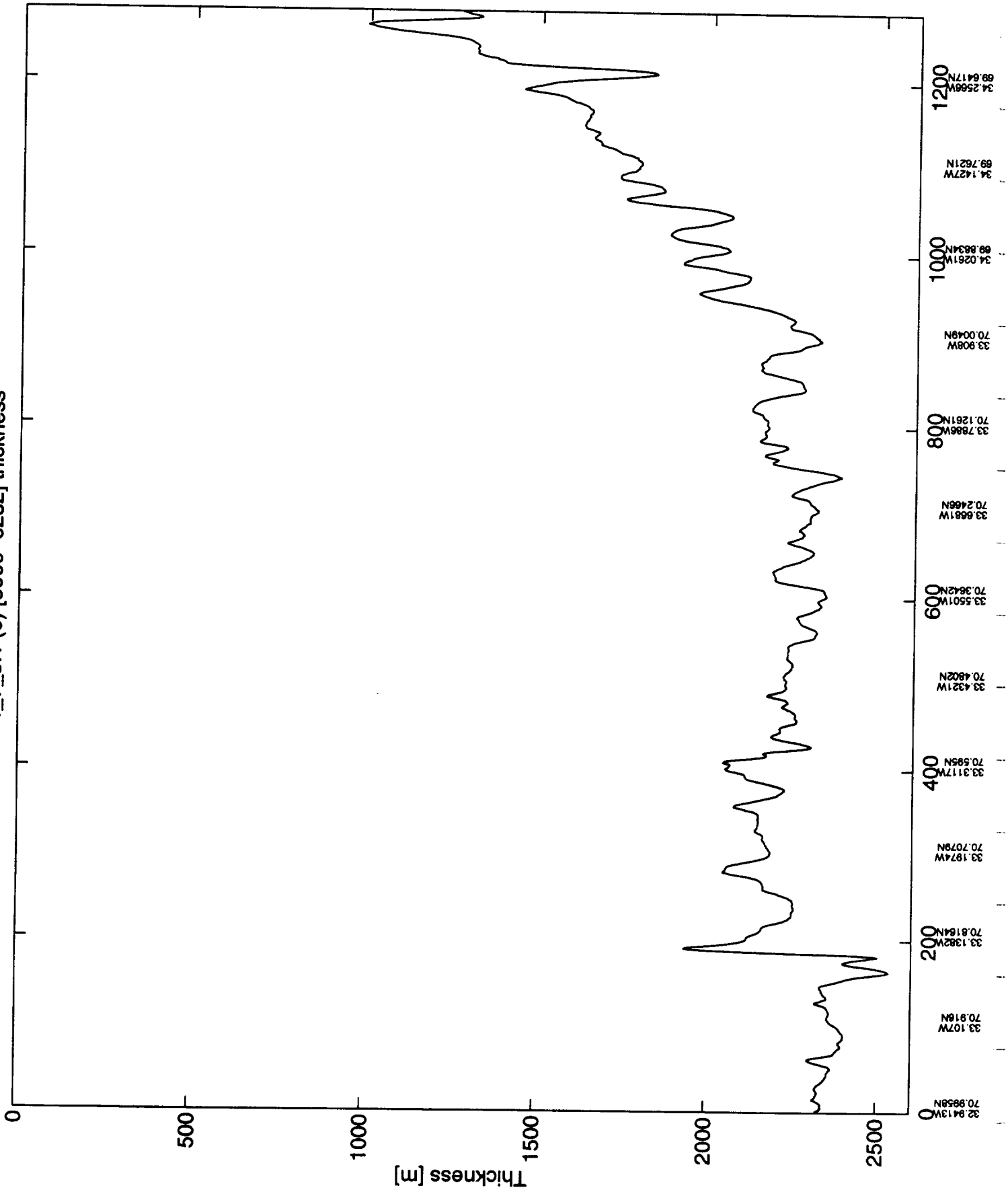
r_7_3.1 (5) [4000-5000] thickness



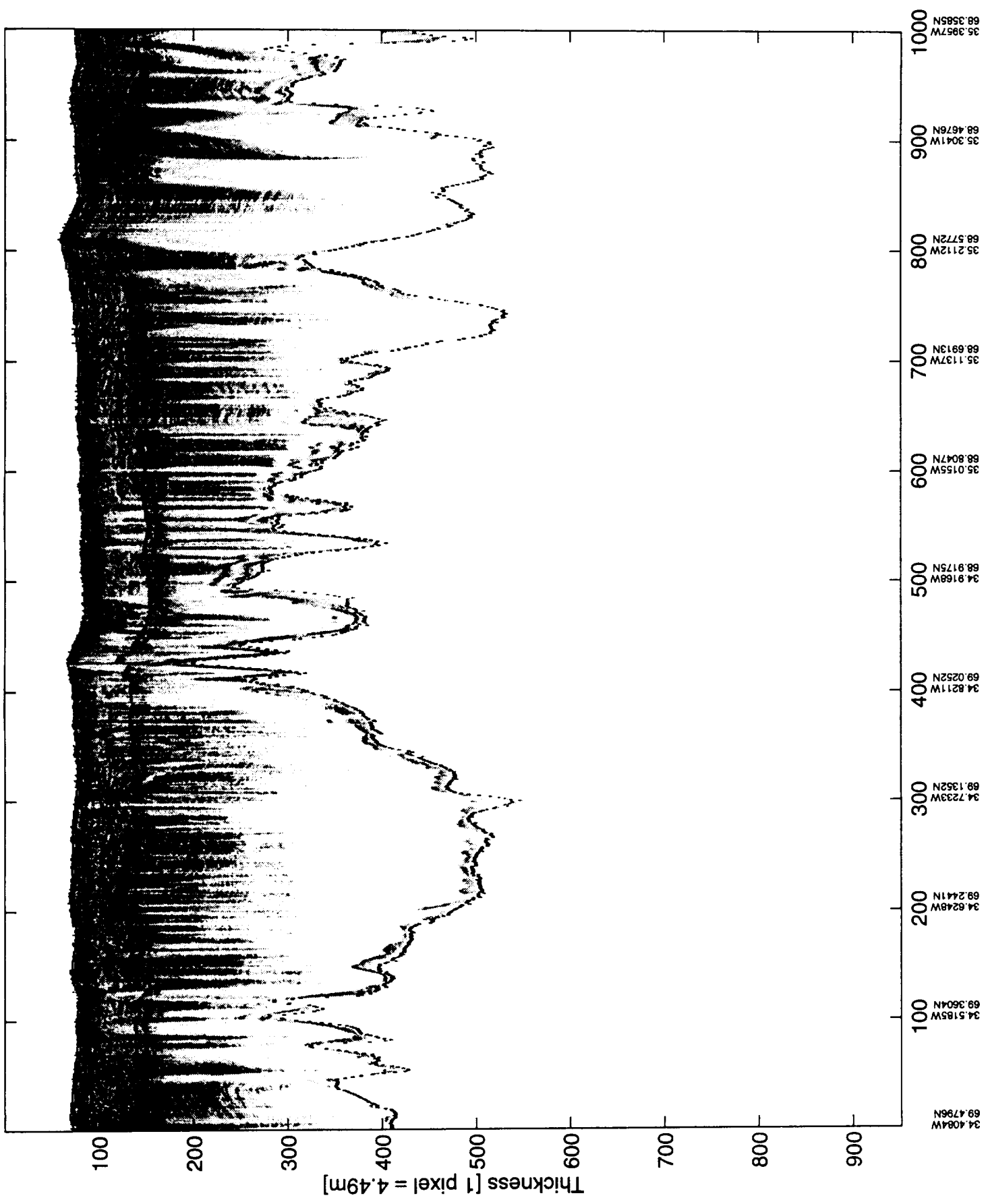
r_7_3.1 (6) [5000-6282]



r_7_3.1 (6) [5000-6282] thickness

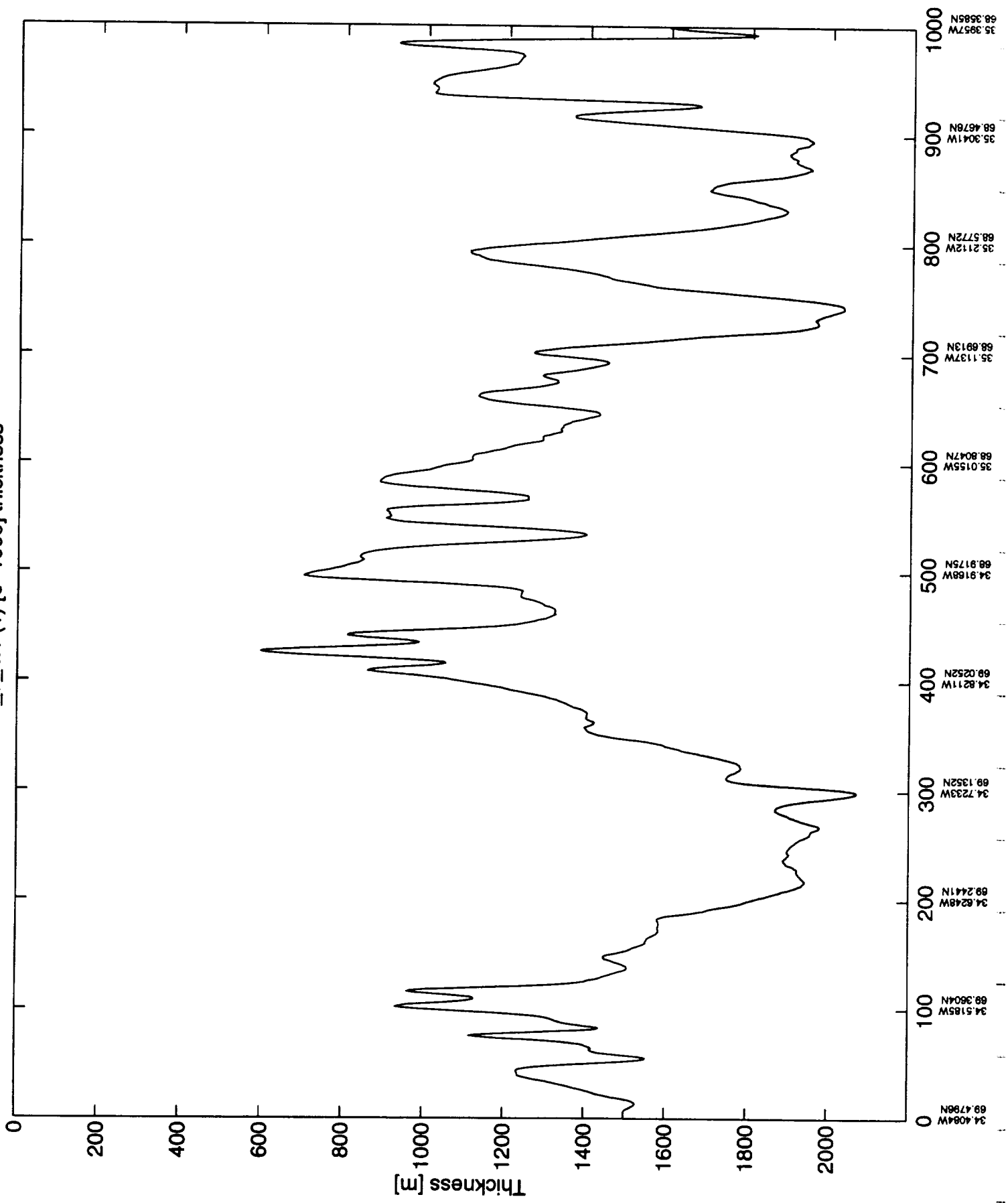


r_7_4.1 (1) [0-1000]

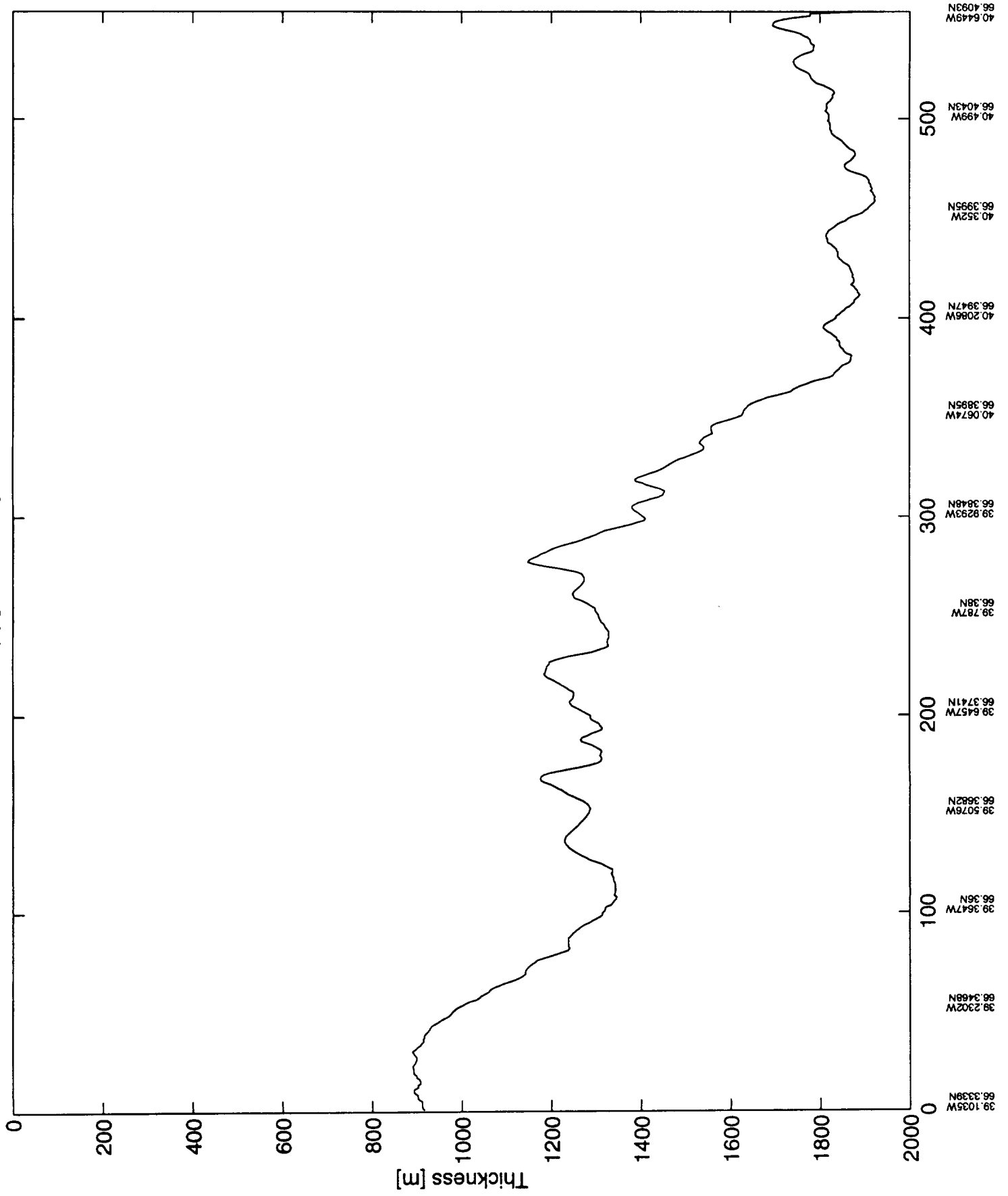


69.4084W
69.4796N
34.5185W
69.3604N
34.6248W
69.2441N
34.7233W
69.1352N
34.8211W
69.0252N
34.9168W
68.9175N
35.0155W
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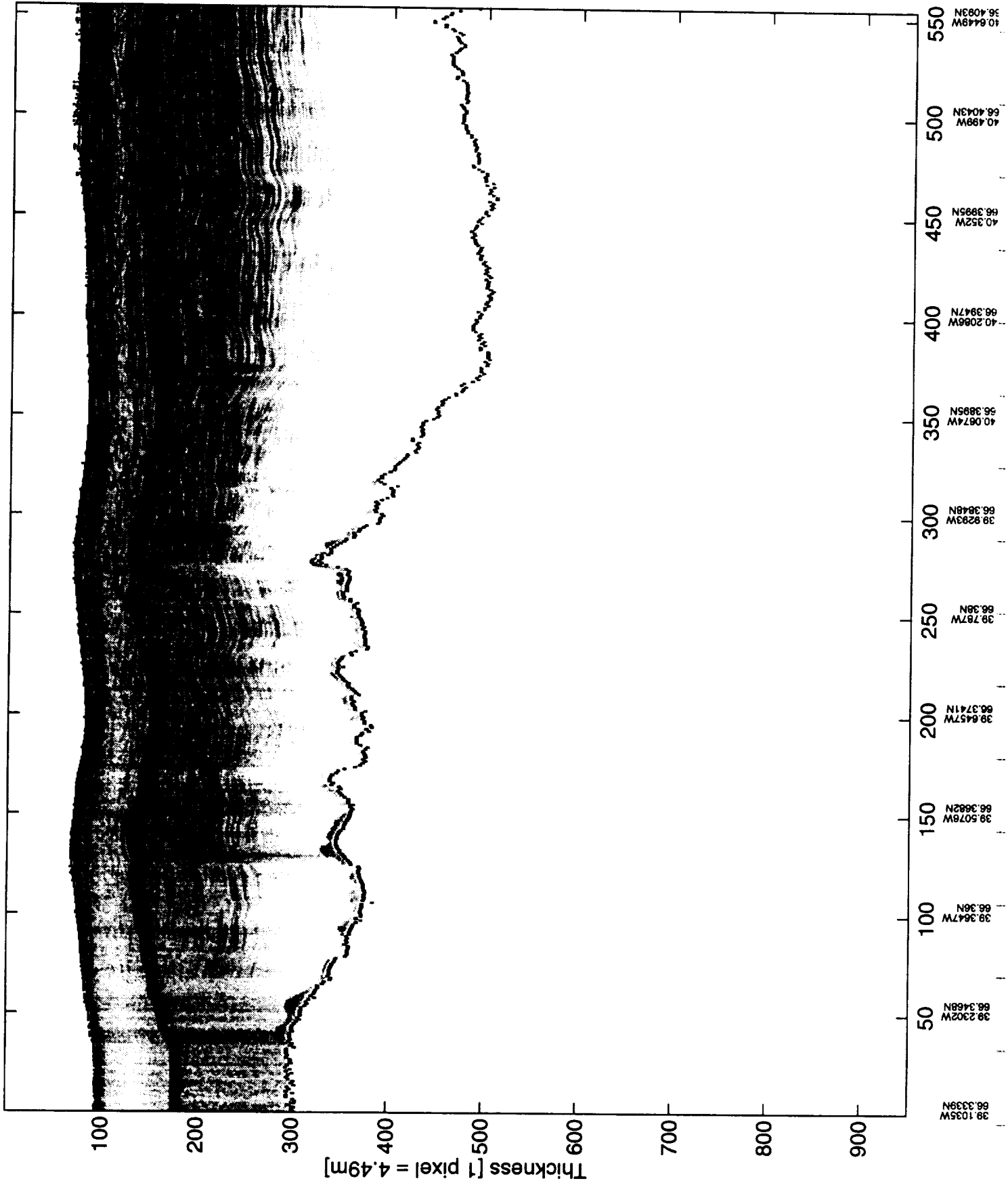
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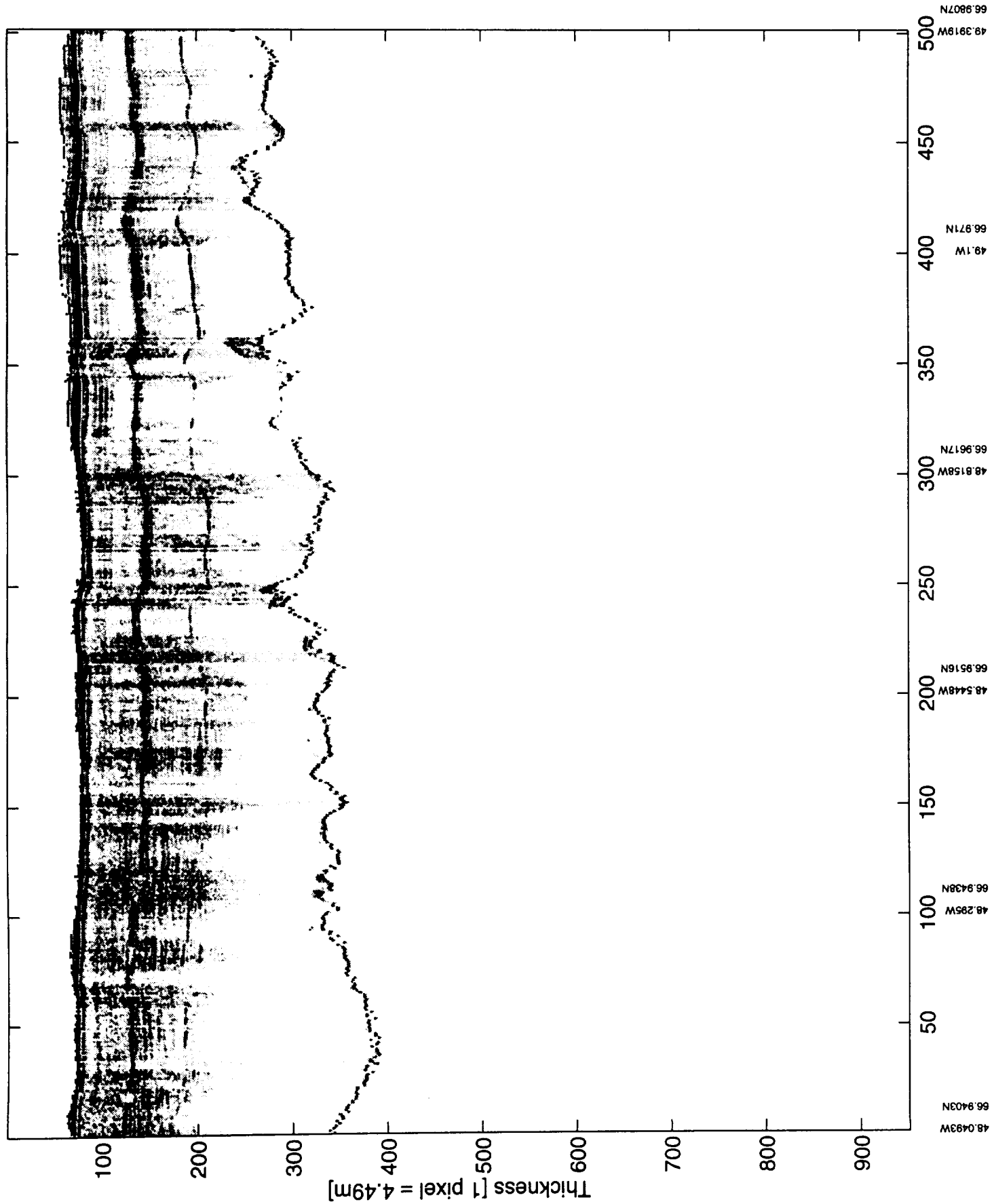
r_7_4.1 (4) [3200-3754] thickness



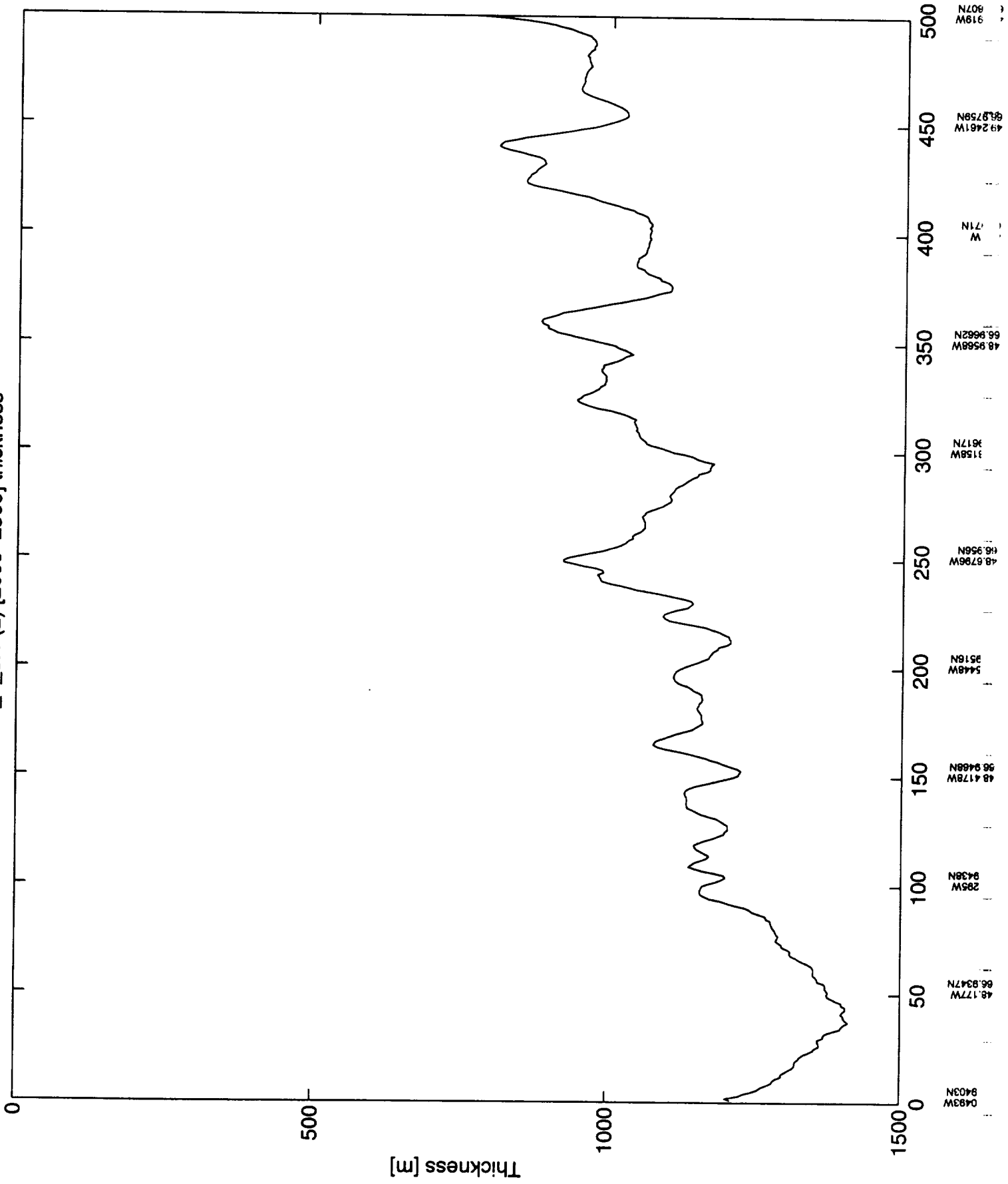
r_7_4.1 (4) [3200-3754]



r_7_8.1 (2) [2000 2500]

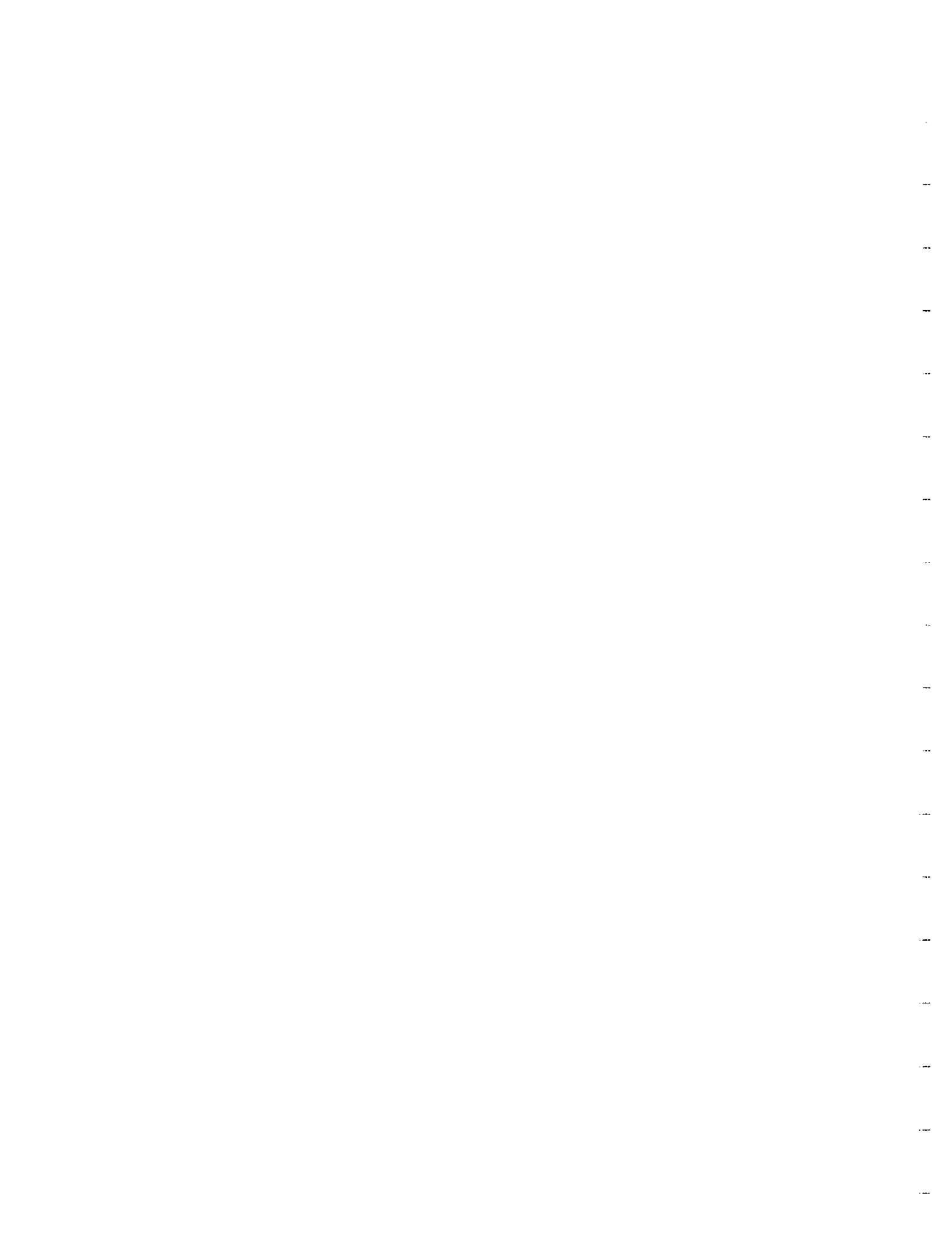


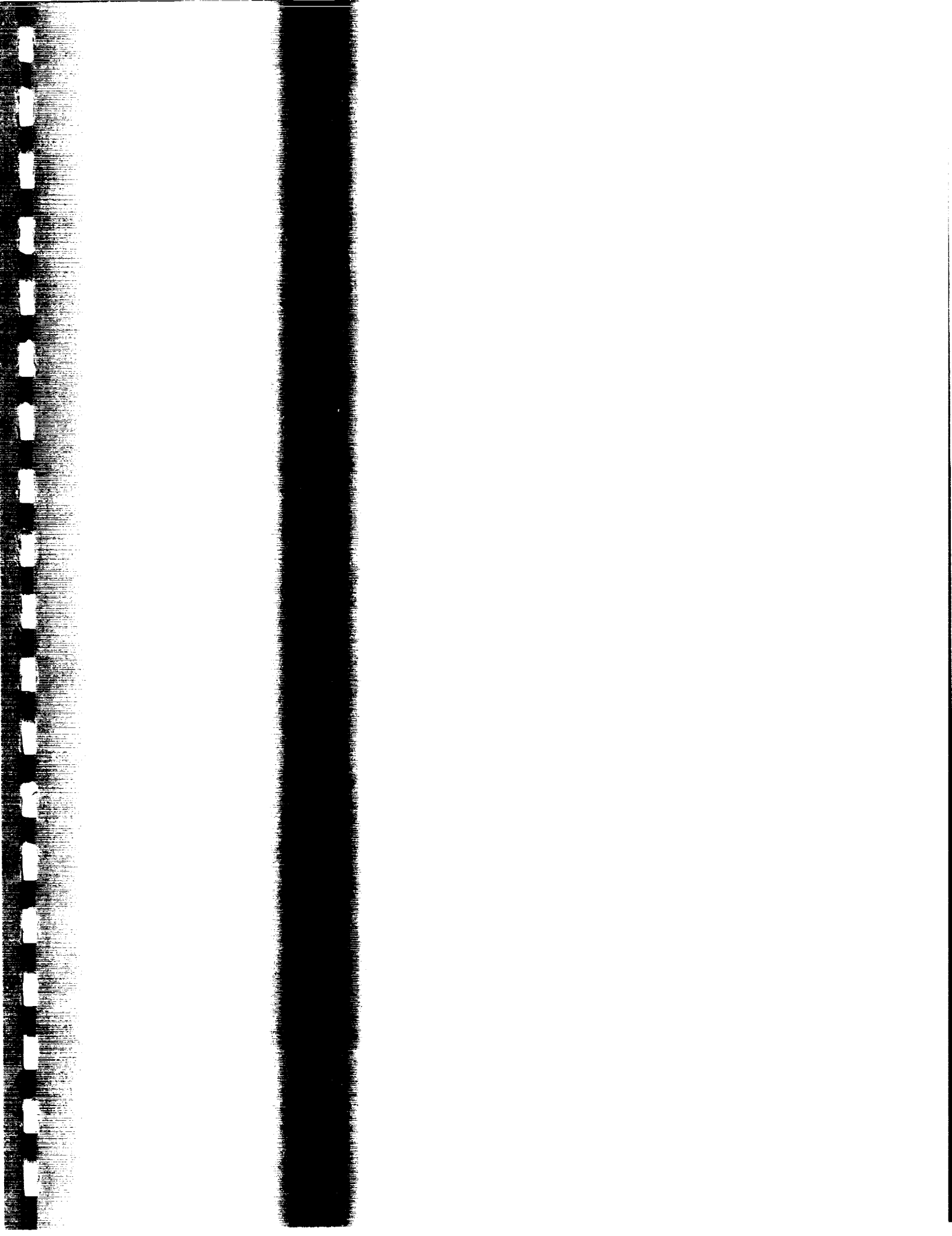
r_7_8.1 (2) [2000-2500] thickness

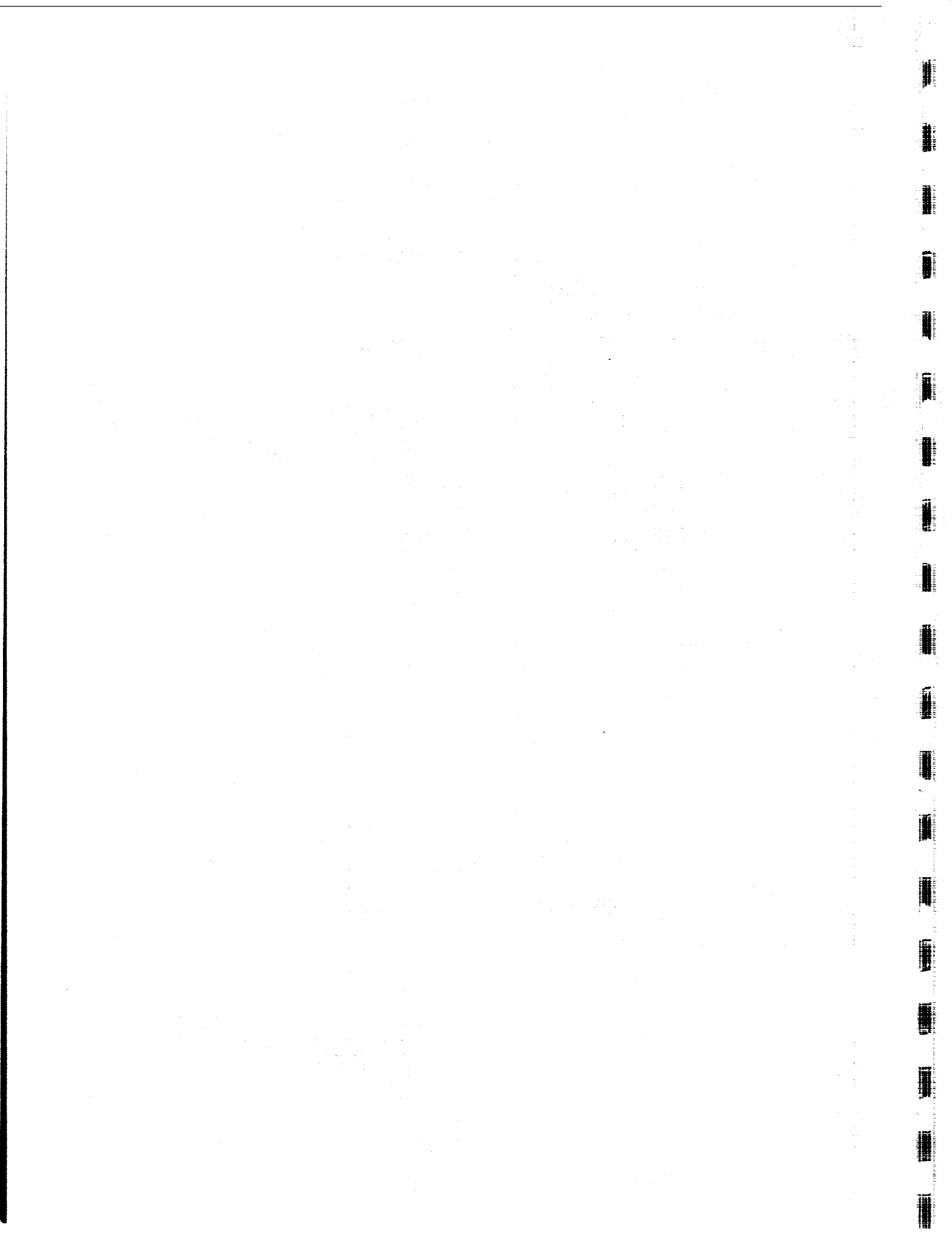


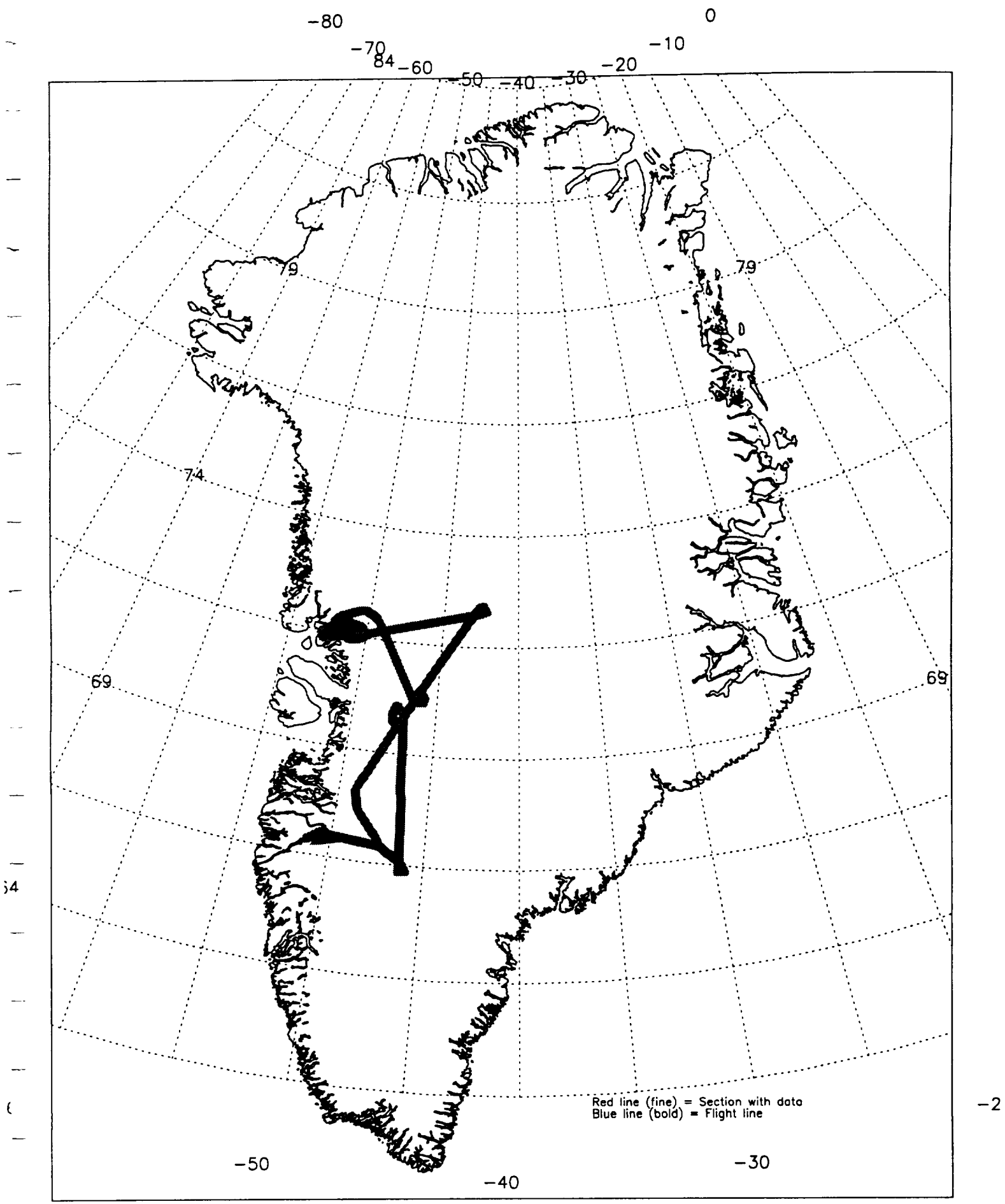
Appendix C

June 27, 1993

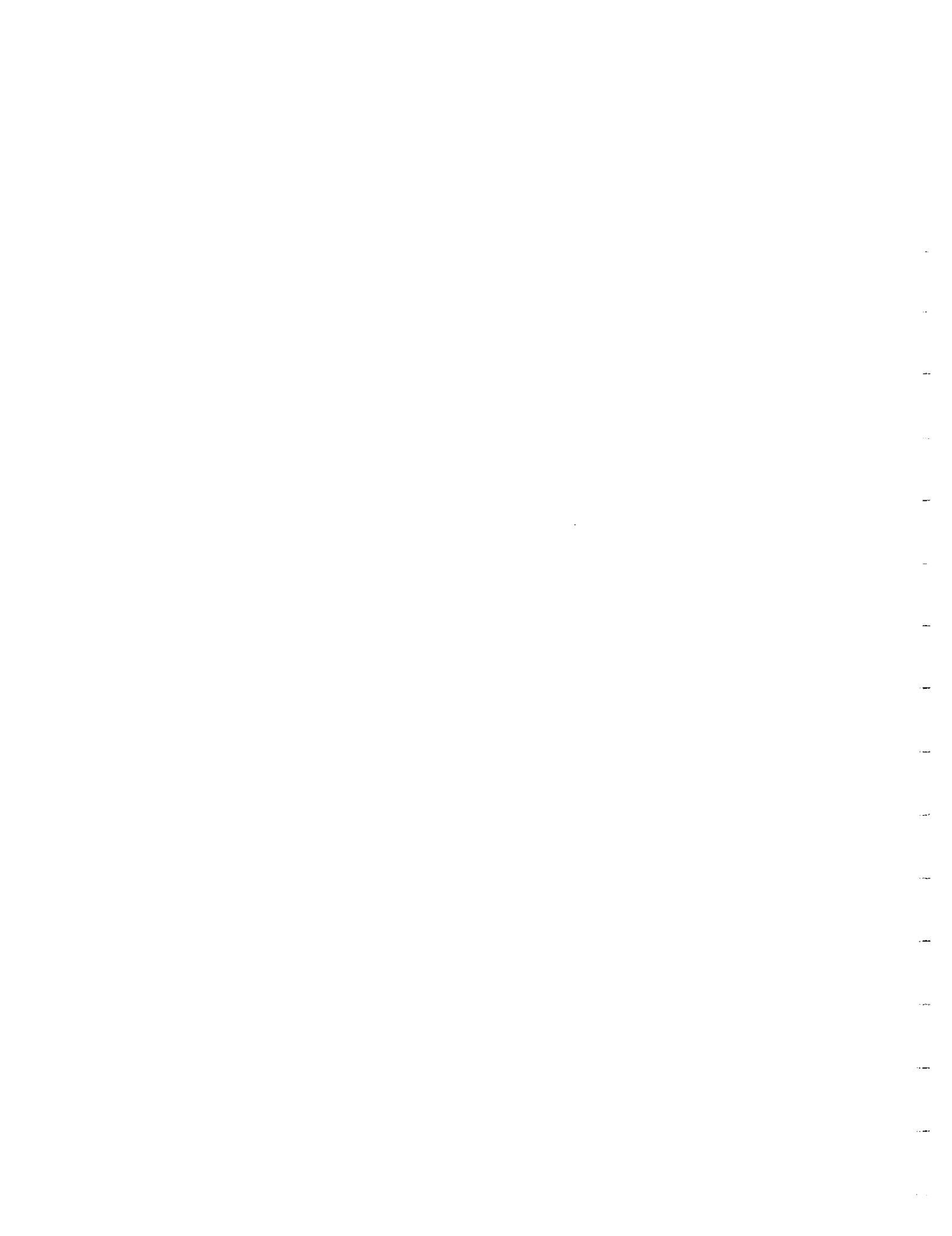


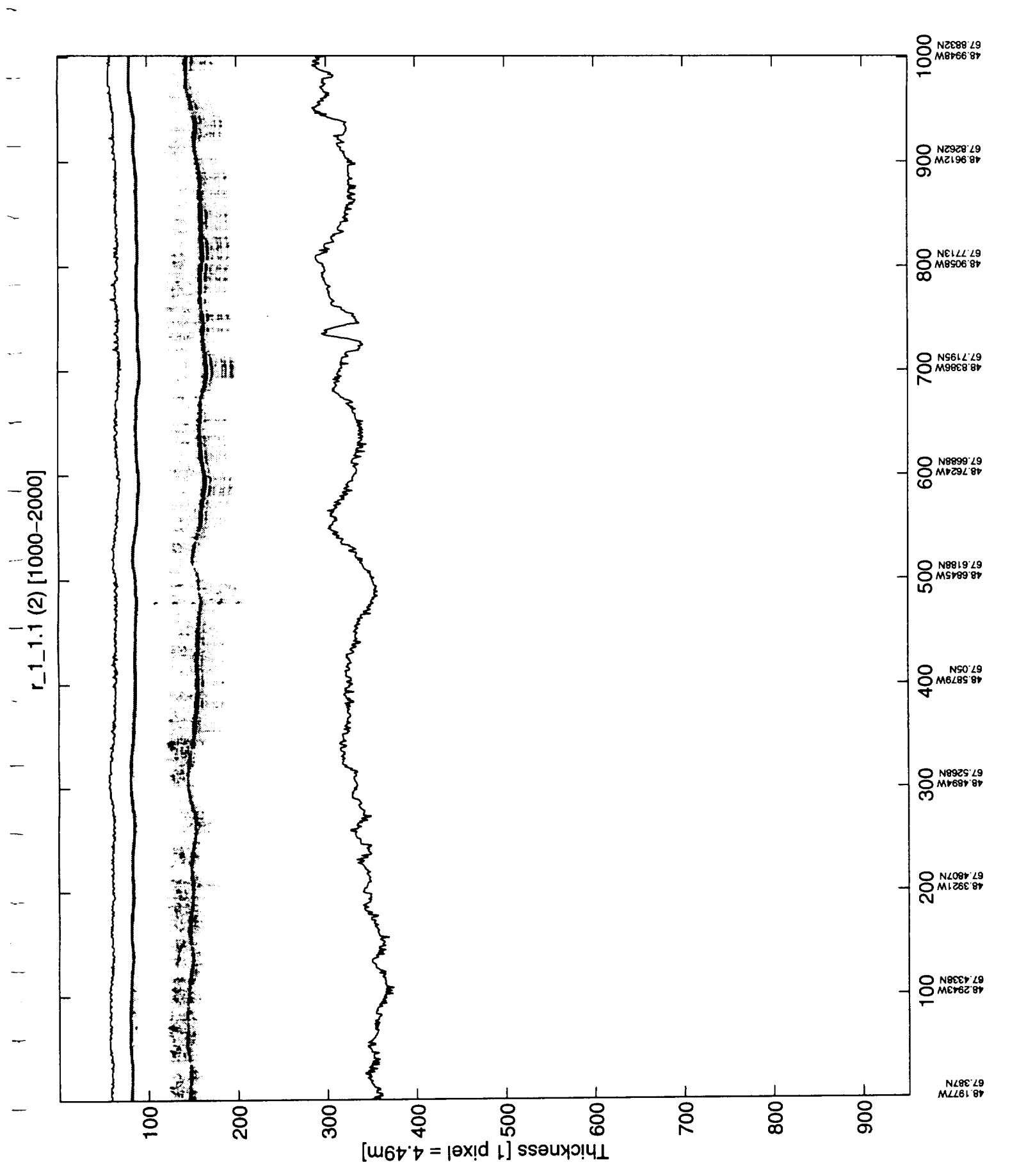




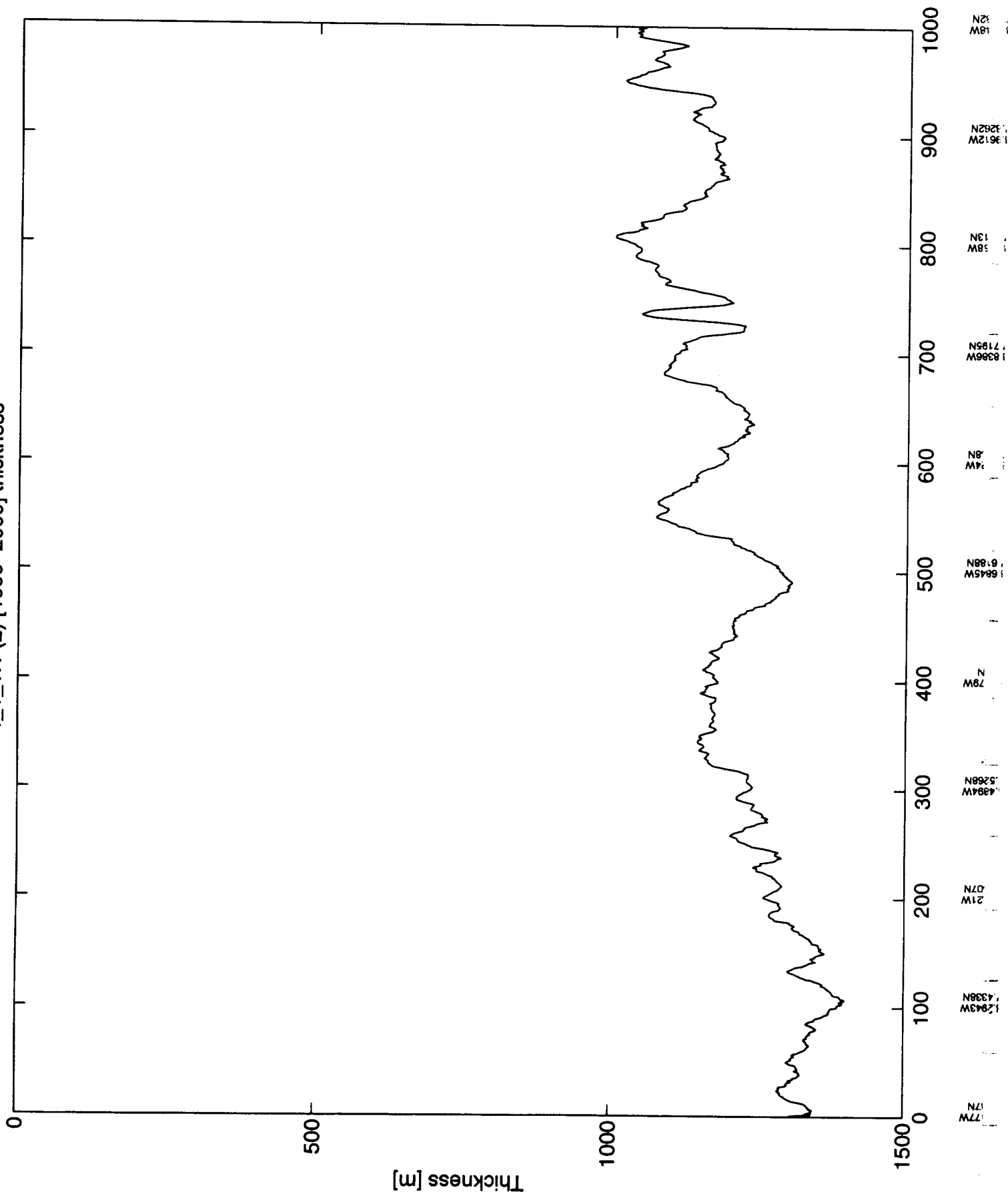


June 27, 1993 (r_1)

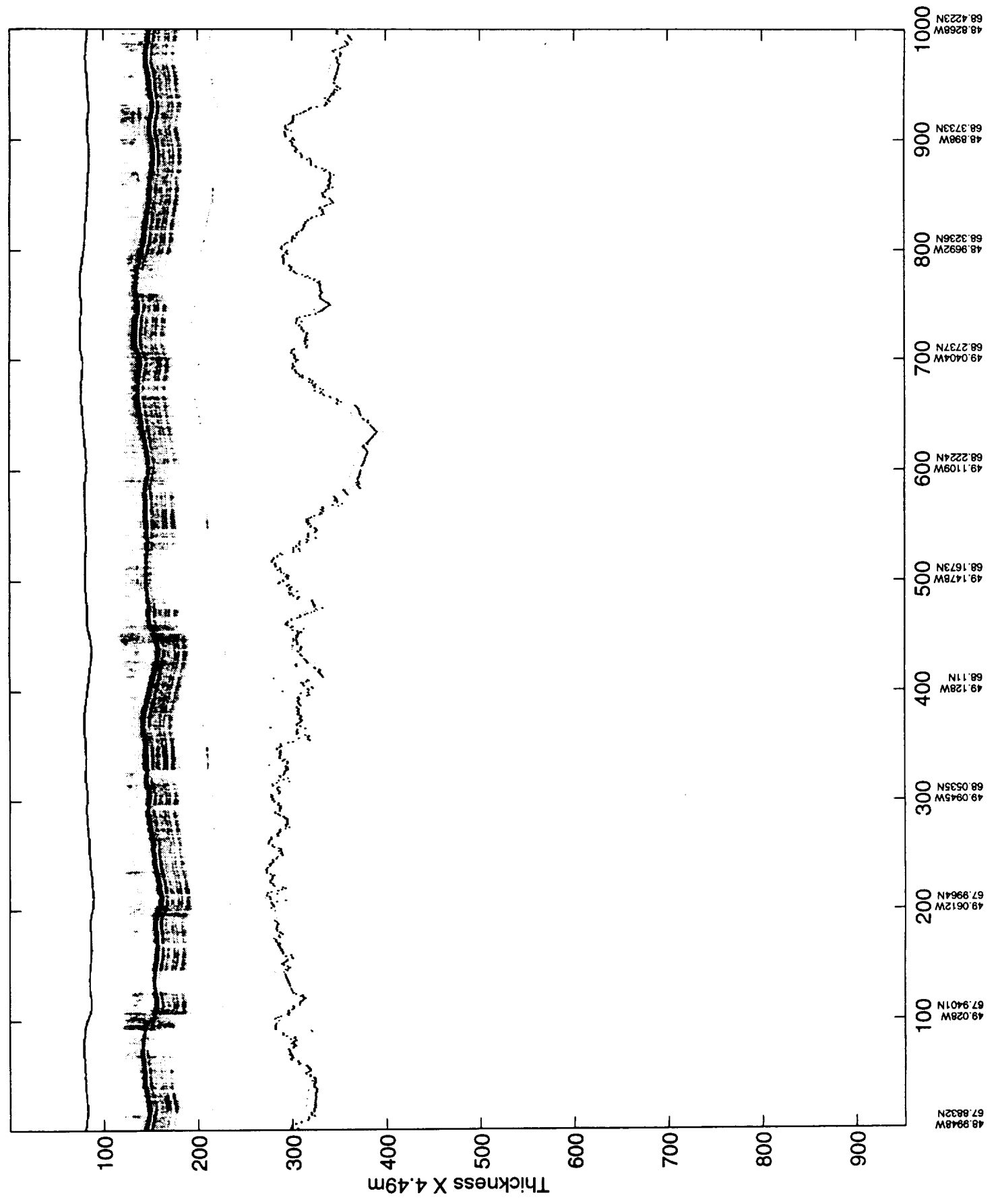




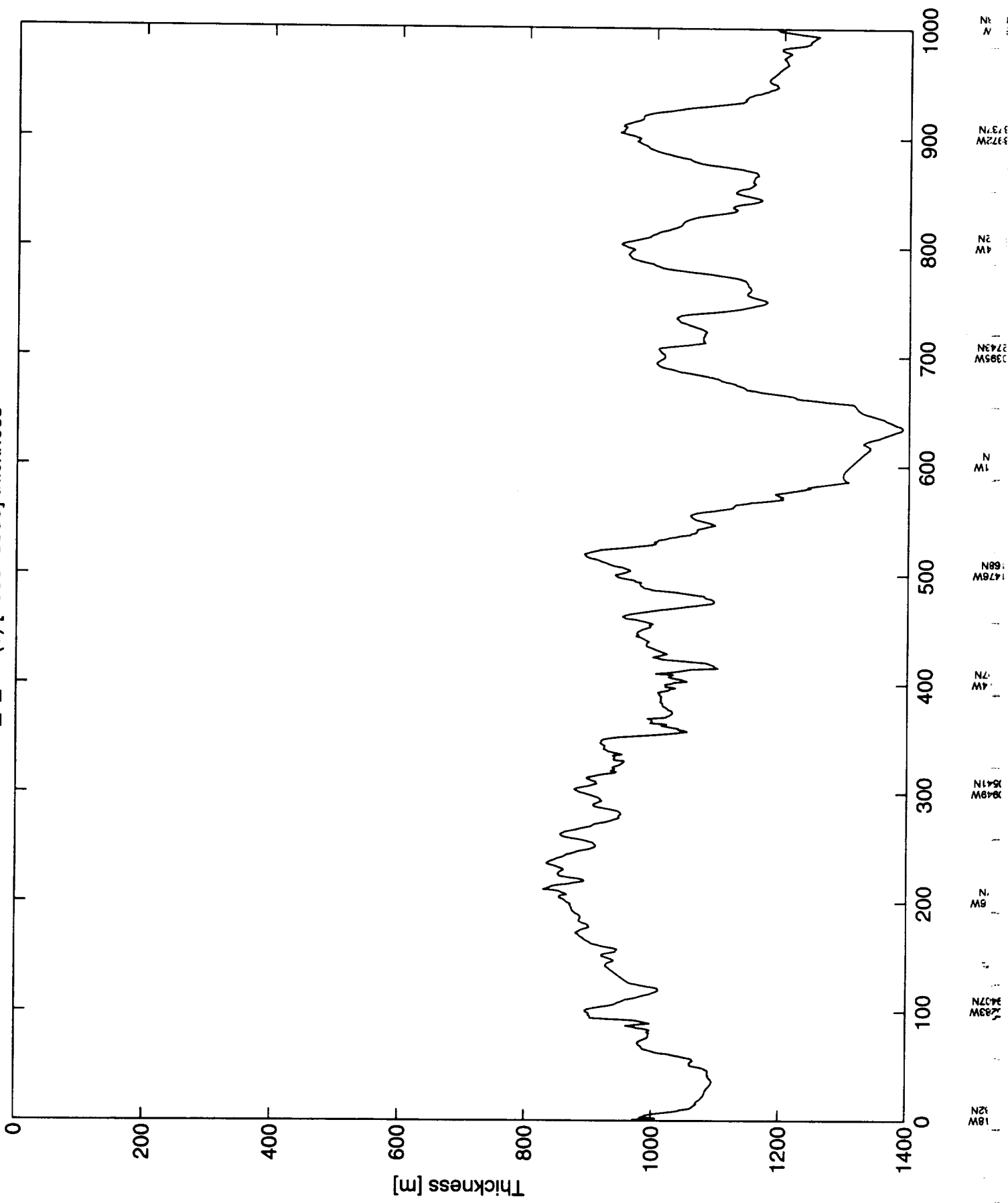
r_1_1.1 (2) [1000-2000] thickness



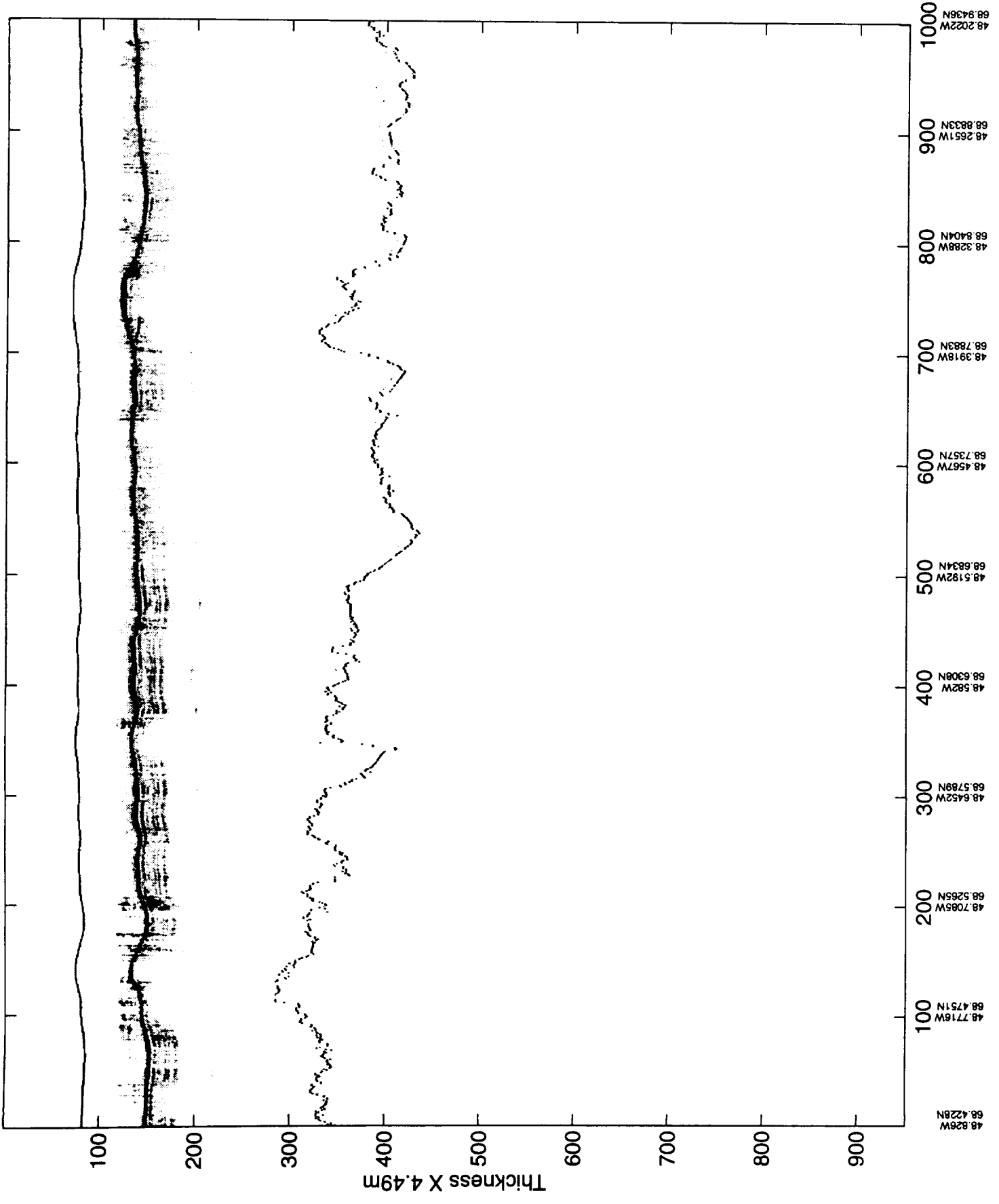
r_1_1.15 [2000-3000]



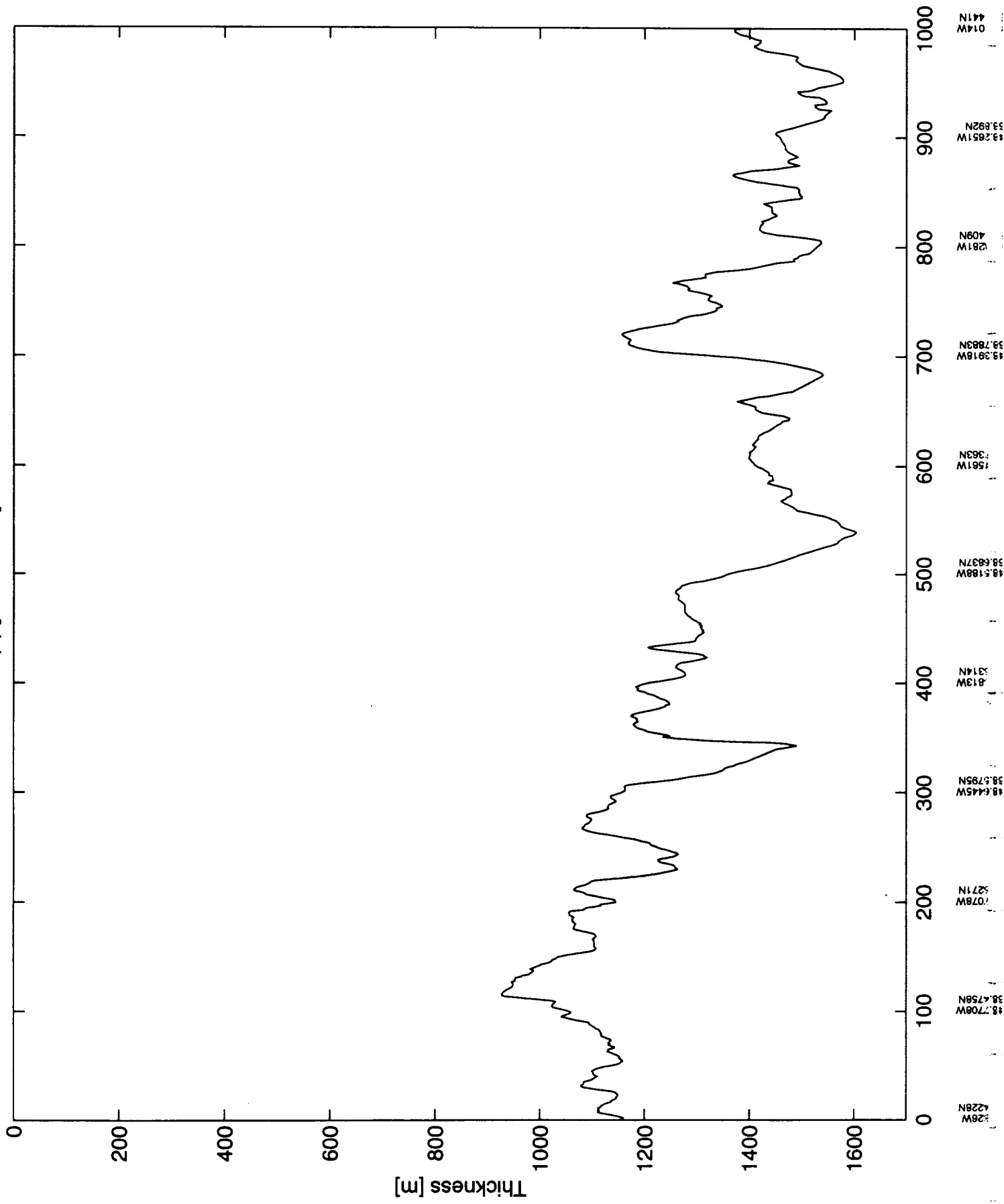
r_1_1.1 (3) [2000-3000] thickness



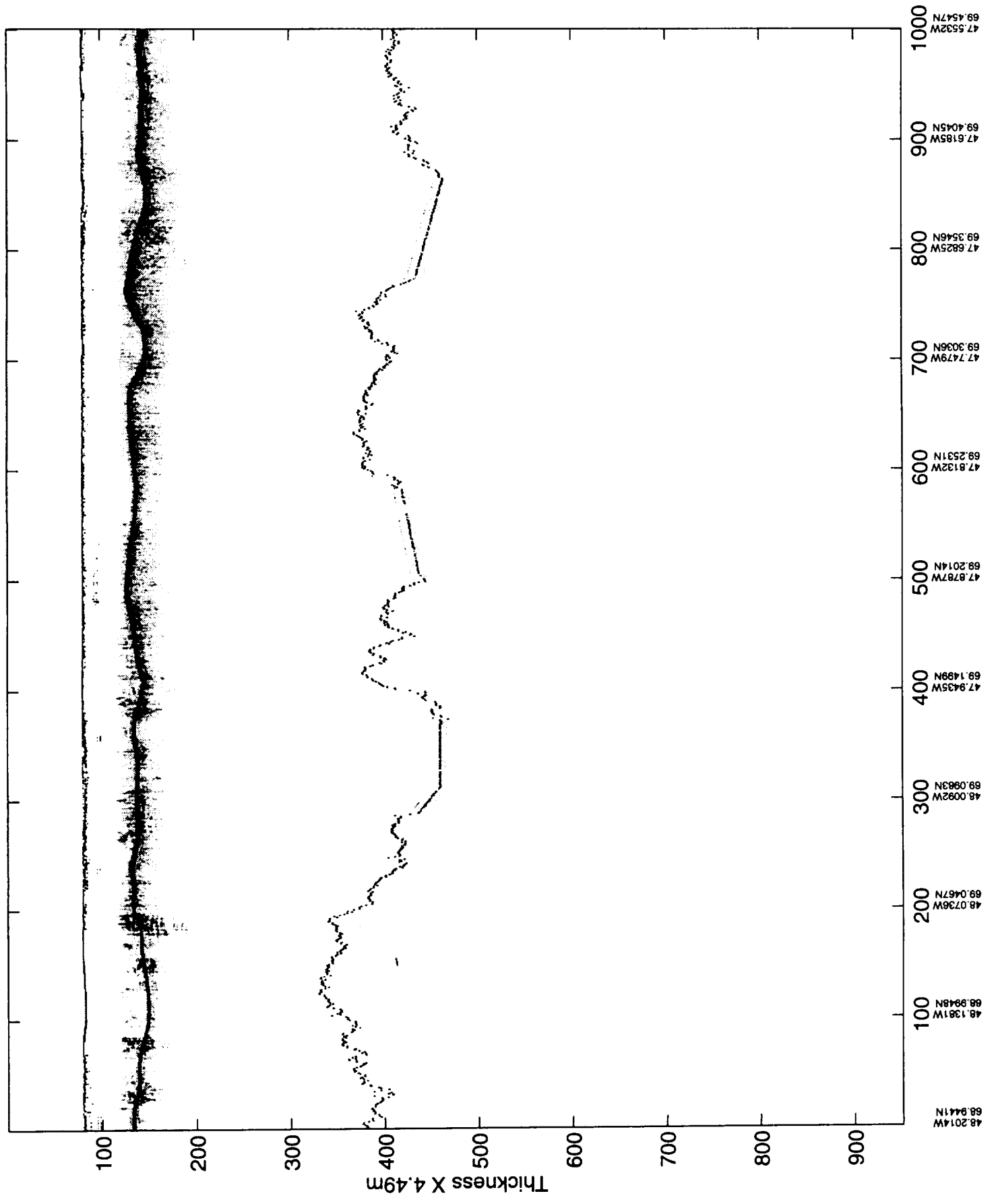
r_1|_1.14 [3000-4000]



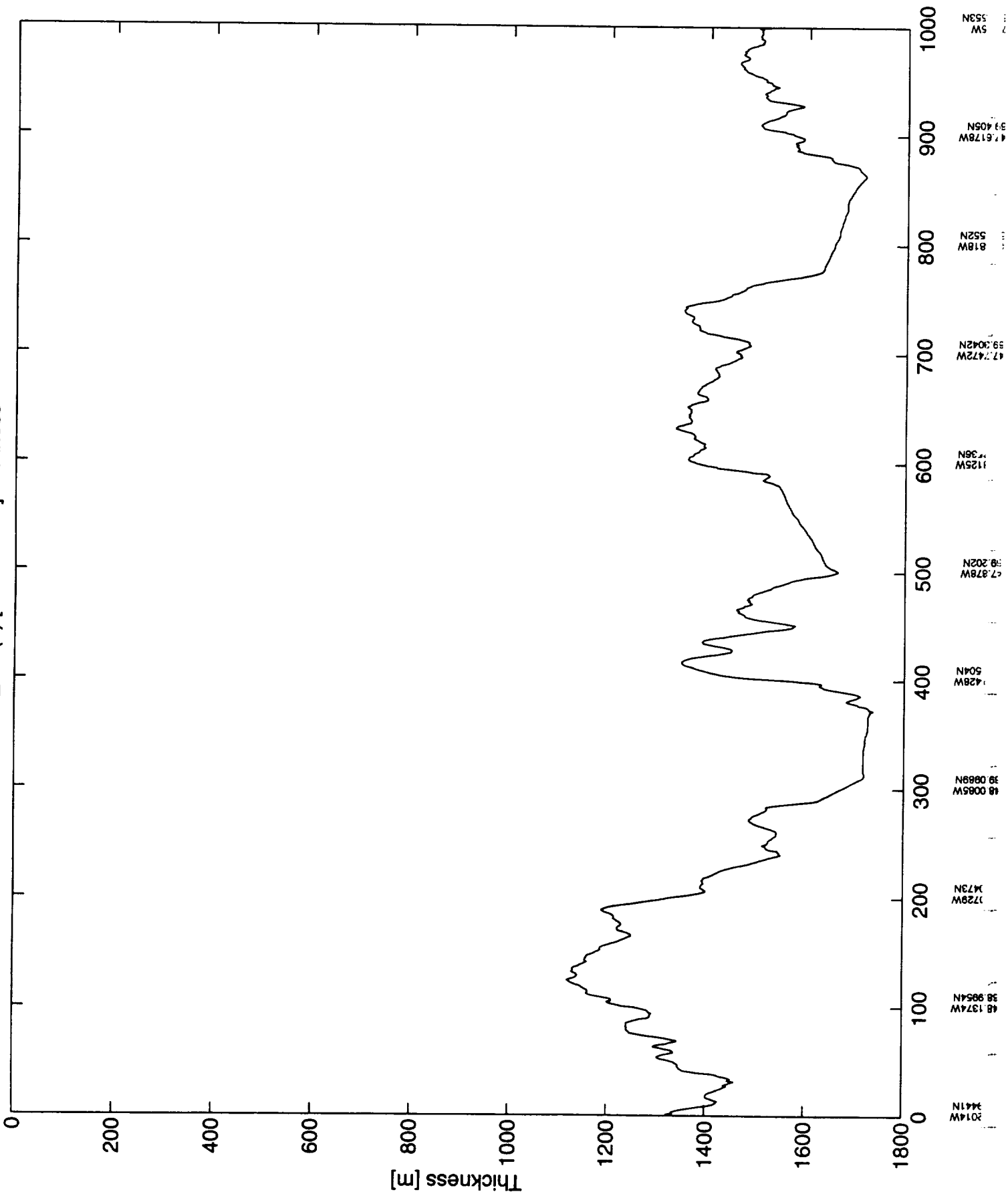
r_1_1.1 (4) [3000-4000] thickness



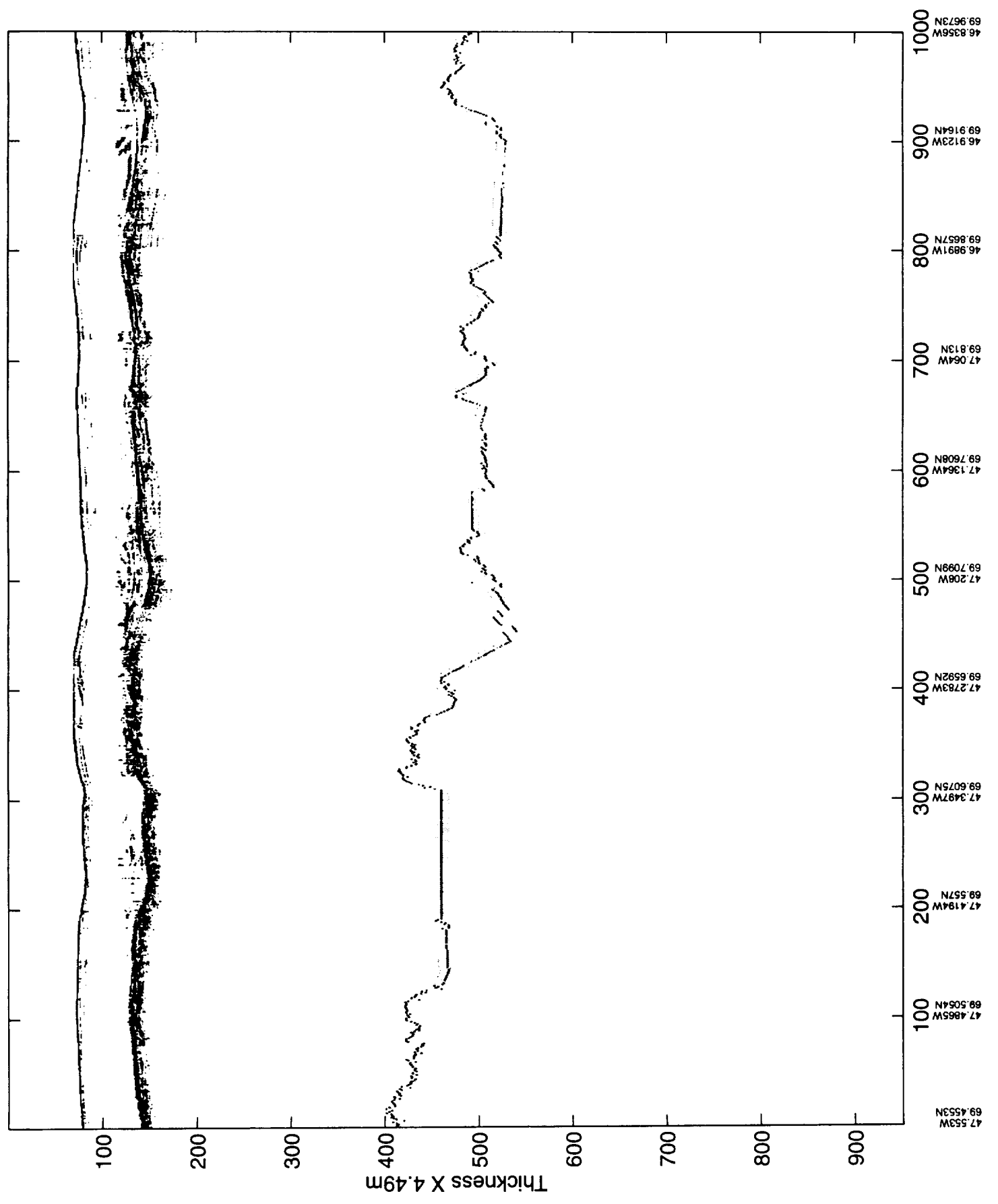
r_1_1.15 [4000-5000]



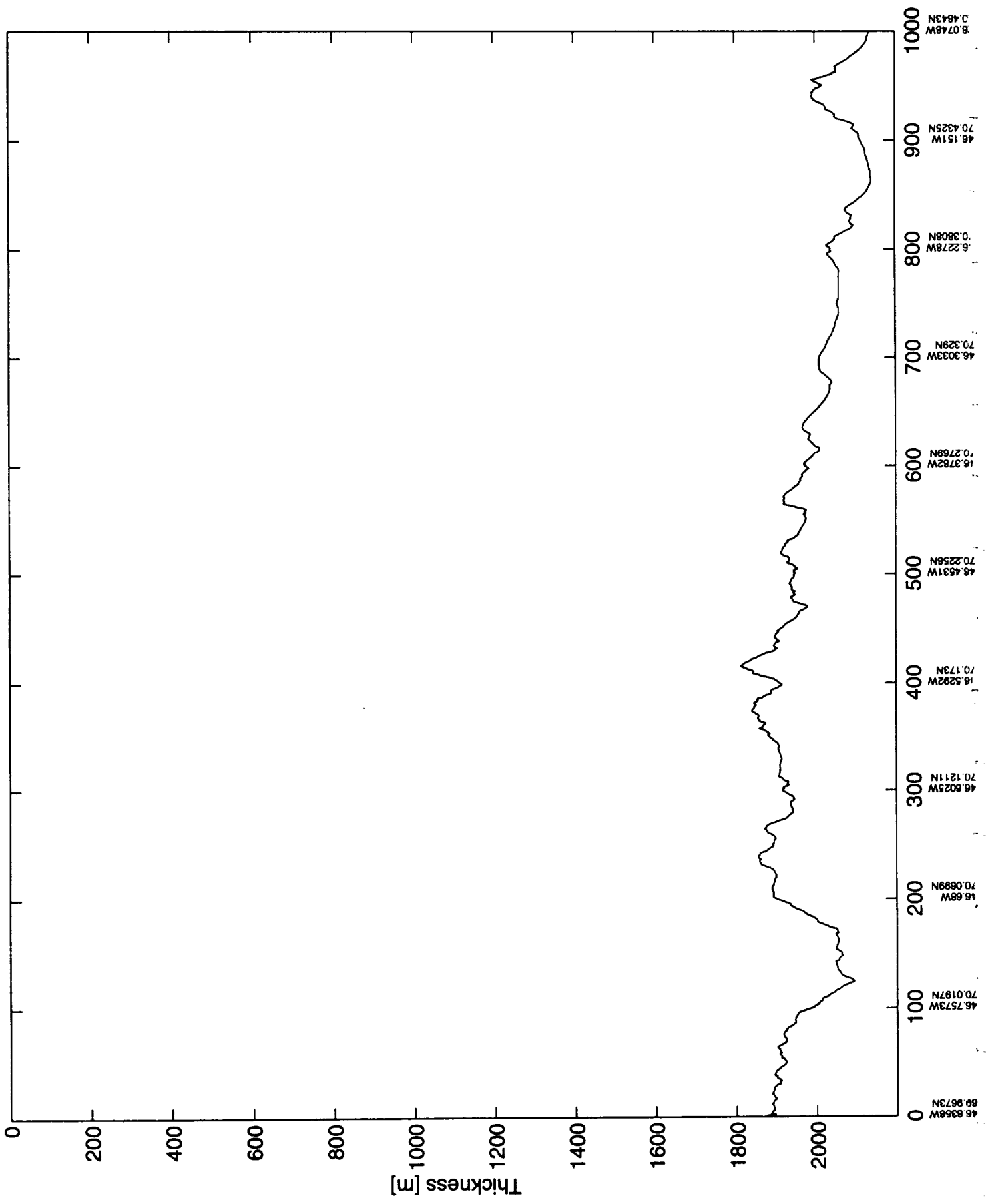
r_1_1.1 (5) [4000-5000] thickness



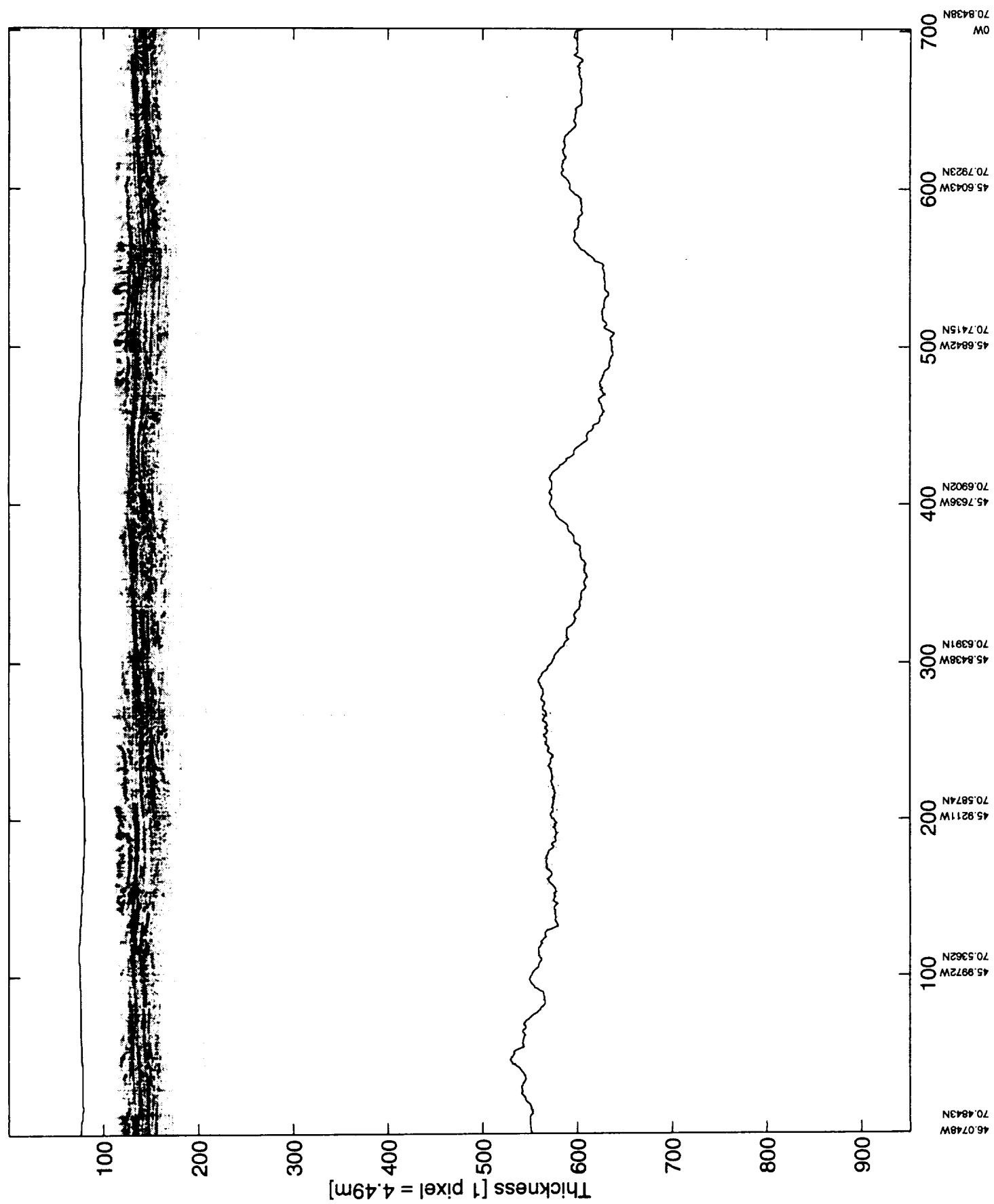
r_1_1.16 [5000-6000]



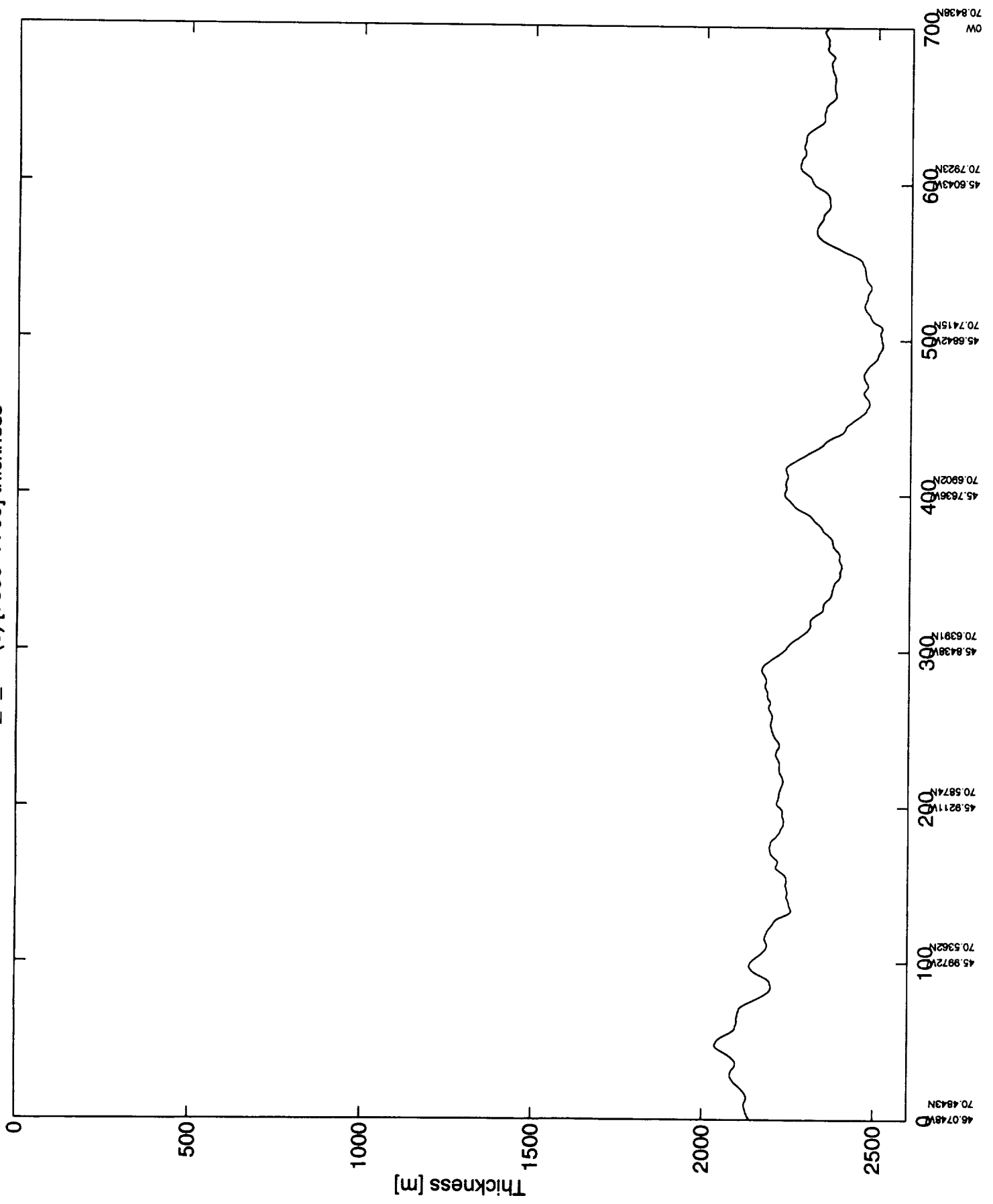
r_1_1.1 (7) [6000-7000] thickness



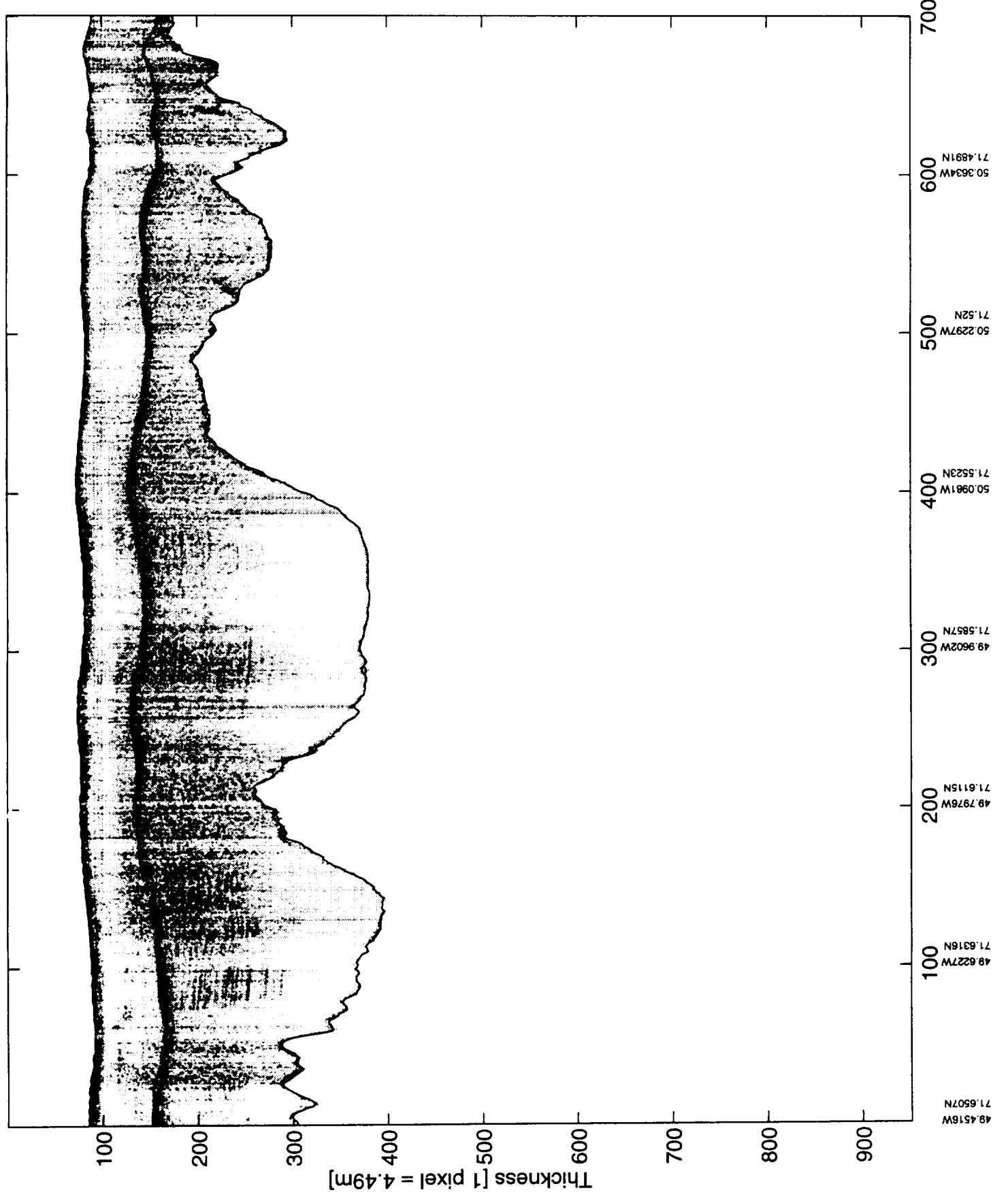
r_1_1.1 (8) [7000-7700]



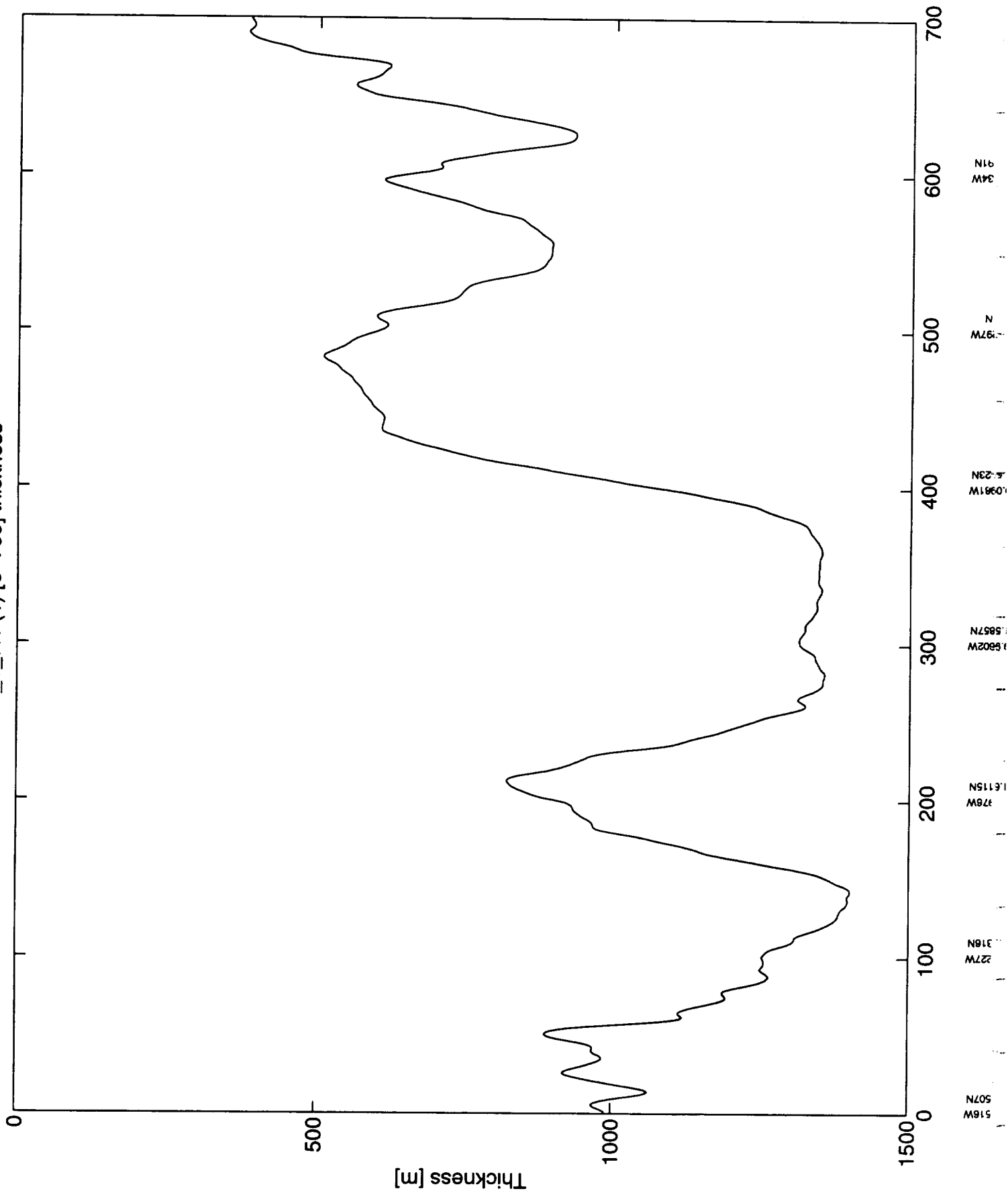
r_1_1.1 (8) [7000-7700] thickness



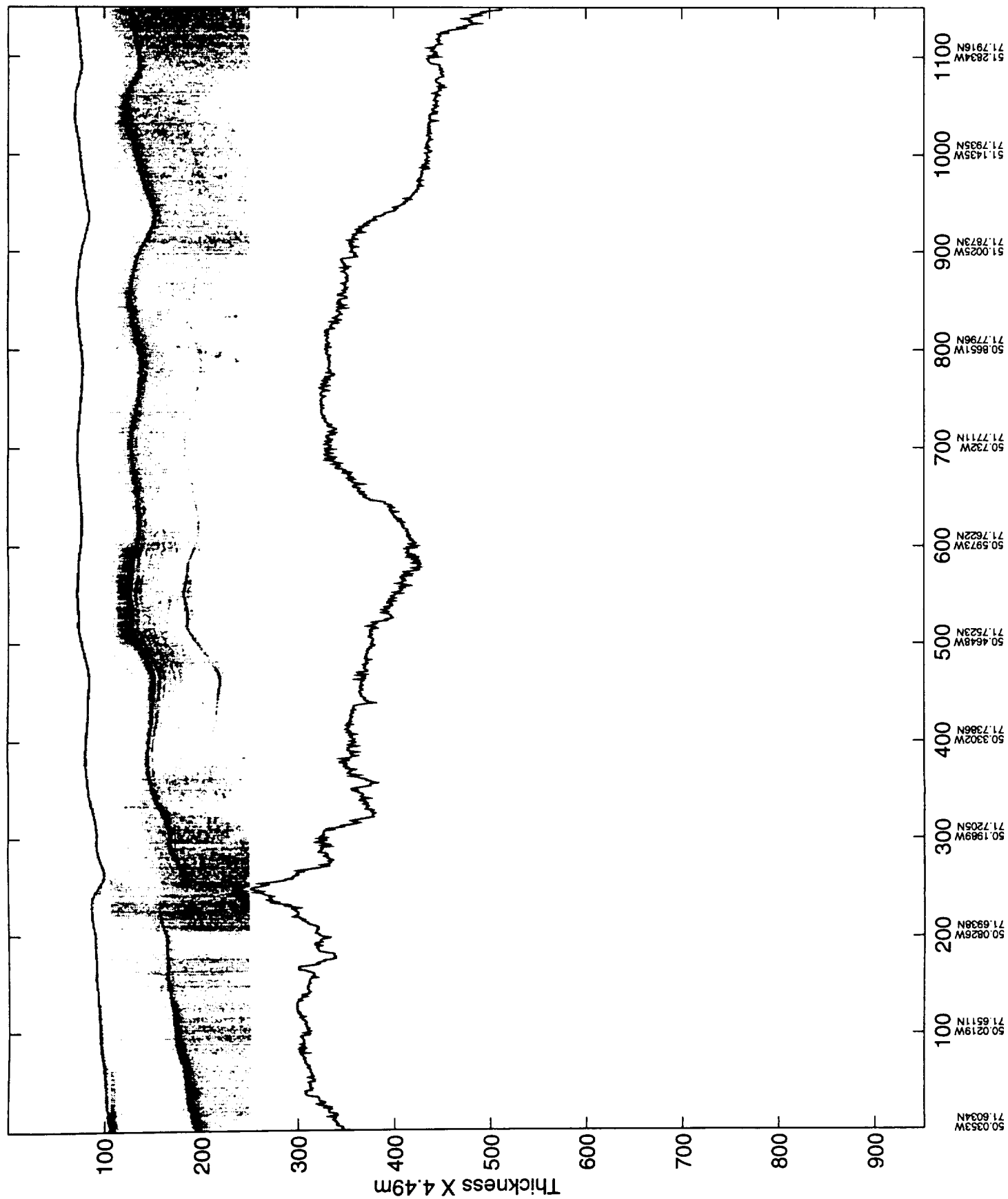
r_1_7.1 (1) [0-700]



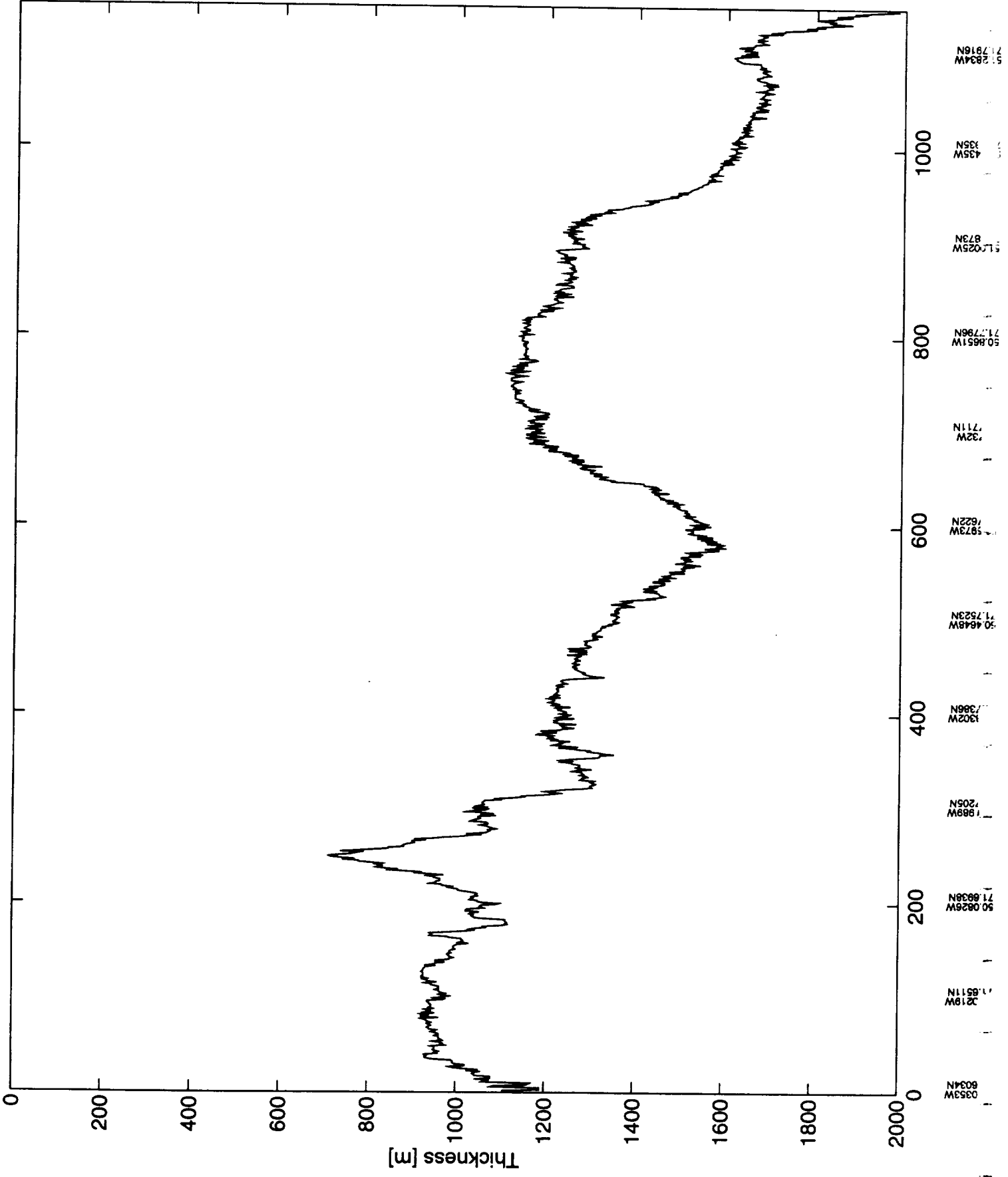
r_1_7.1 (1) [0-700] thickness



r_1_g.12a [300-14bu]



r_1_9.12a [300-1450] thickness



51.2834W
71.7916N

51.435W
71.835N

51.673W
71.873N

50.8651W
71.7796N

51.72W
71.711N

51.5873W
71.622N

50.488W
71.7523N

51.302W
71.386N

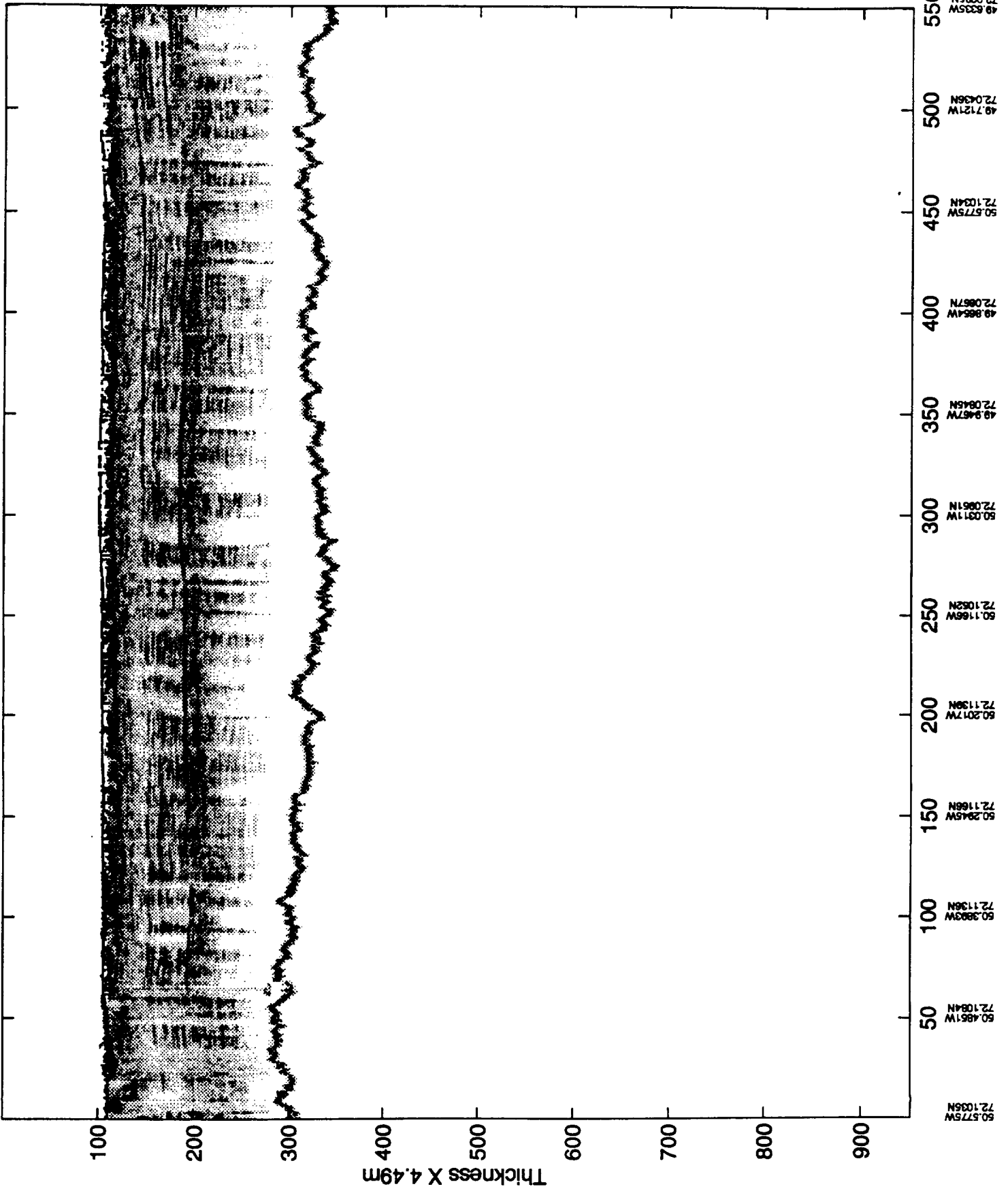
51.789W
71.205N

50.0826W
71.6938N

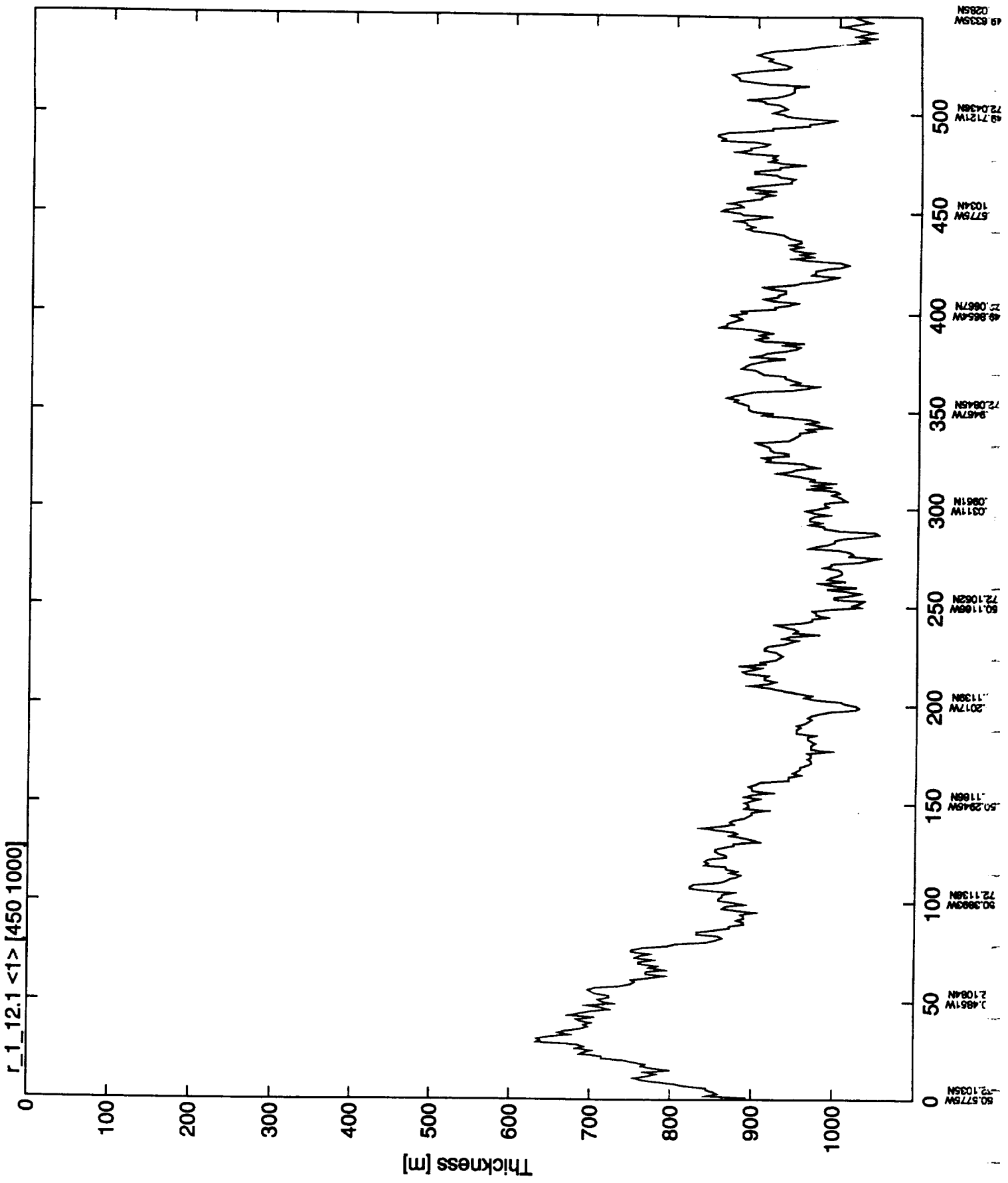
51.219W
71.6511N

50.934W
71.6034N

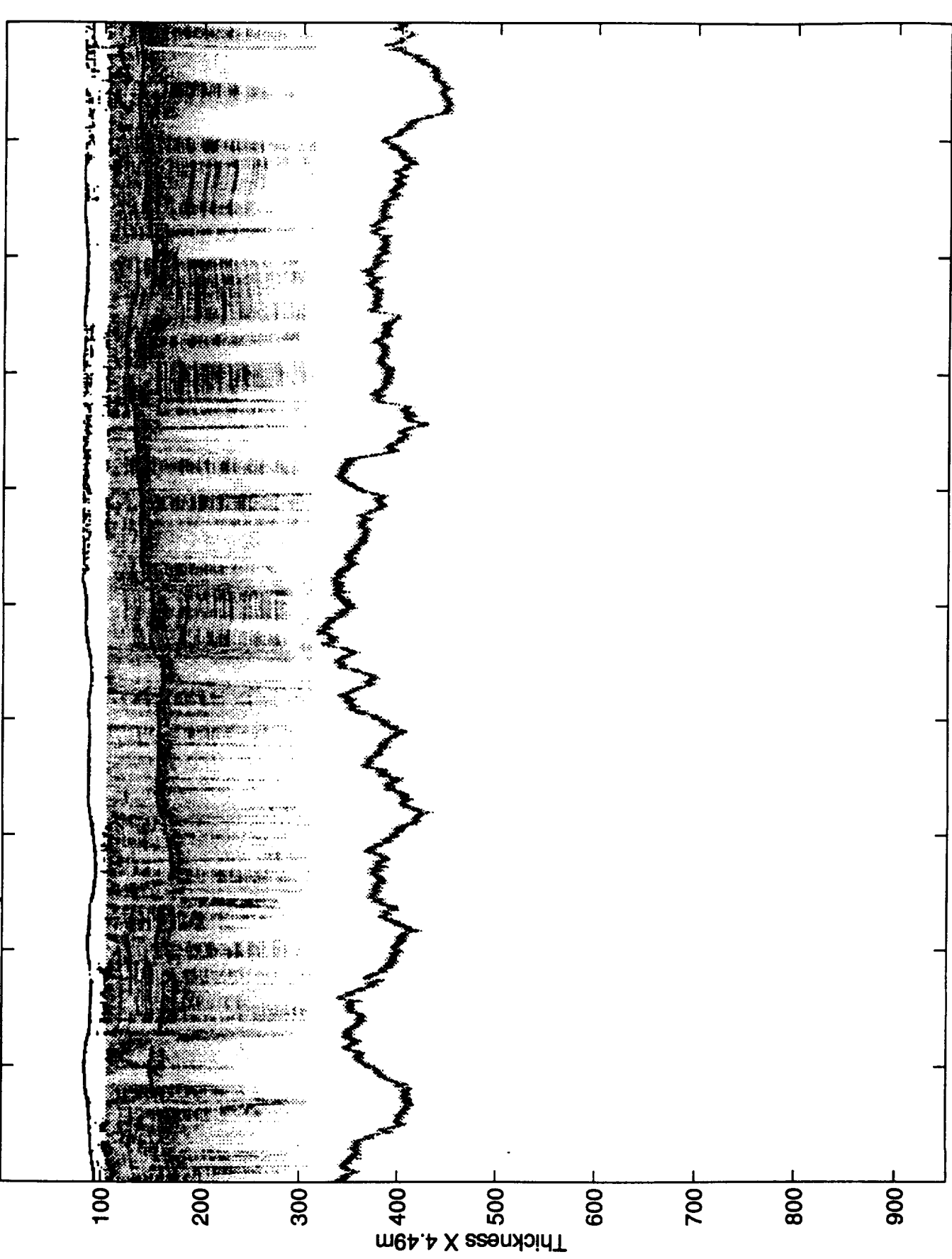
r_1_12.1 <1> [450 1000]



r_1_12.1 <1> [450 1000]

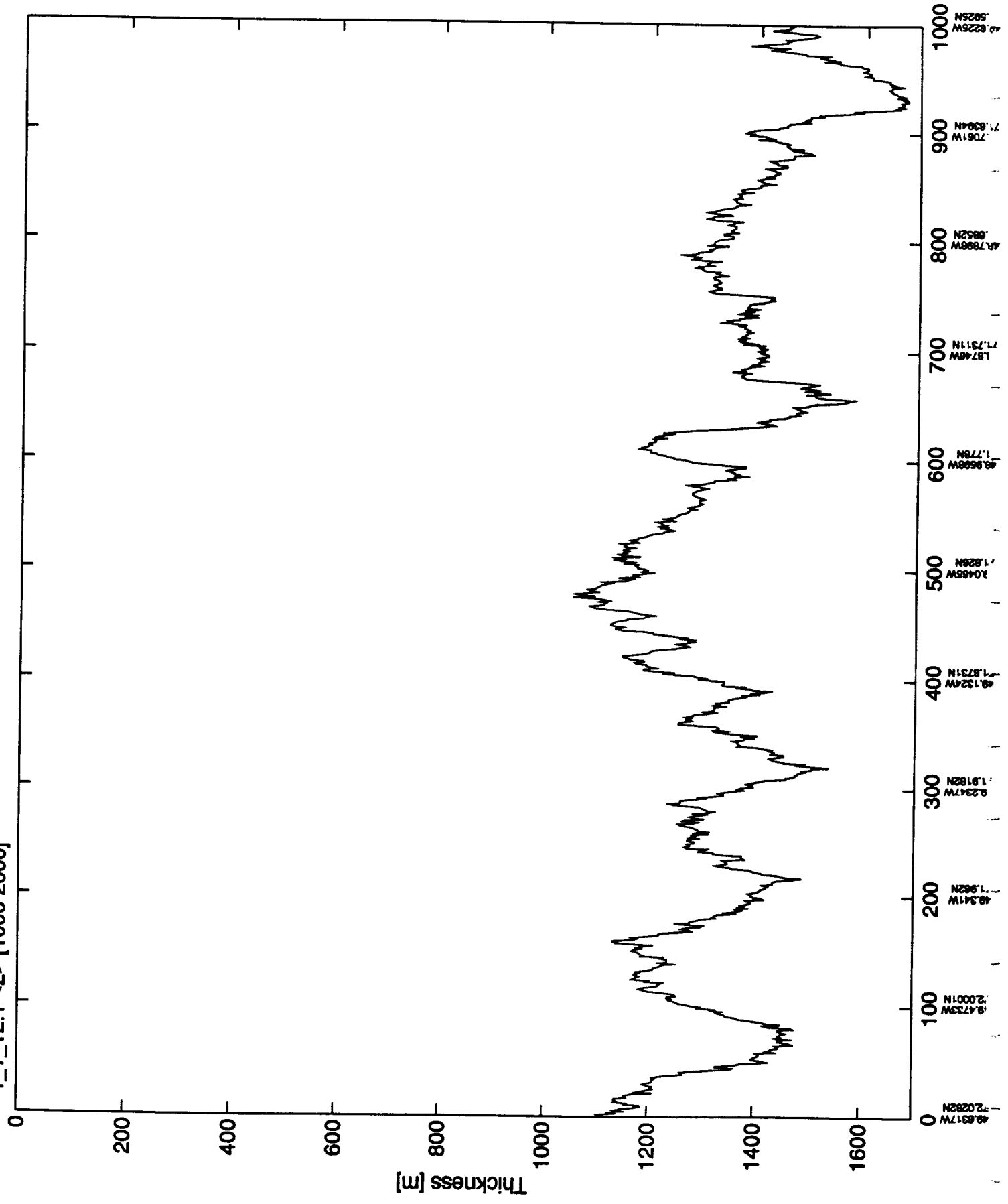


r_1_12.1 <2> [1000 2000]

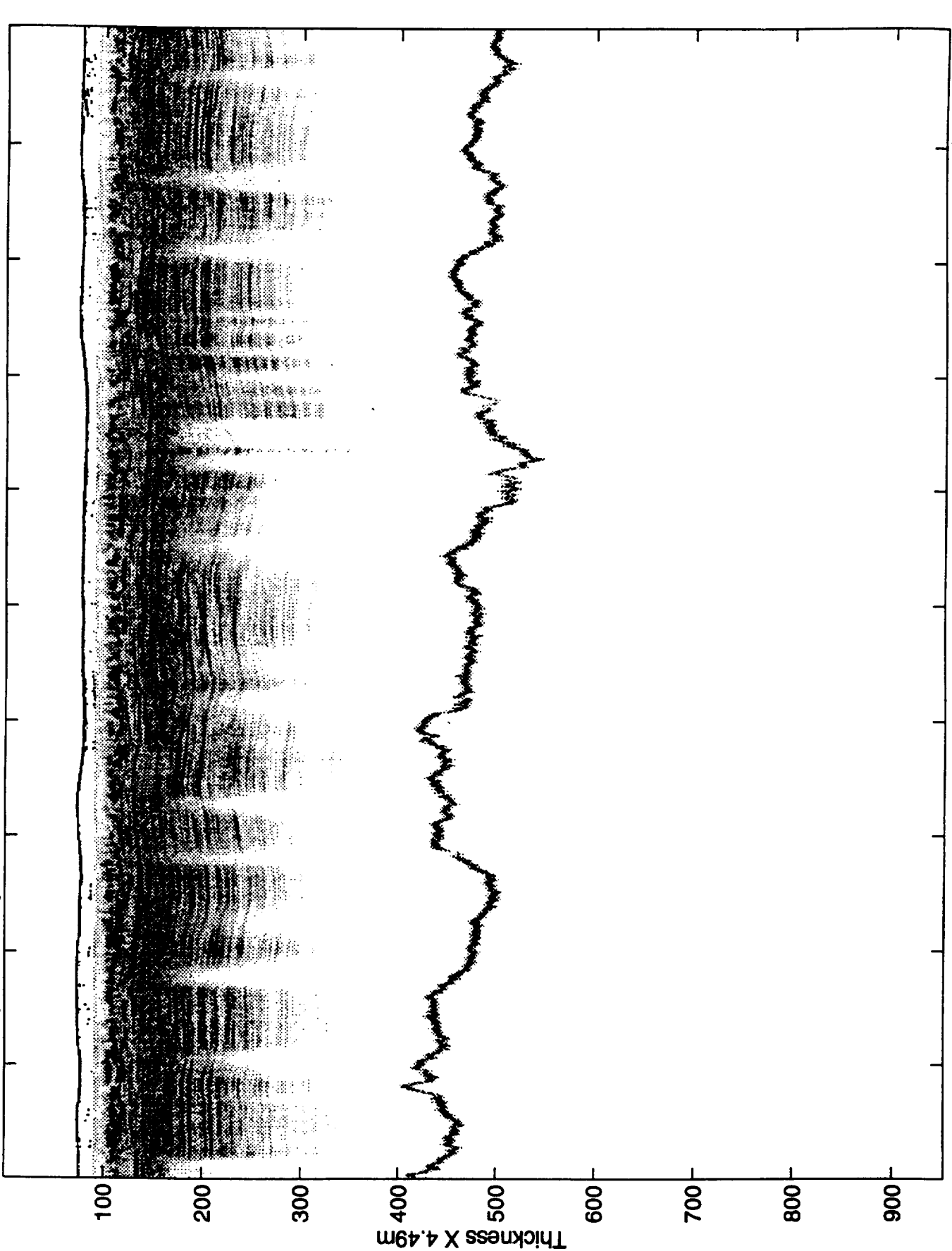


72.0282N 49.6317W
72.0001N 49.4733W
100
71.982N 49.341W
200
71.9182N 49.2347W
300
71.8731N 49.1324W
400
49.0465W 71.826N
500
48.9698W 71.778N
600
48.8746W 71.7311N
700
48.7896W 71.6852N
800
48.7061W 71.6394N
900
48.6225W 71.5925N
1000

$r_{1_12.1} \langle 2 \rangle [1000 \ 2000]$

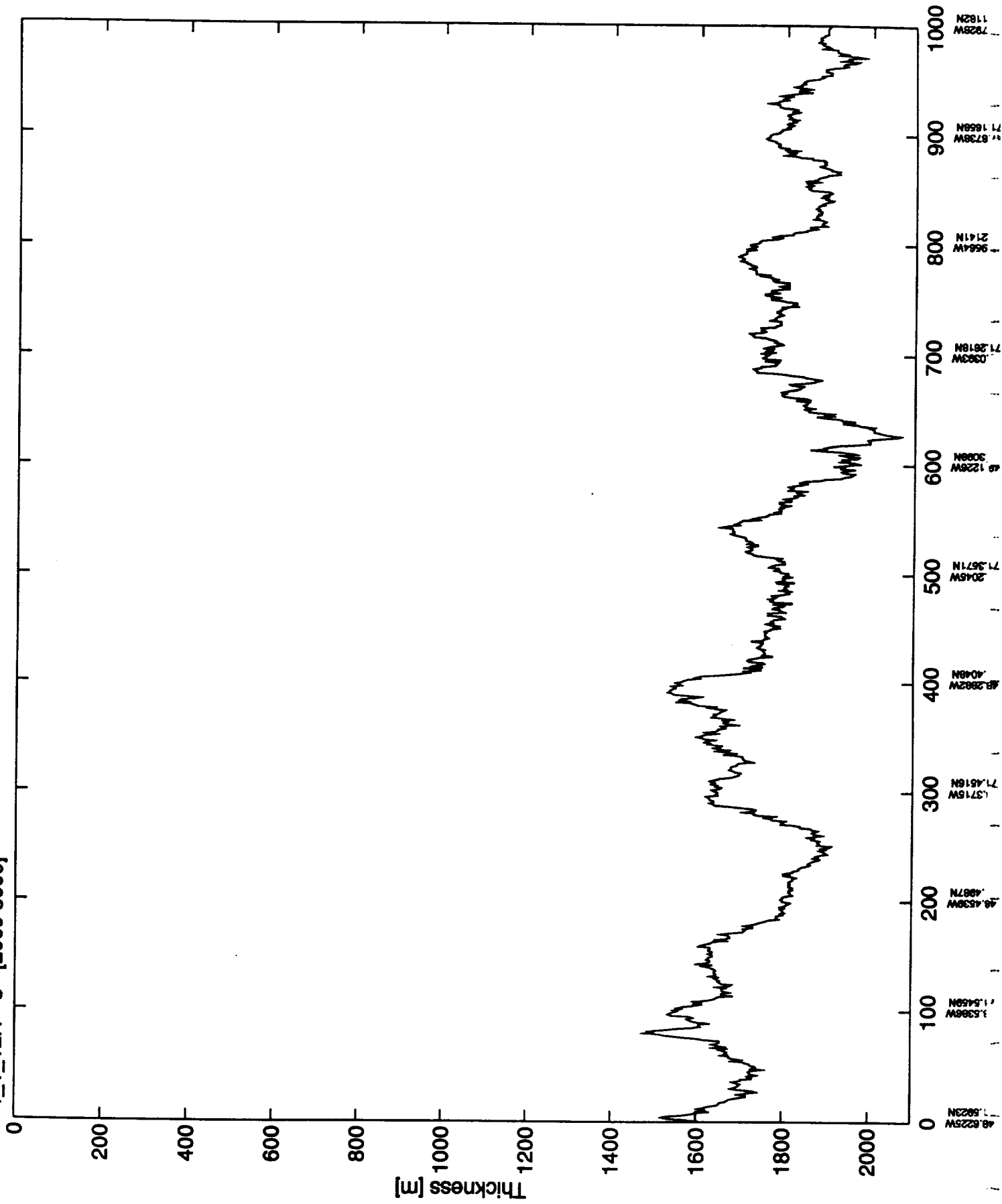


r_1_12.1 <3> [2000 3000]

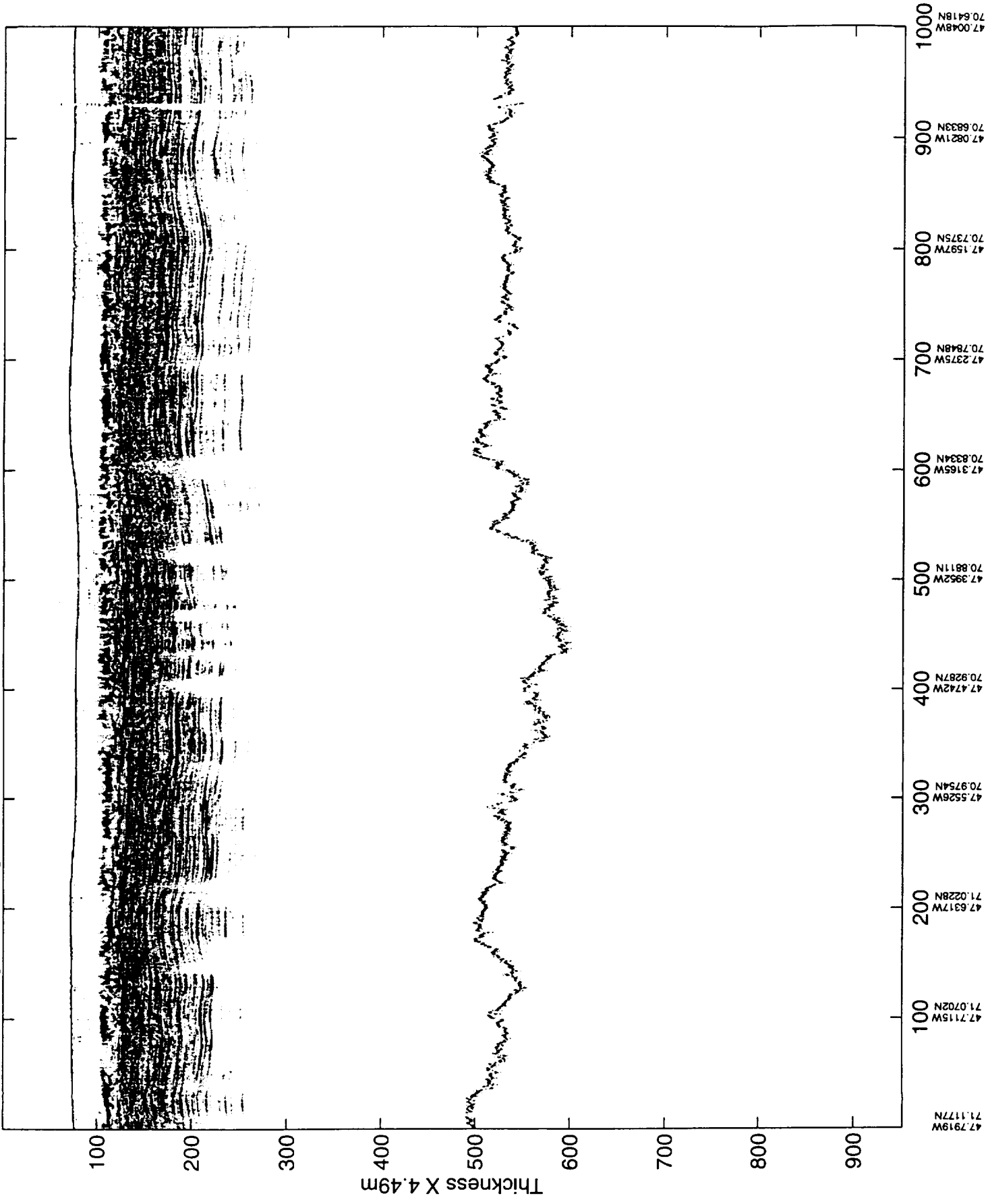


48.6225W 71.5922N
48.5388W 71.5459N
48.4539W 71.4977N
48.3715W 71.4518N
48.2882W 71.4048N
48.2045W 71.3571N
48.1226W 71.3088N
48.0393W 71.2618N
47.9564W 71.2141N
47.8738W 71.1658N
47.7928W 71.1182N

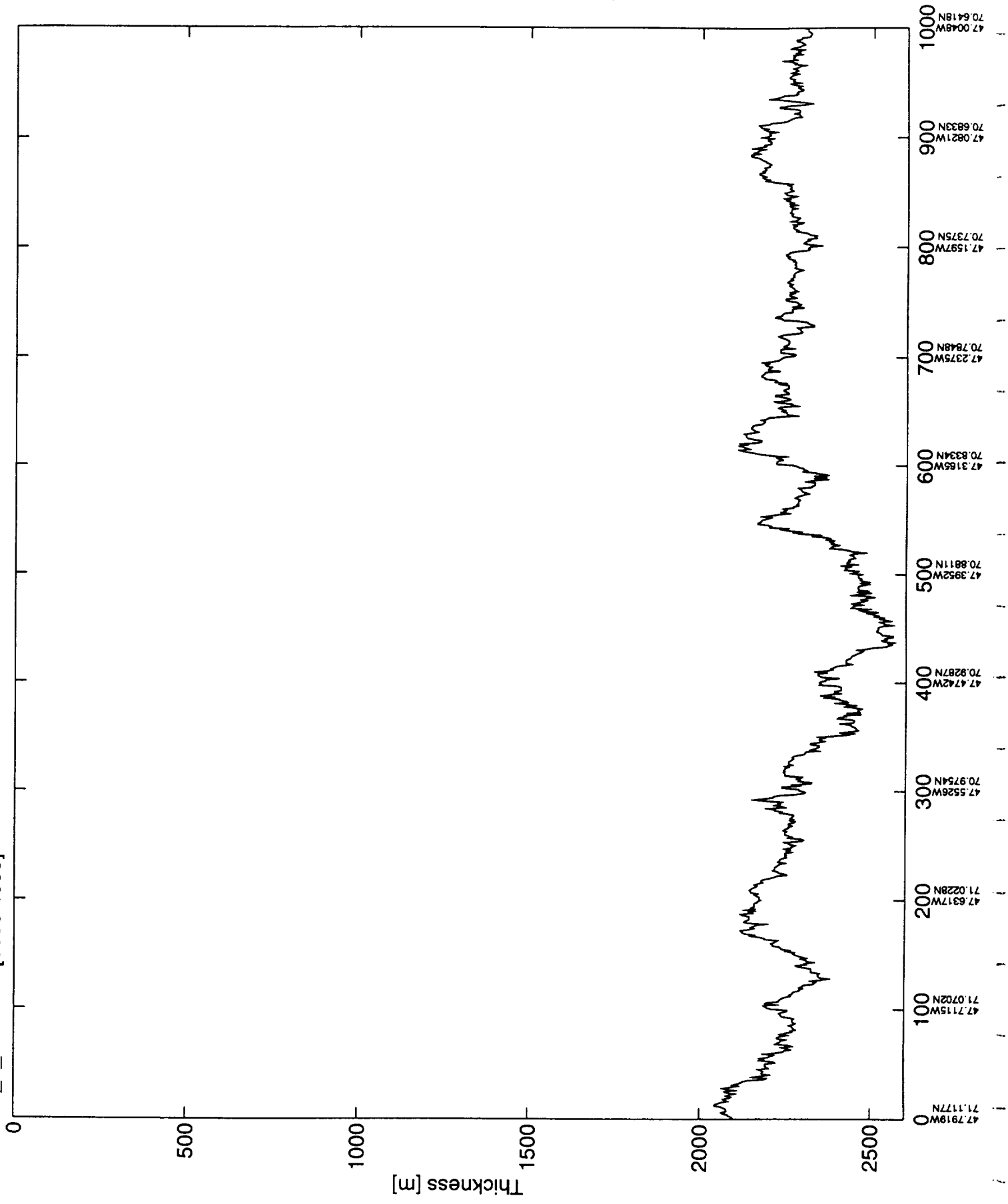
r_1_12.1 <3> [2000 3000]



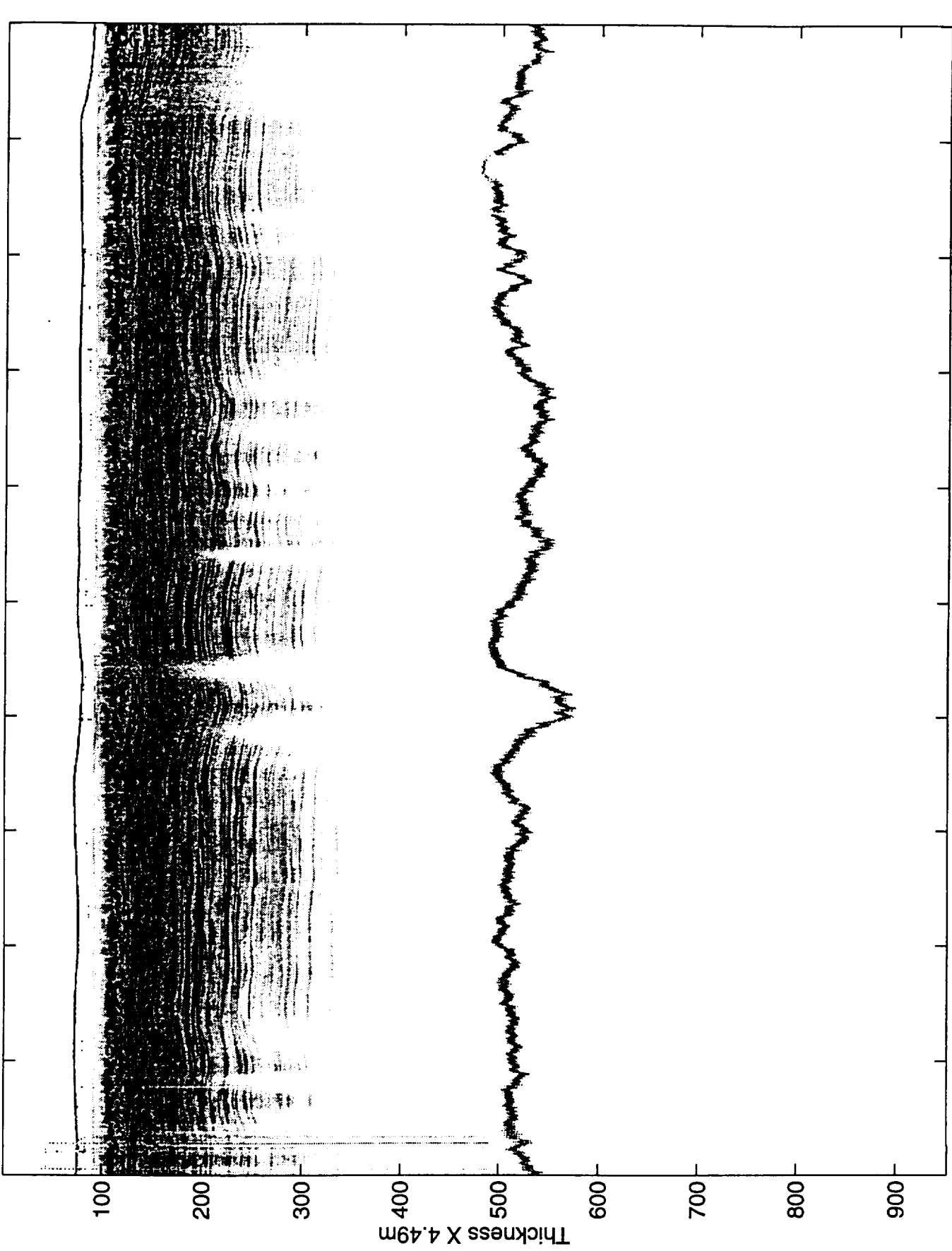
r_1_12.1 <4> [3000 4000]



r_1_12.1 <4> [3000 4000]

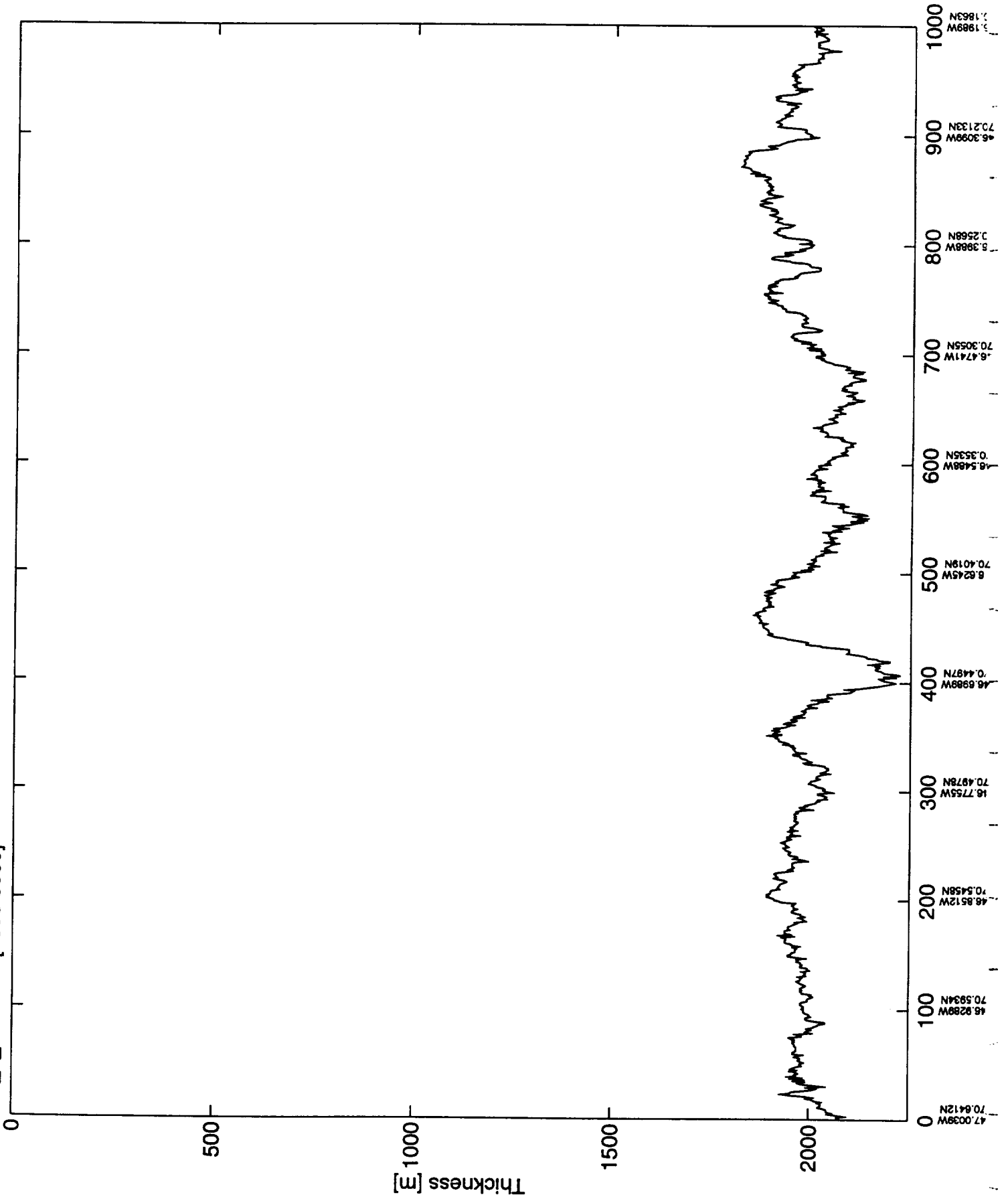


r_1_12.1 <5> [4000 5000]

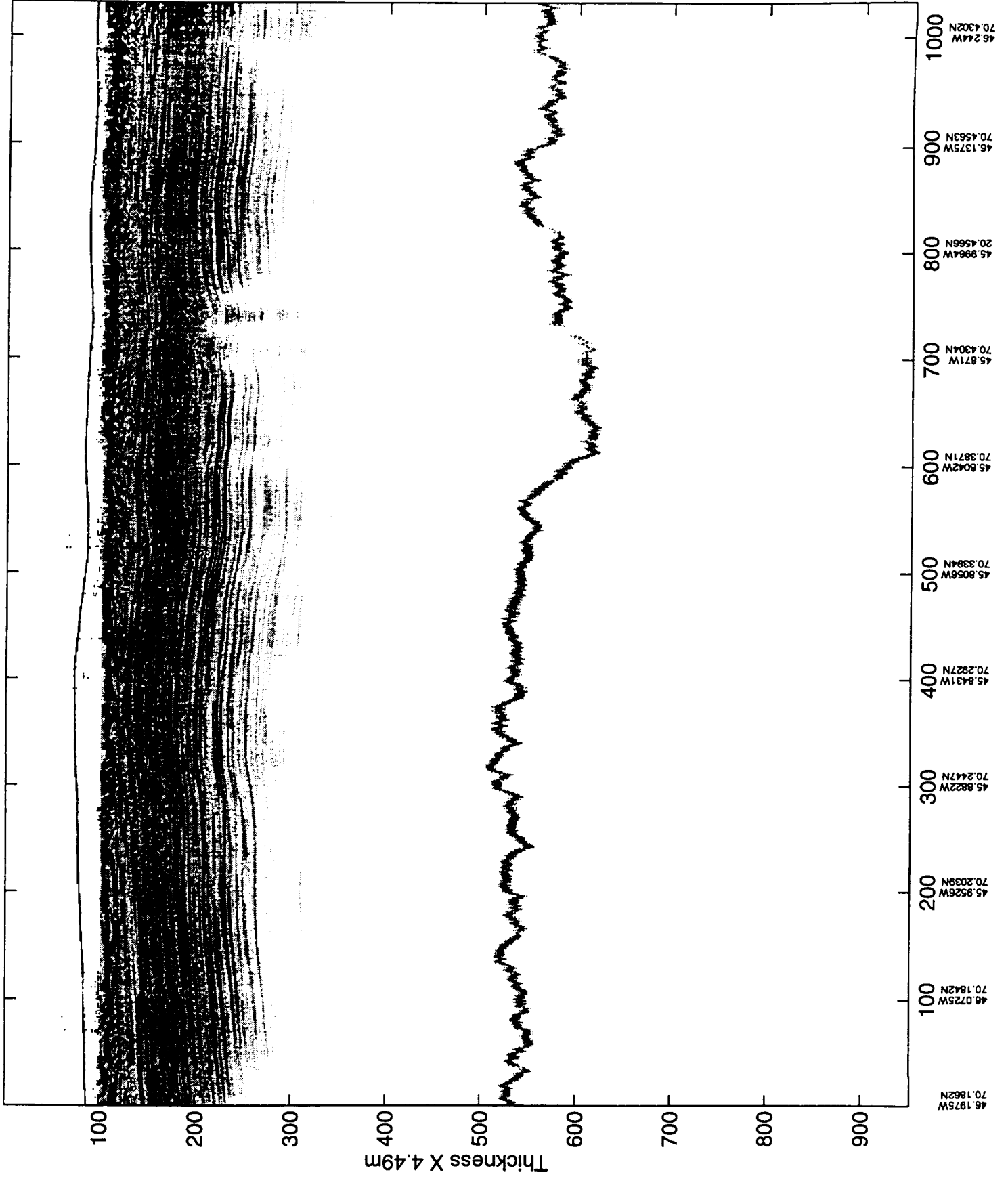


47.0039W
70.6412N
46.9289W
70.5934N
46.8512W
70.5458N
46.7755W
70.4978N
46.6989W
70.4497N
46.6245W
70.4019N
46.5488W
70.3535N
46.4741W
70.3055N
46.3968W
70.2568N
46.3099W
70.2133N
46.1989W
70.1863N

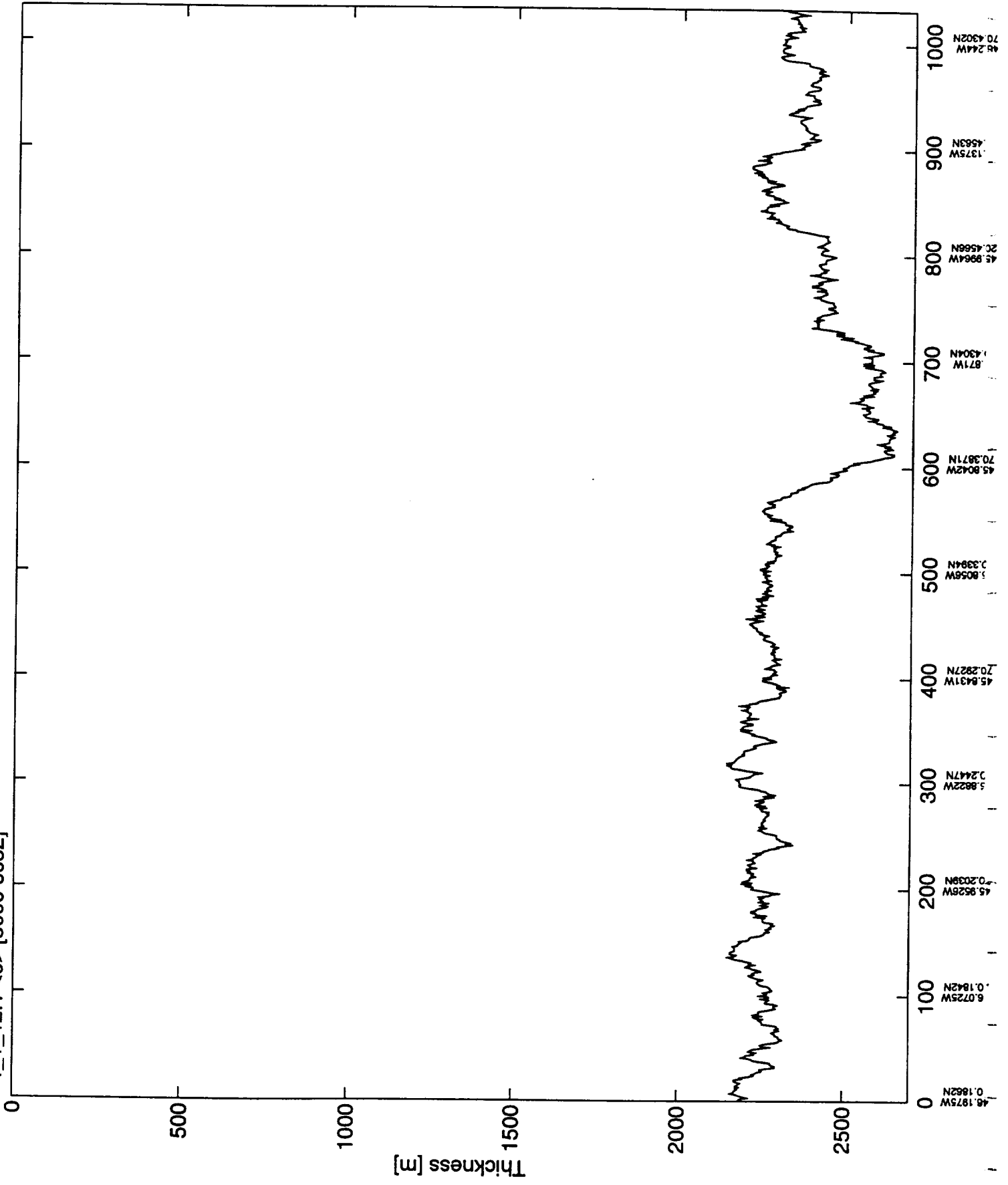
r_1_12.1 <5> [4000 5000]



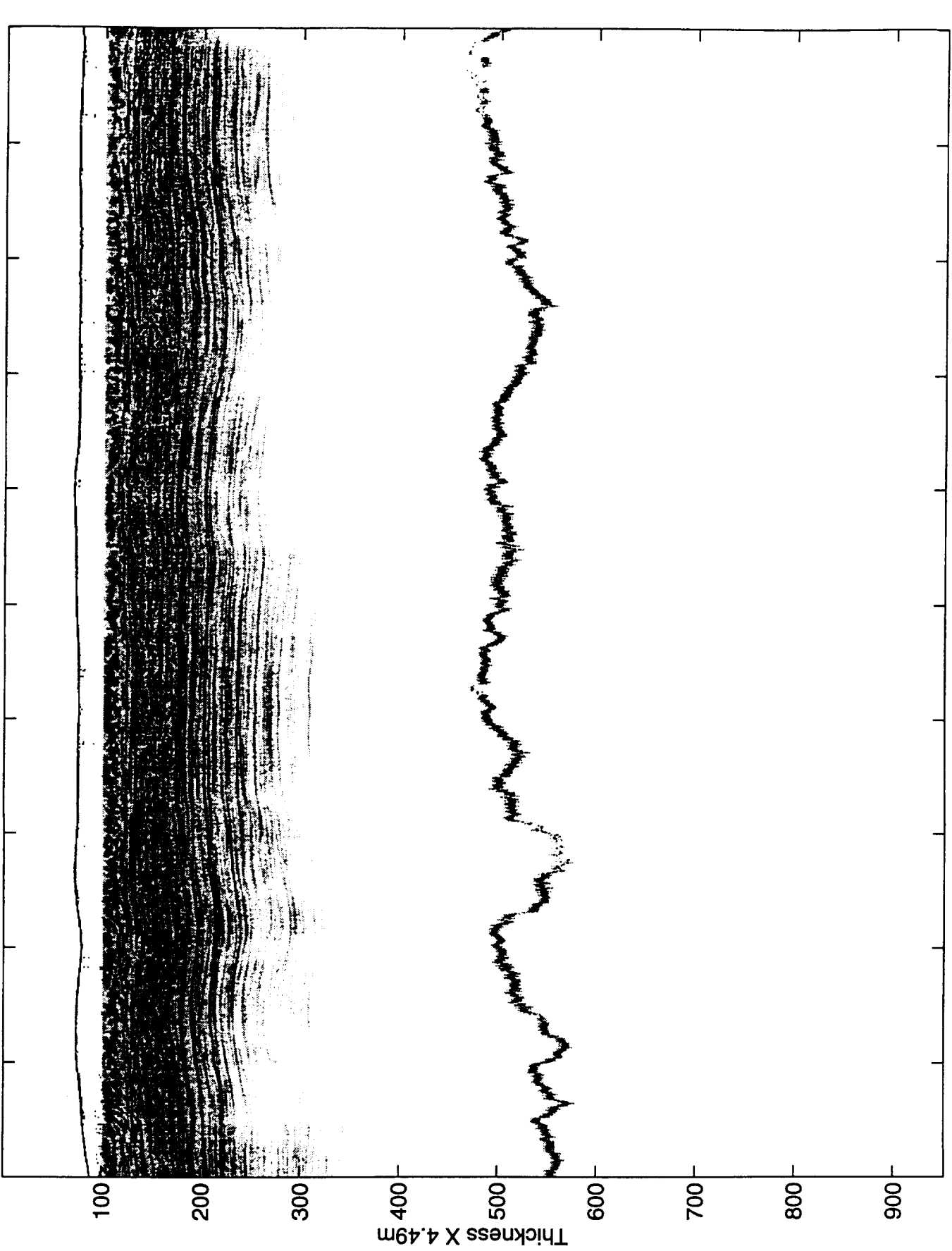
r_1_12.1 <6> [5000 6032]



r_1_12.1 <6> [5000 6032]

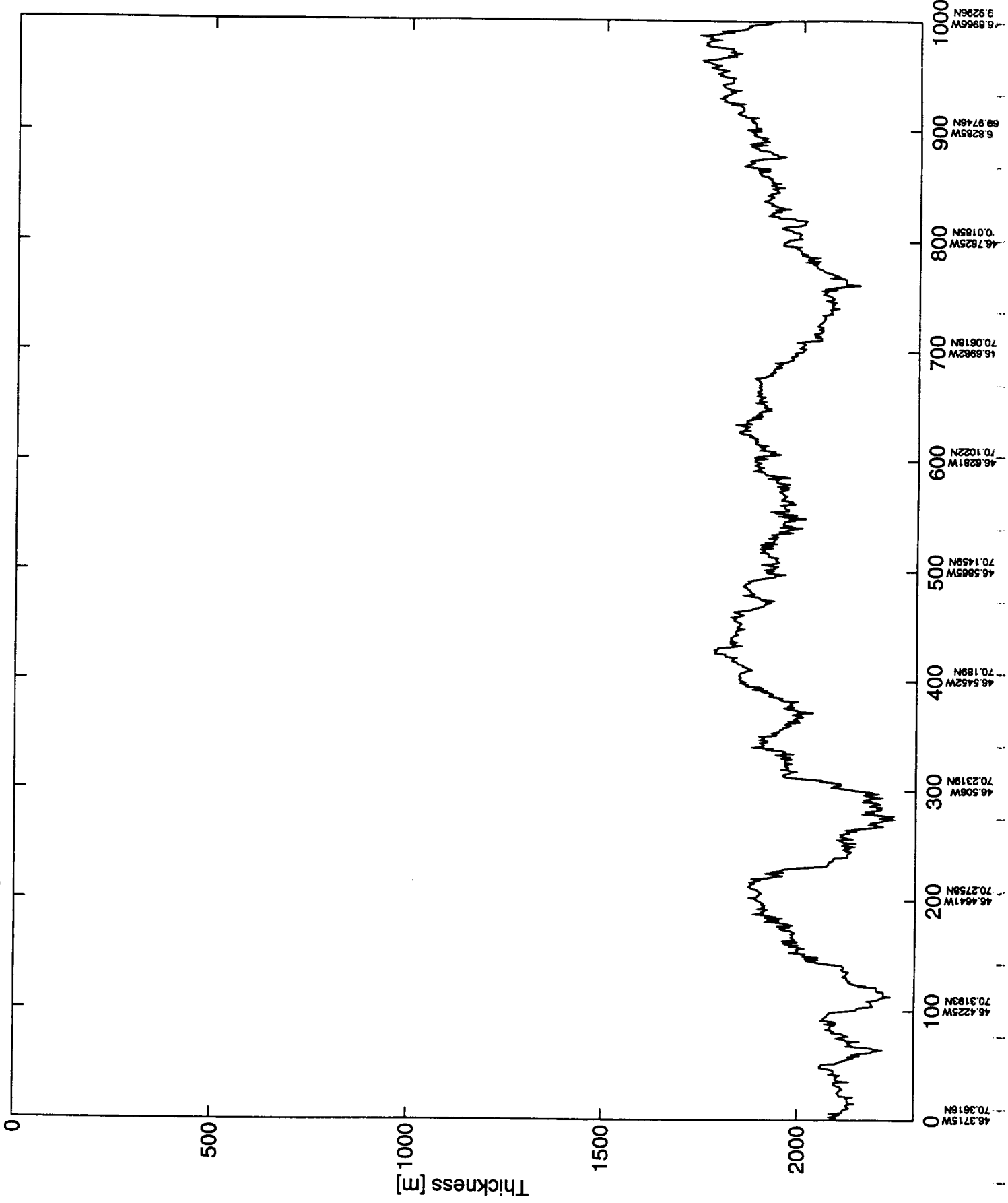


r_1_13.1 <1> [0 1000]



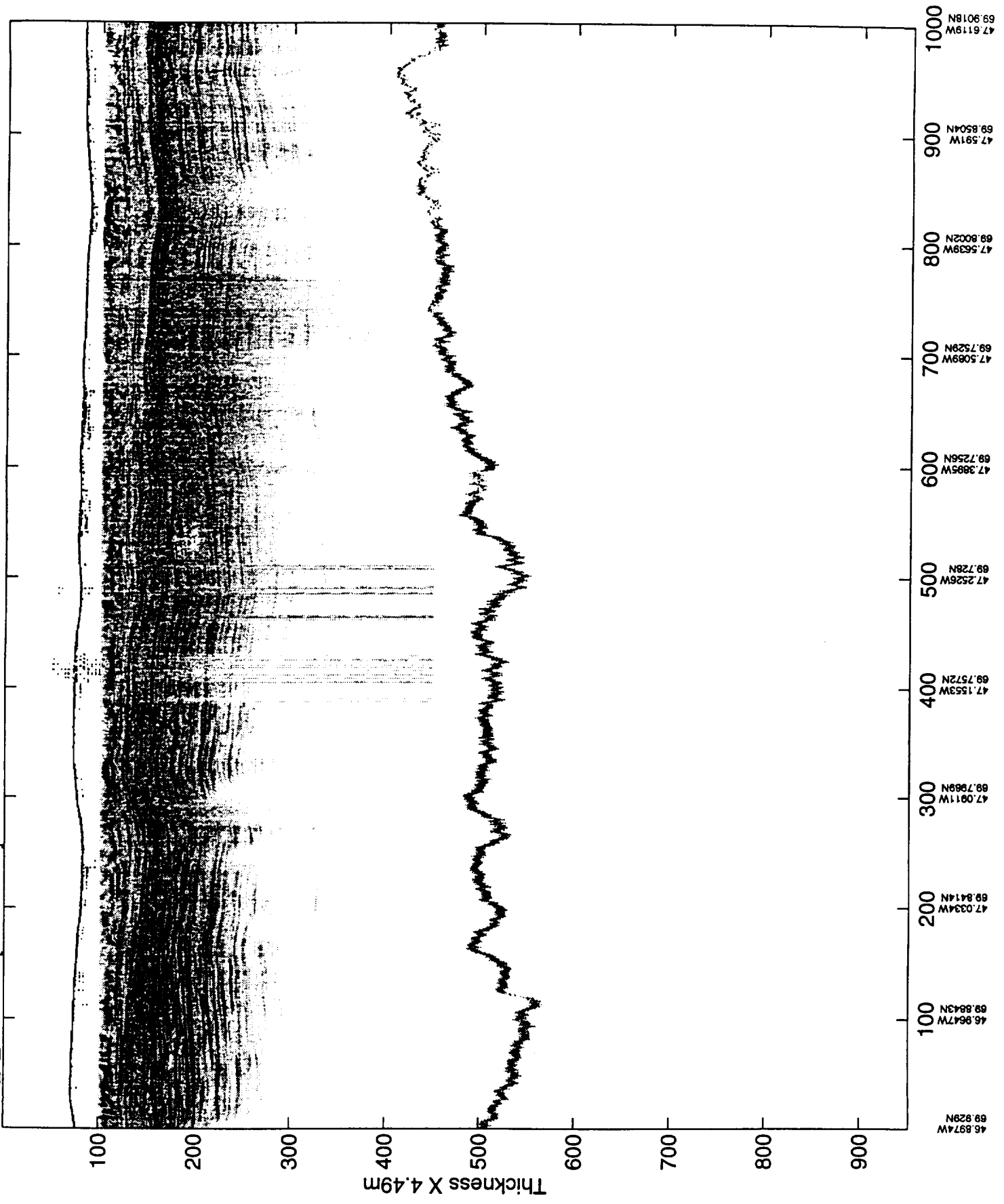
46.3715W 70.3616N
46.4225W 70.3193N
46.4641W 70.2758N
46.506W 70.2319N
46.5452W 70.189N
46.5865W 70.1459N
46.6281W 70.1022N
46.6692W 70.0618N
46.725W 70.0185N
46.8285W 69.9746N
46.8966W 69.9296N

r_1_13.1 <1> [0 1000]

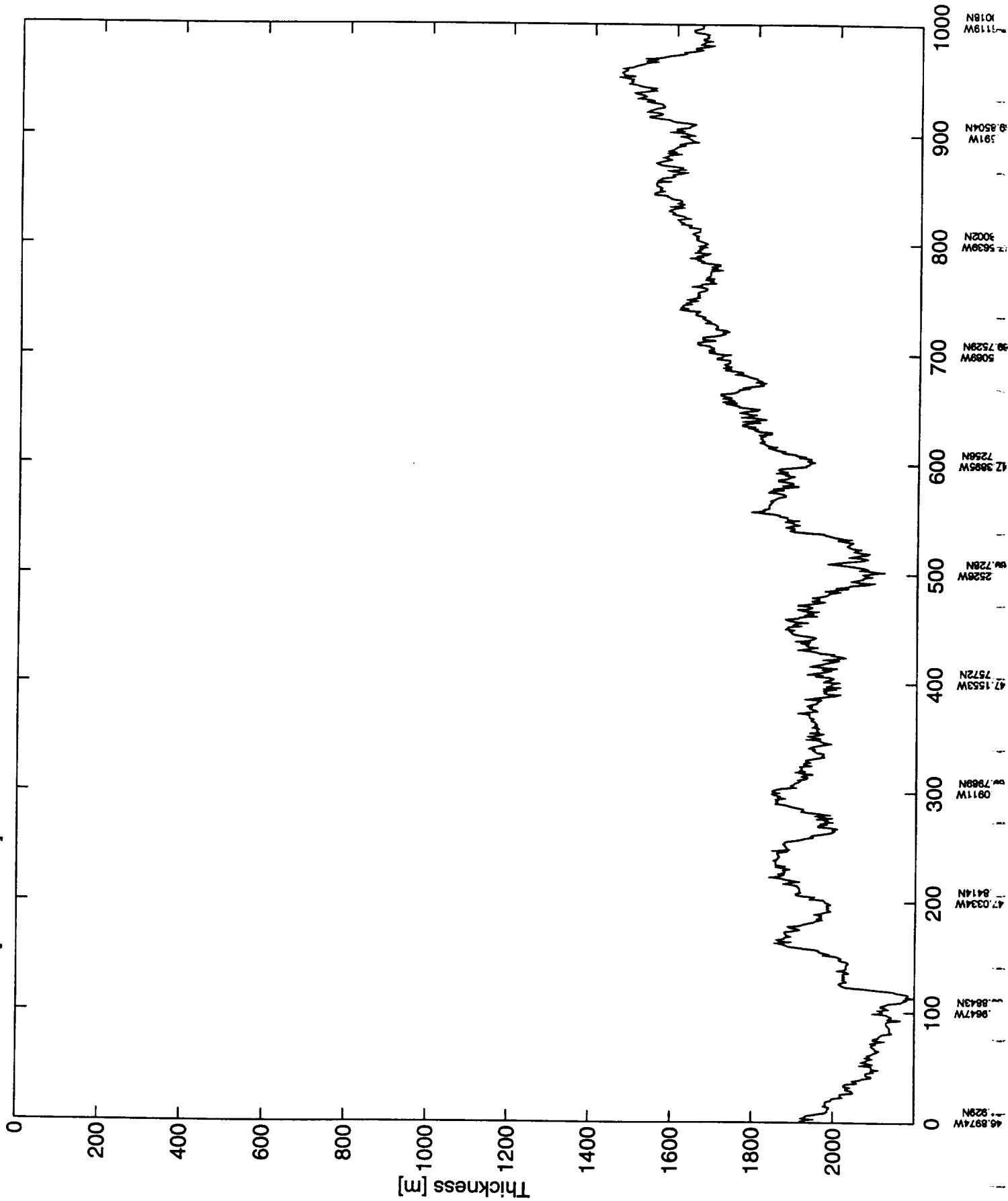


48.3715W
70.3183N
48.4225W
70.3183N
48.4641W
70.2758N
48.5056W
70.2318N
48.5452W
70.189N
48.5855W
70.1459N
48.6281W
70.1022N
48.6862W
70.0618N
48.7625W
0.0185N
68.8285W
68.9748N
68.9965W
9.9295N

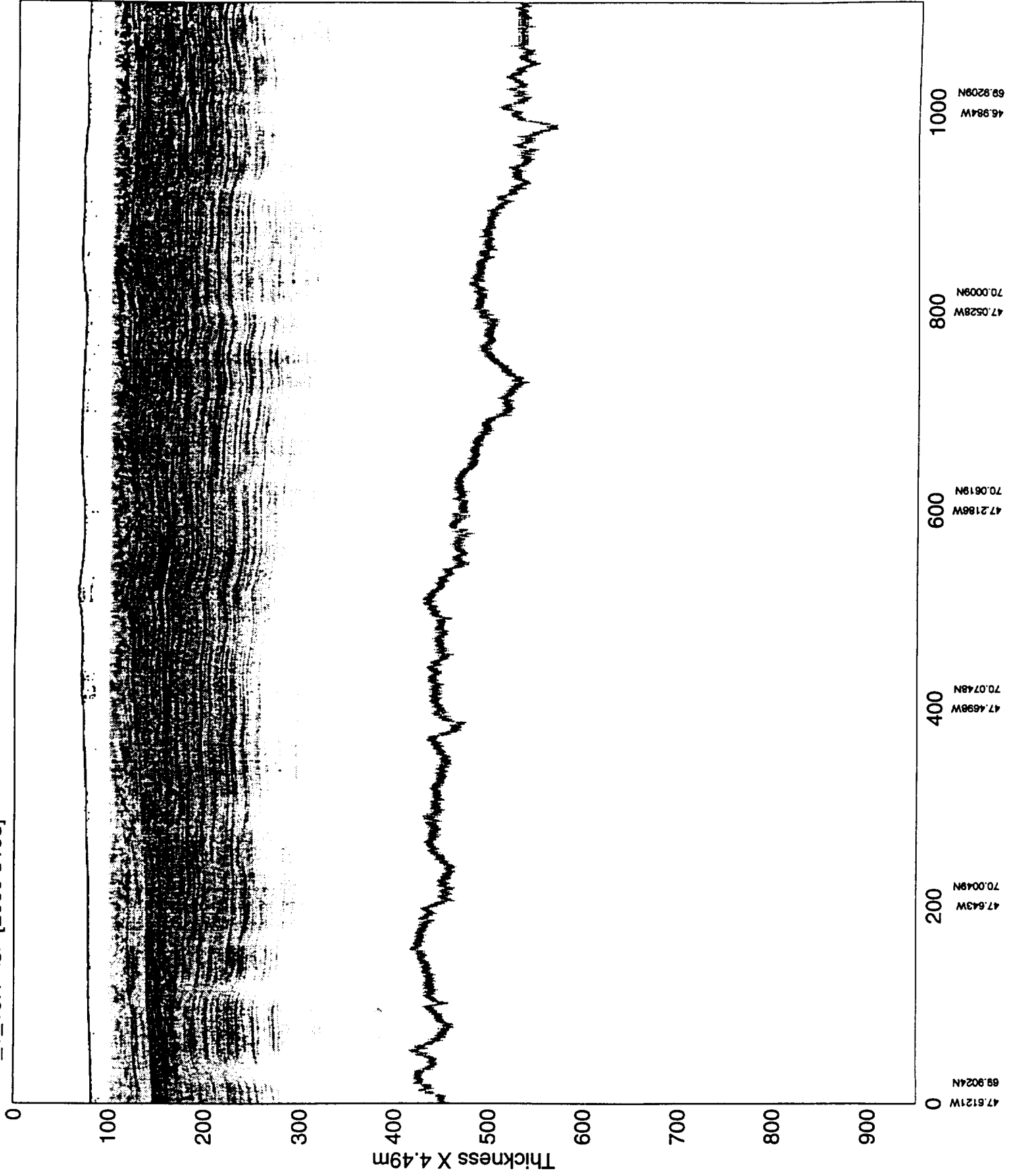
r_1_13.1 <2> [1000 2000]



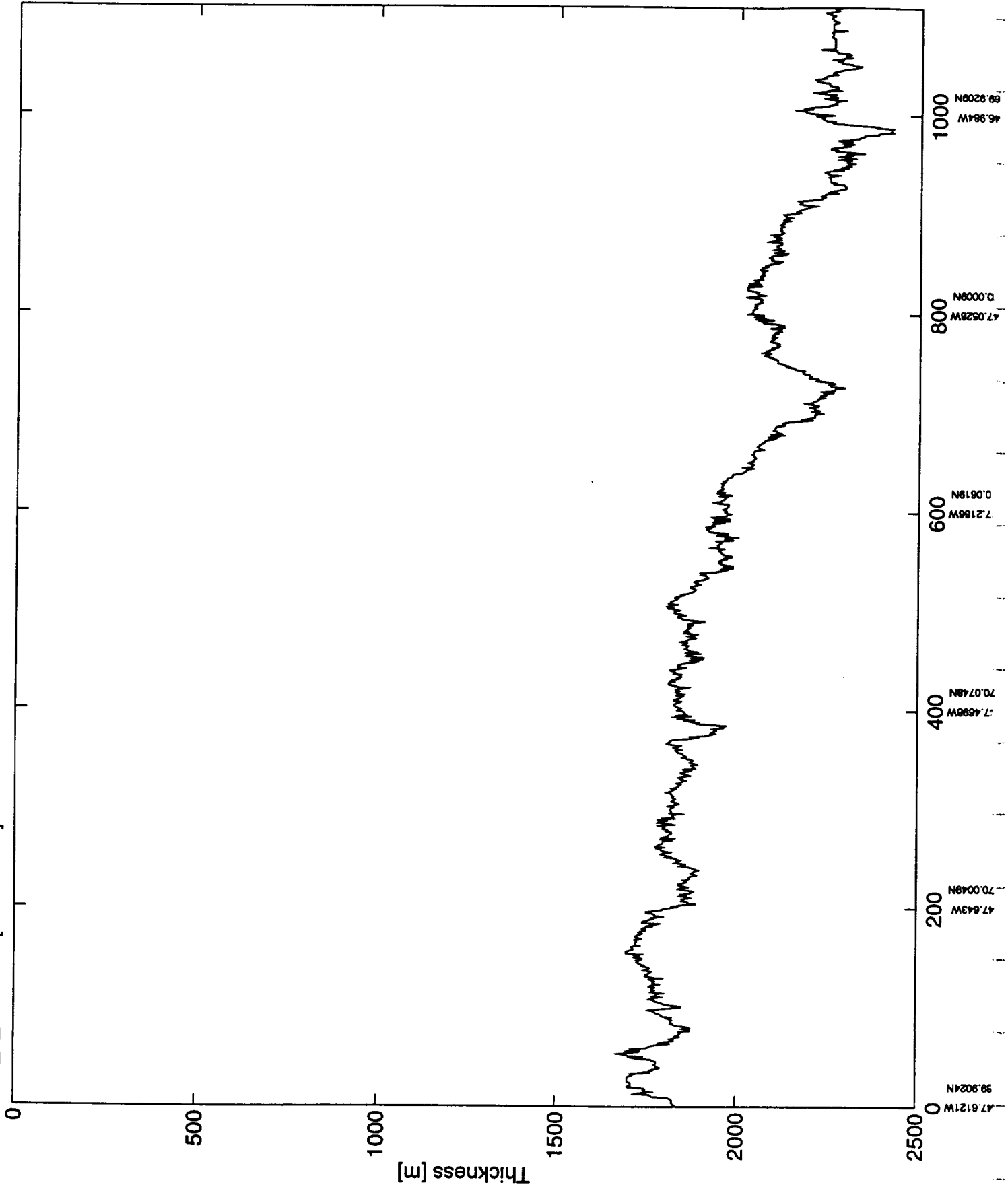
r_1_13.1 <2> [1000 2000]



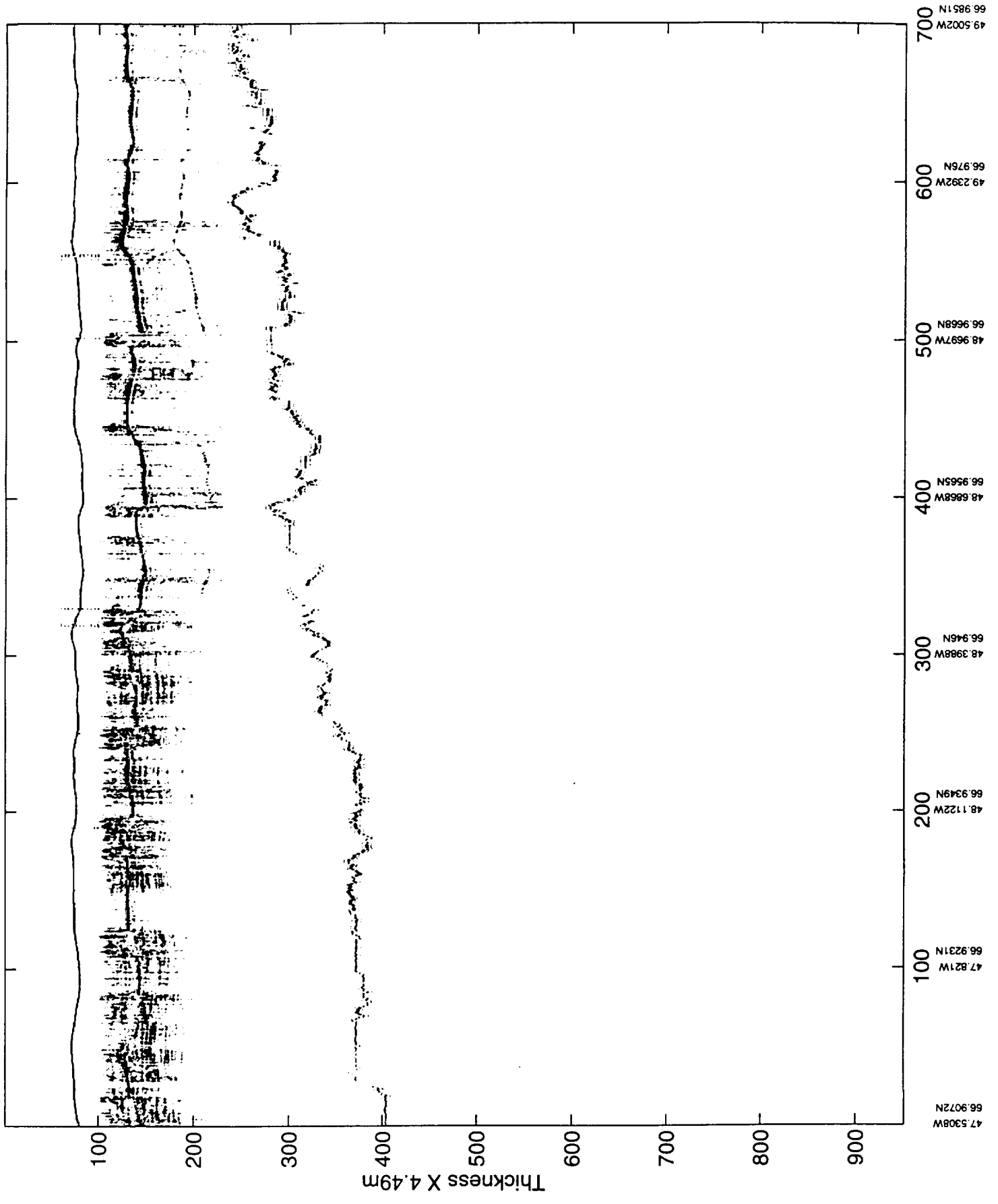
r_1_13.1 <3> [2000 3108]



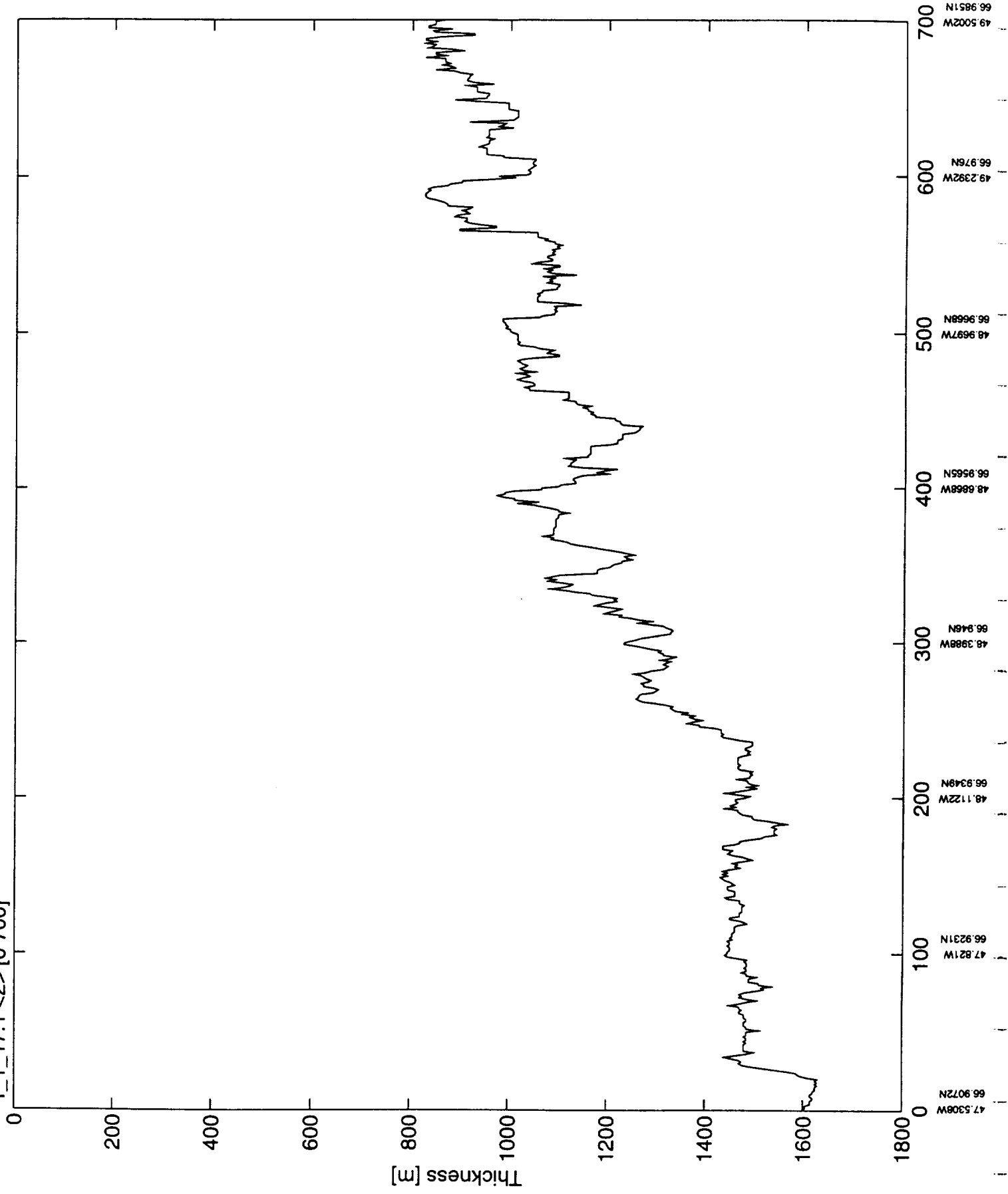
r_1_13.1 <3> [2000 3108]



17/10/2000

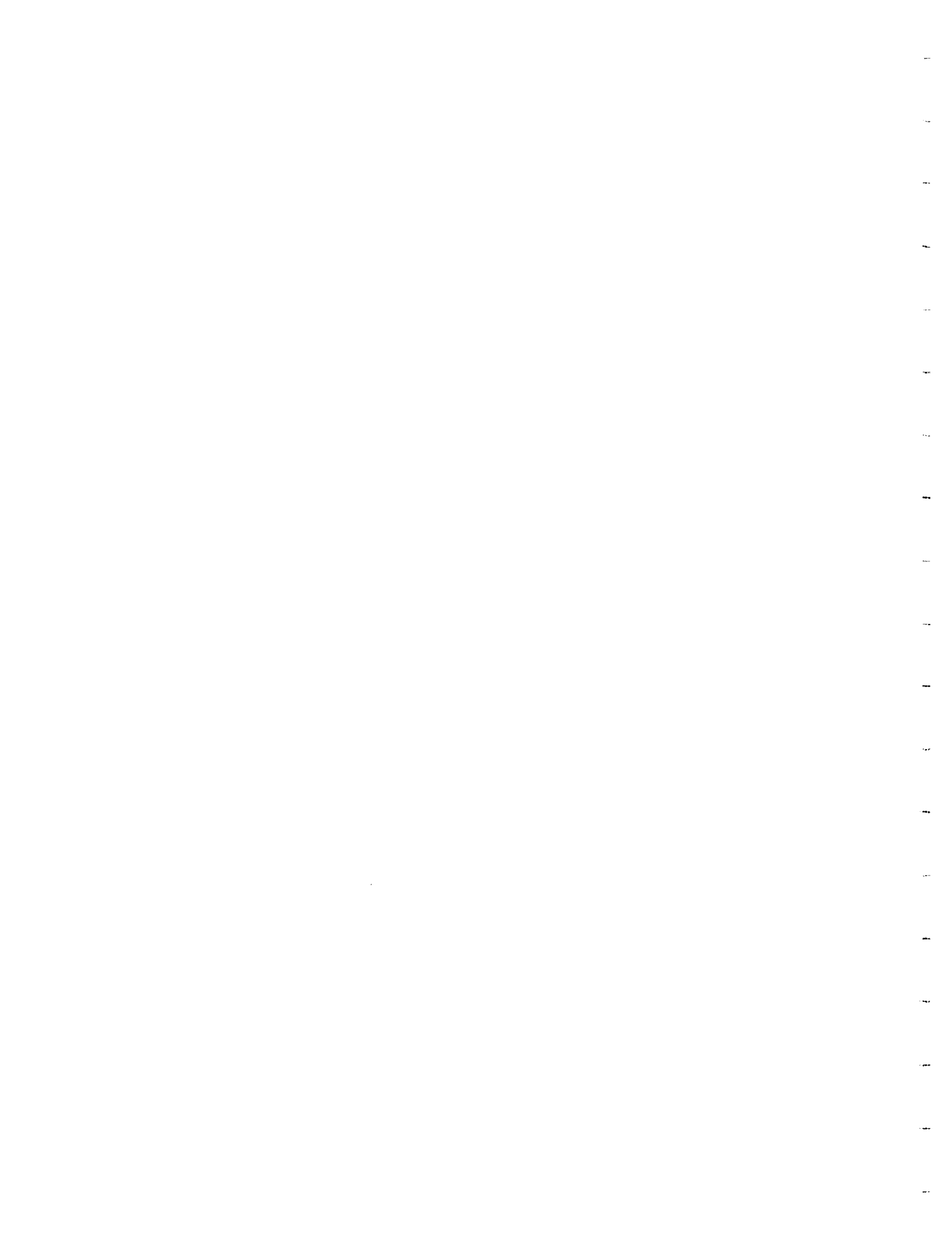


r_1_17.1 <2> [0 700]

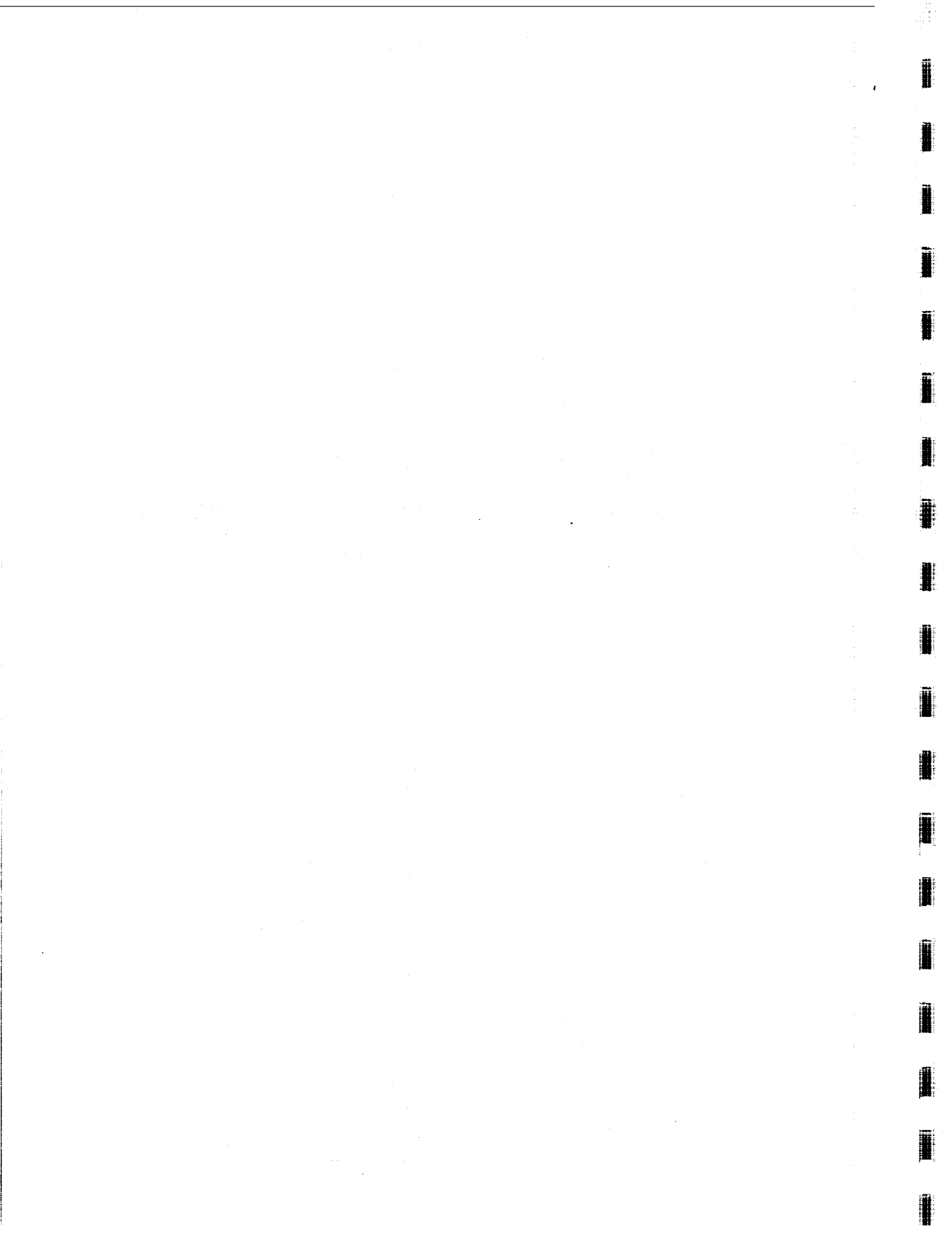


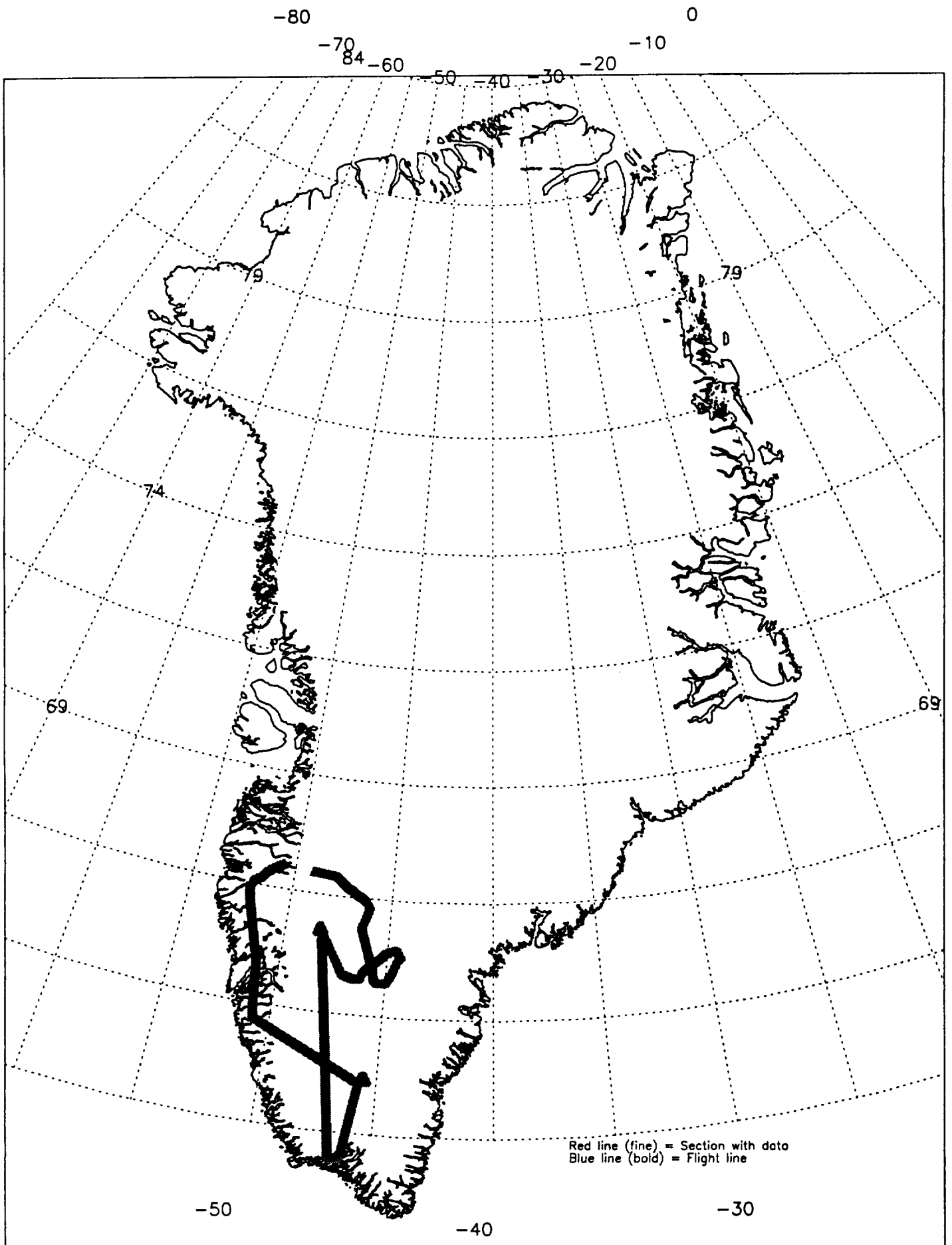
Appendix D

June 28, 1993

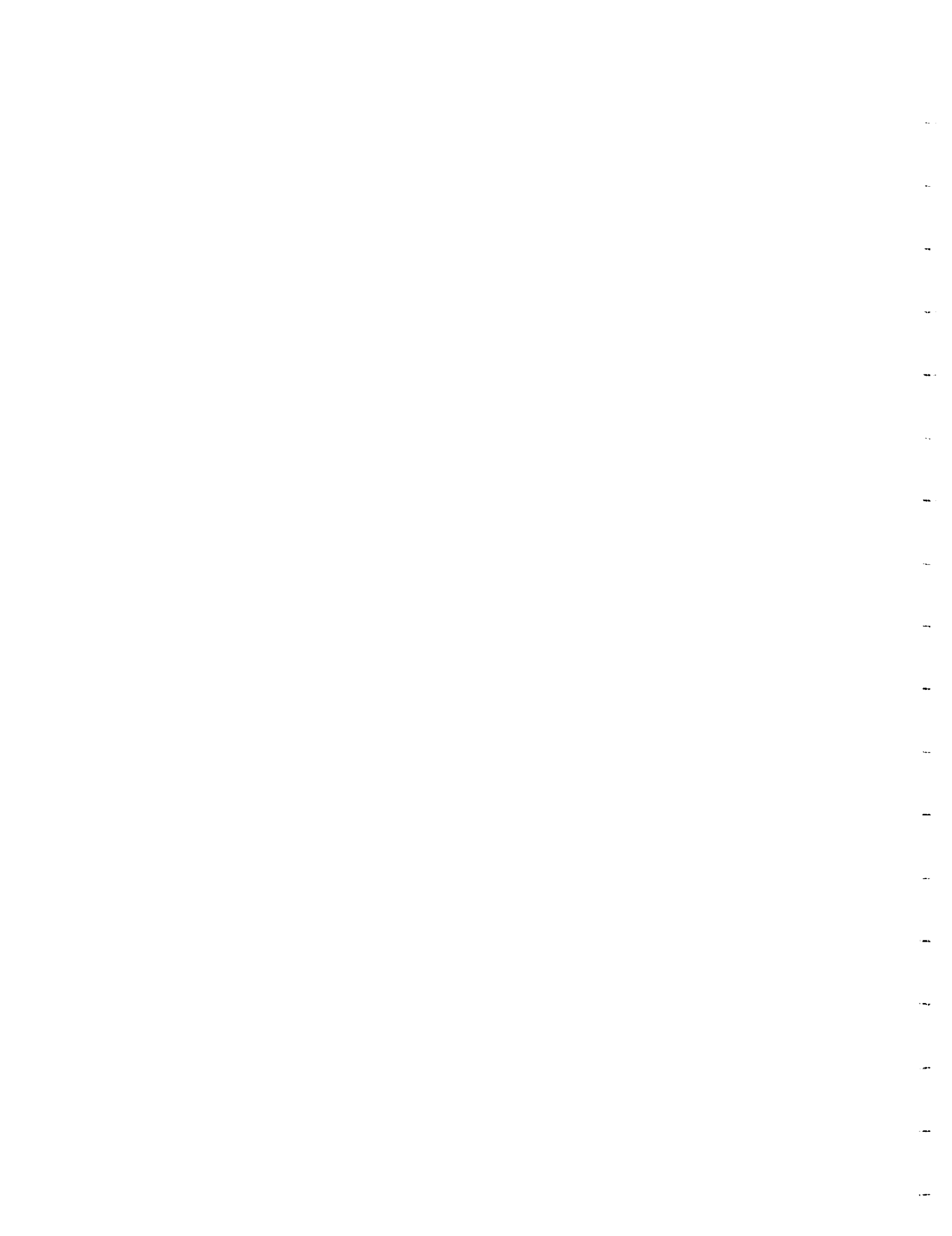




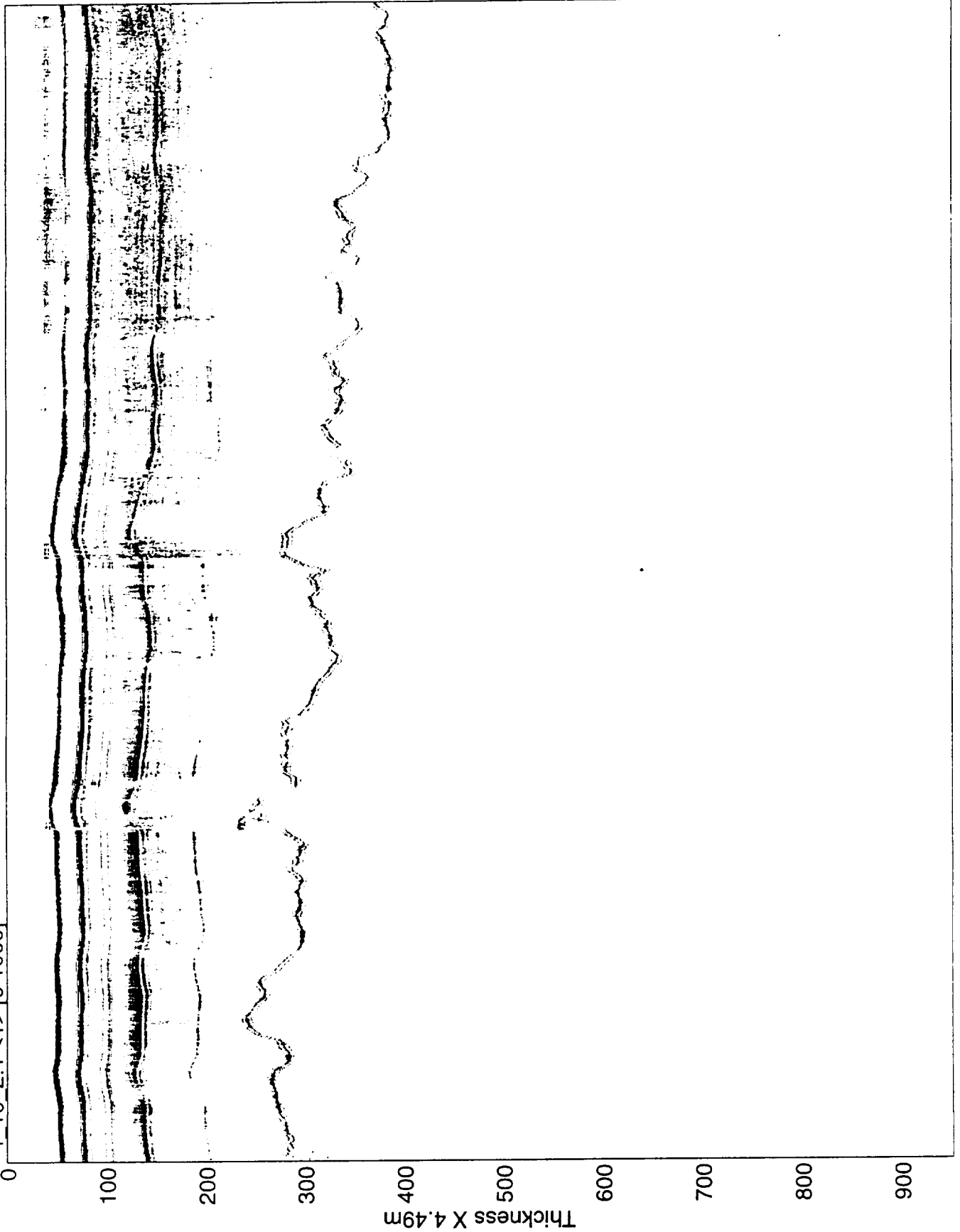




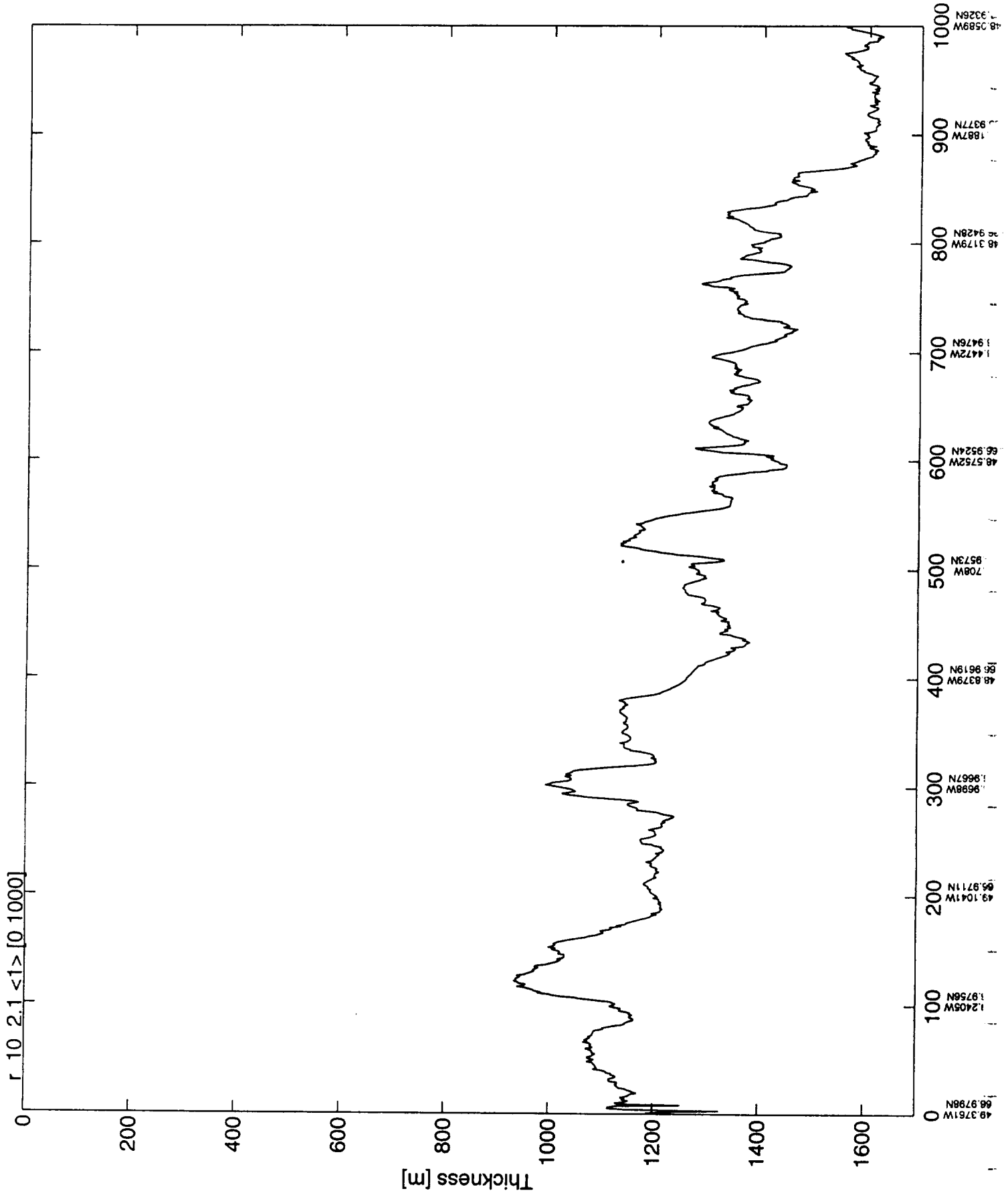
June 28, 1993 (r_10)



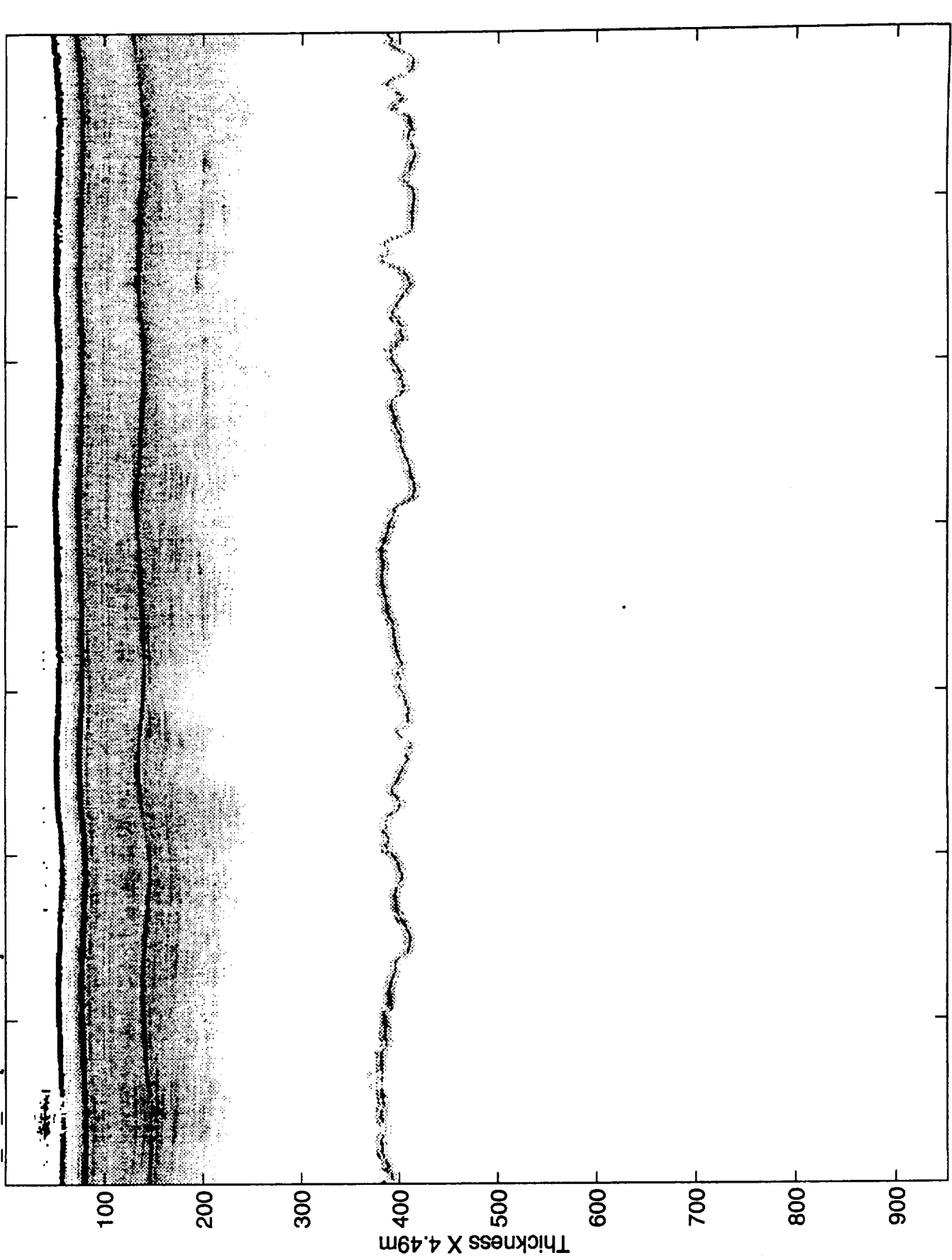
r 10 2.1 <1> [0 1000]



49.3761W
66.9798N
0
100
49.2405W
66.9756N
200
49.1041W
66.9711N
300
48.9688W
66.9667N
400
48.8379W
66.9619N
500
48.708W
66.9573N
600
48.572W
66.9524N
700
48.442W
66.9476N
800
48.3179W
66.9428N
900
48.1887W
66.9377N
1000
66.9326N
48.0589W

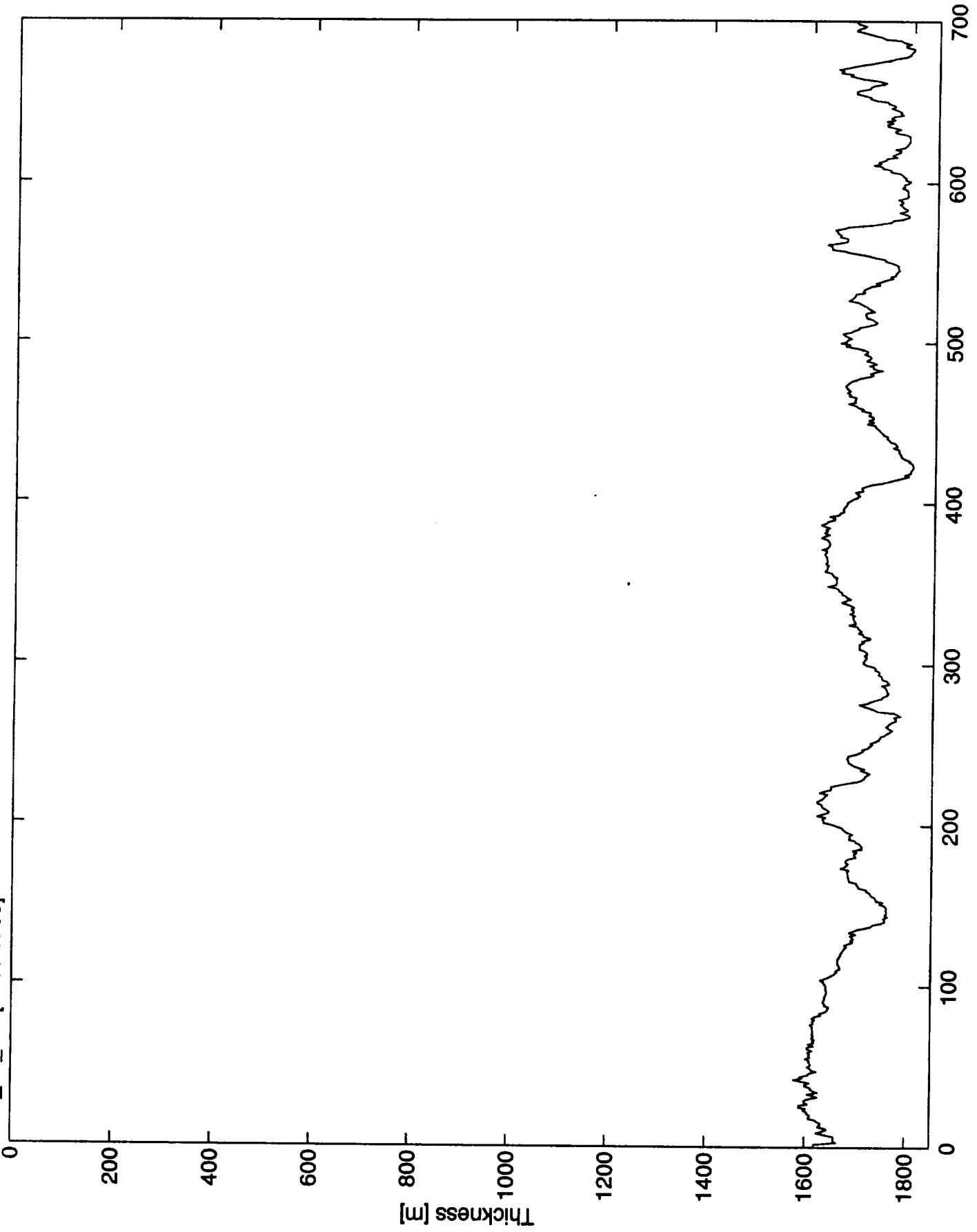


r_10_2:1 [1000 1700]

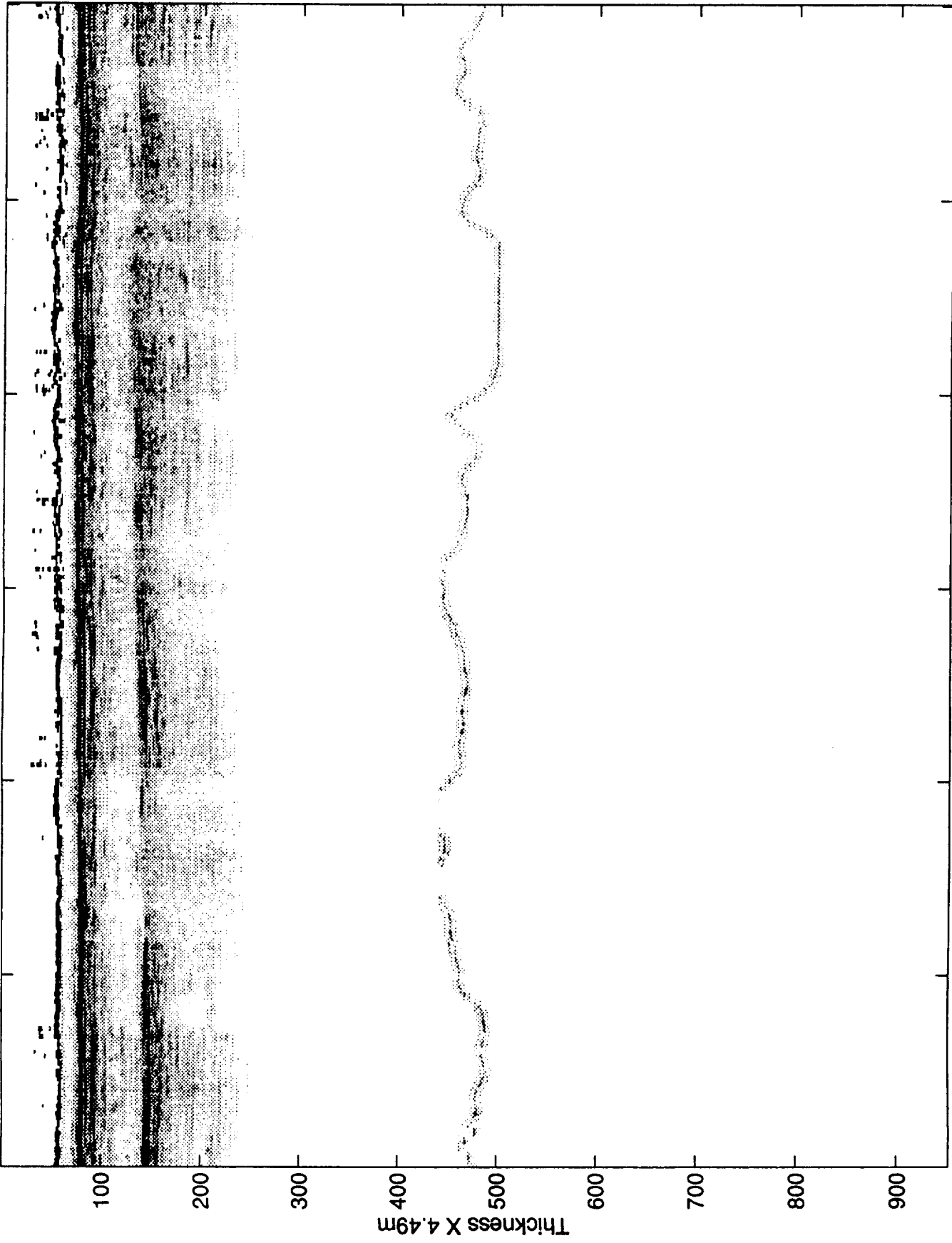


48.05N
66.93N
47.9199W
66.9267N
32.7871W
66.915N
47.672W
66.8868N
47.5696W
66.8517N
47.4689W
66.816N
47.338W
66.7787N
47.2729W
66.7432N

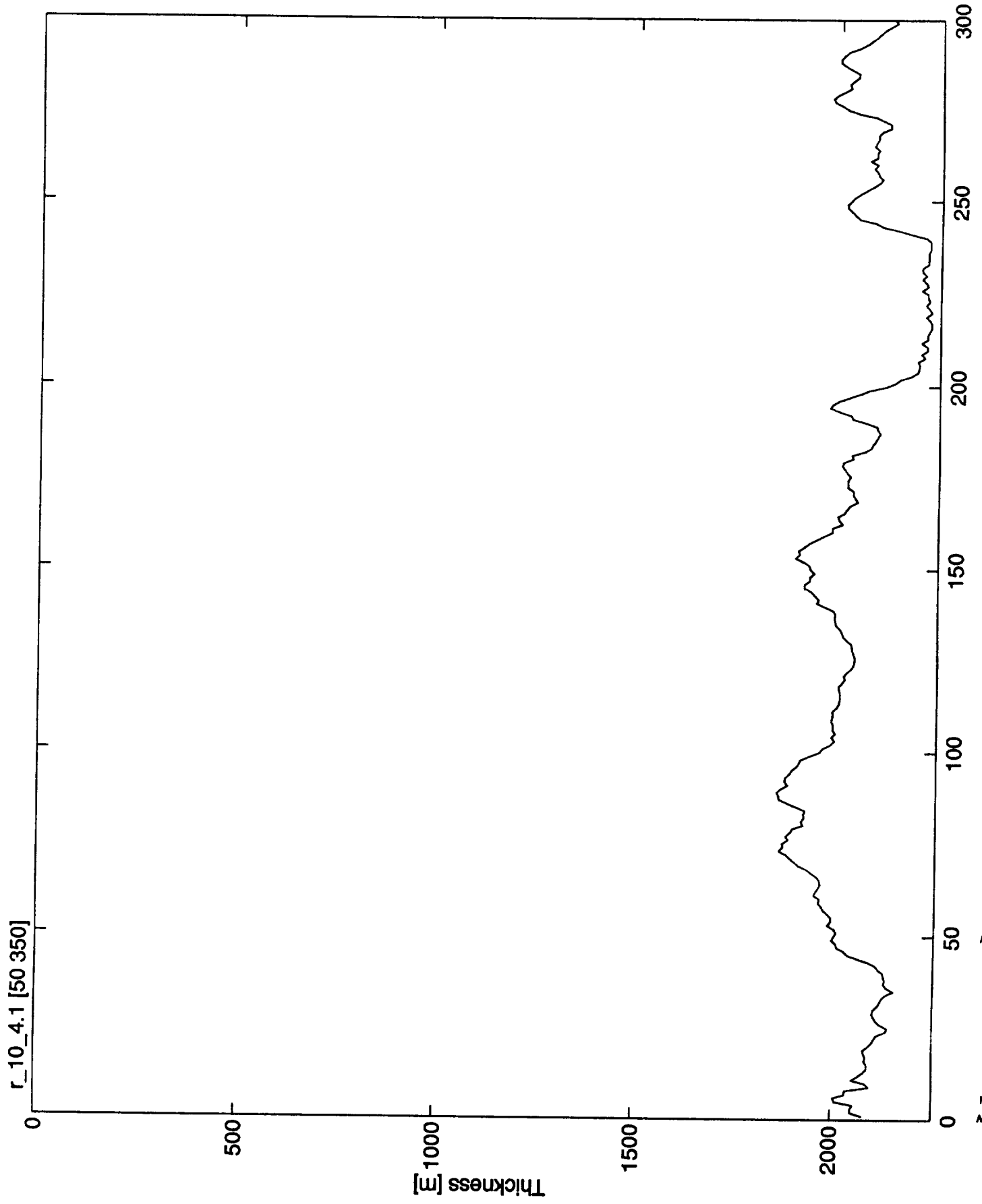
r_10_2.1 [1000 1700]



r_10_4.1 [50 350]

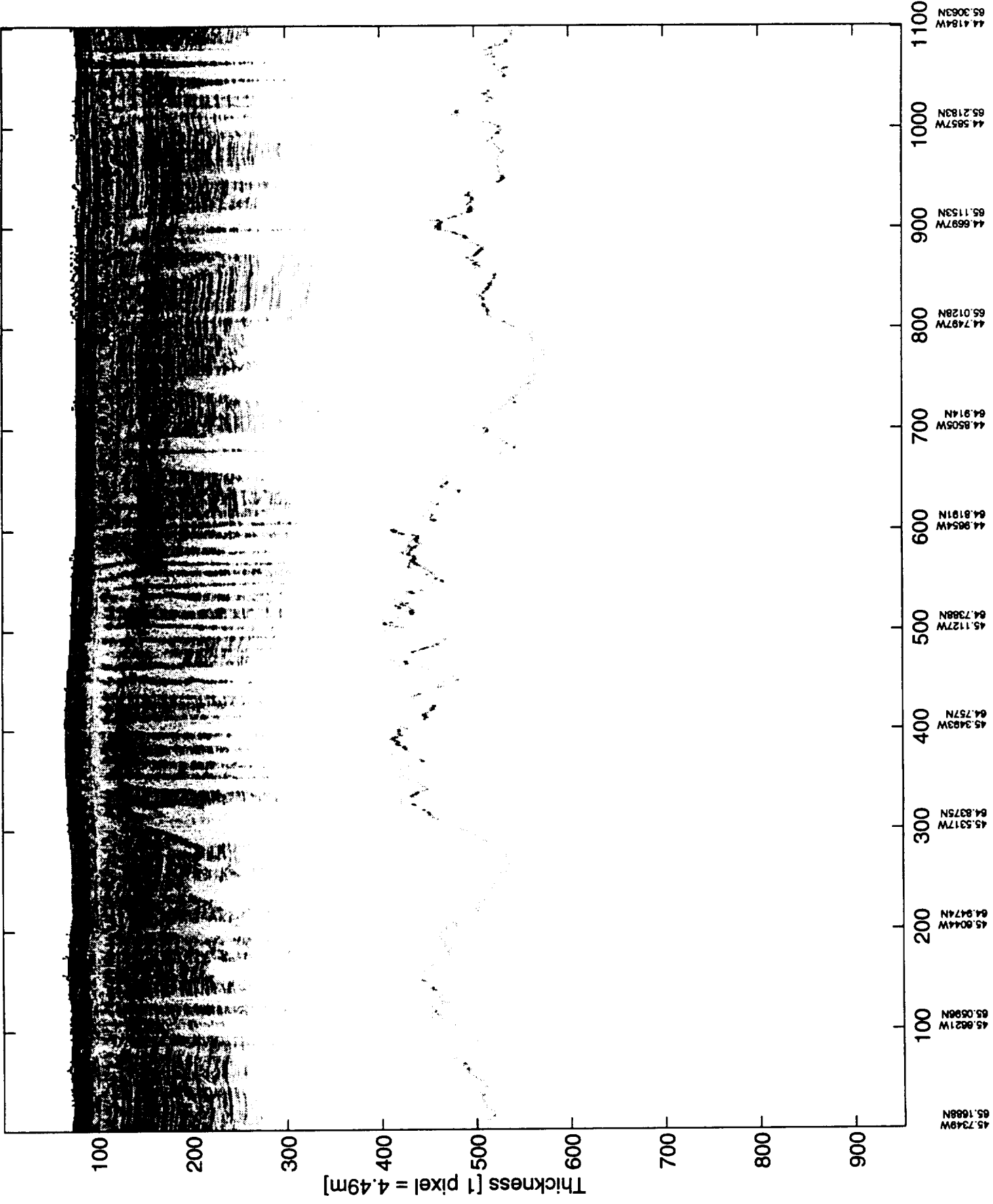


46.2803W 66.0722N
46.3328W 66.0226N
46.3673W 65.9686N
46.335W 55.9141N
46.2981W 55.8608N
5.2567W 5.9073N
5.213W 5.7563N

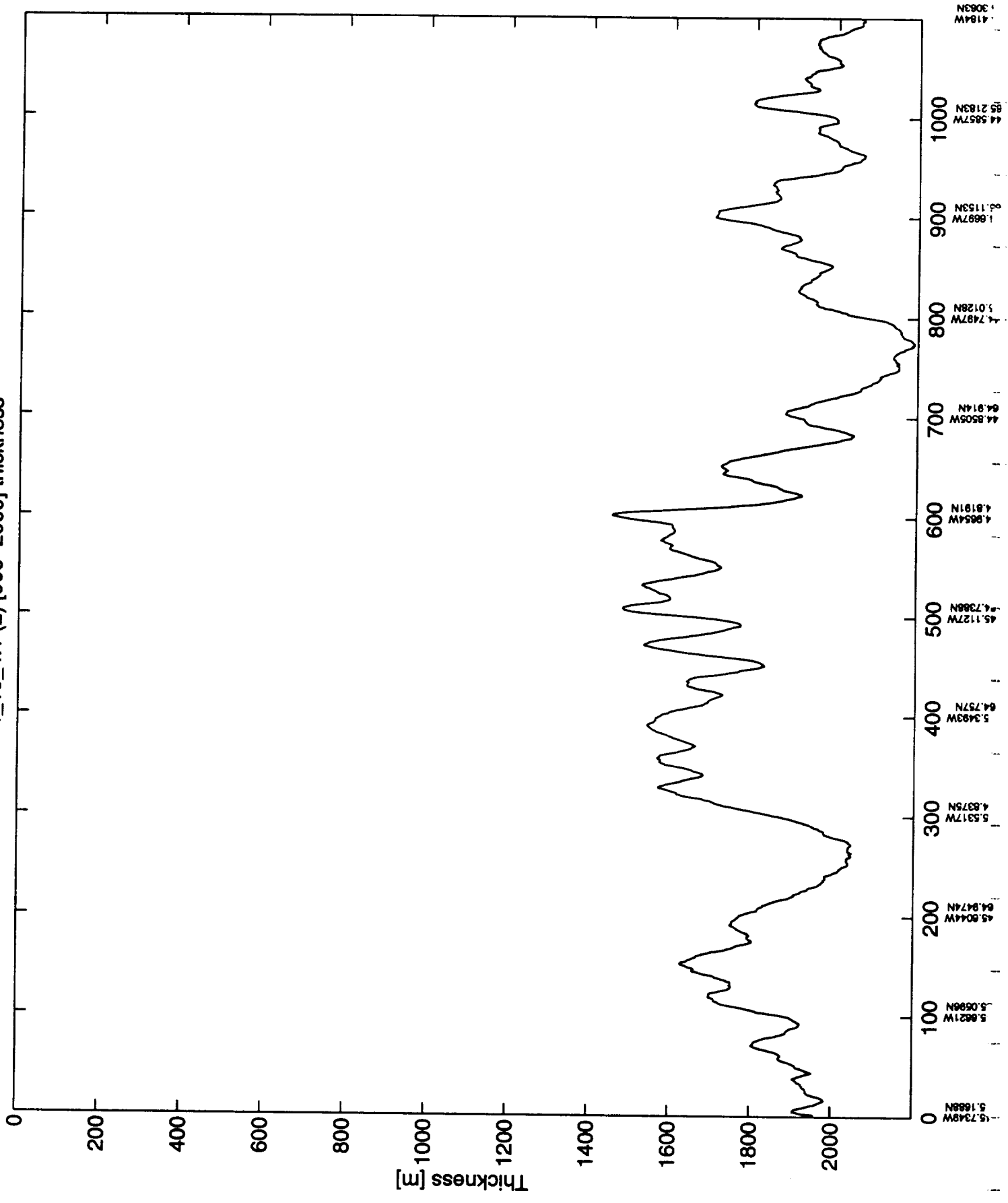


44.293W 66.22N
48.38W 66.0226N
48.3673W 66.16N
48.3141N 66.141N
46.281W 66.18N
46.17W 66.1973N
62.74W 66.23N

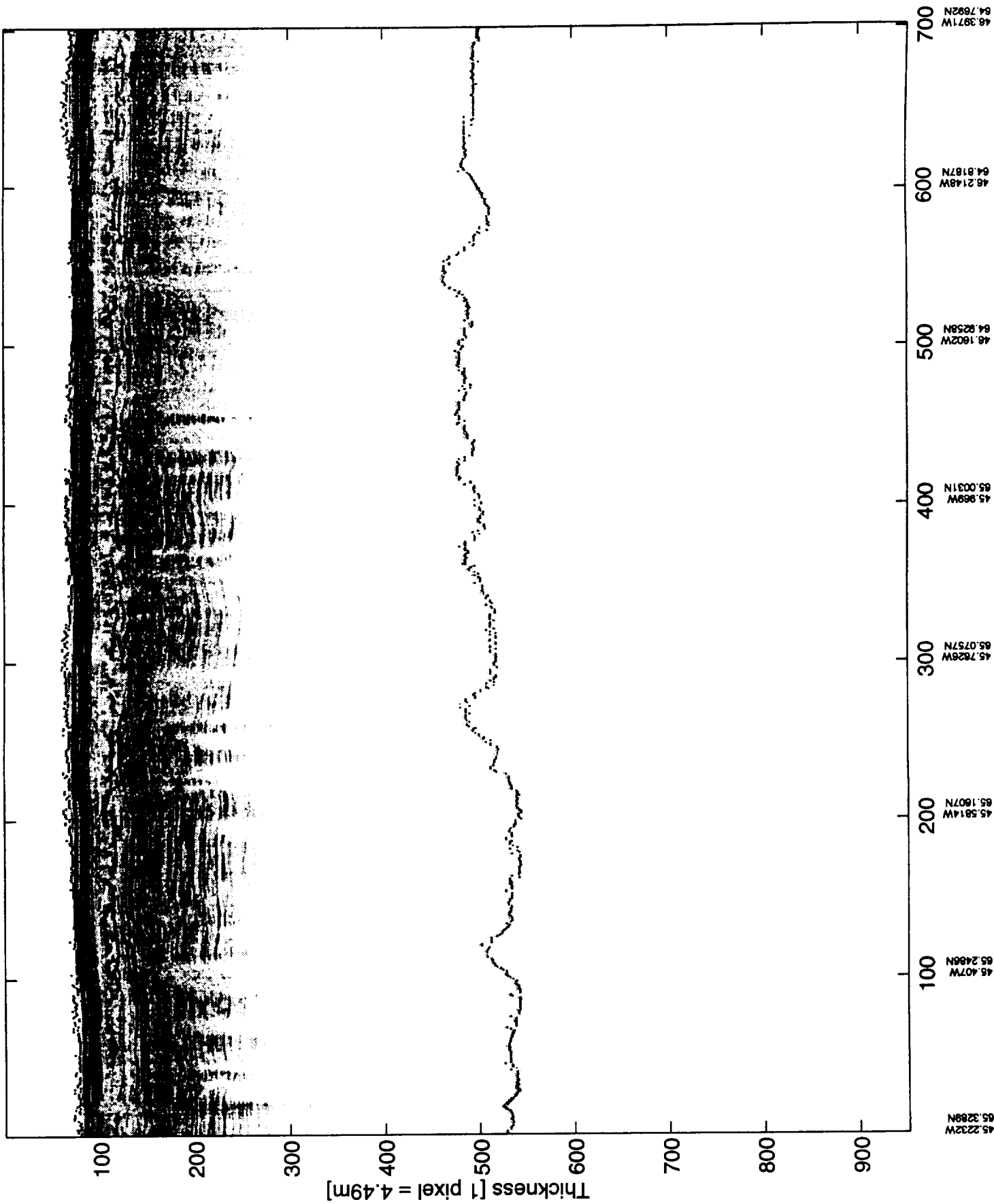
r_10_4.1 (2) [900-2000]



r_10_4.1 (2) [900-2000] thickness

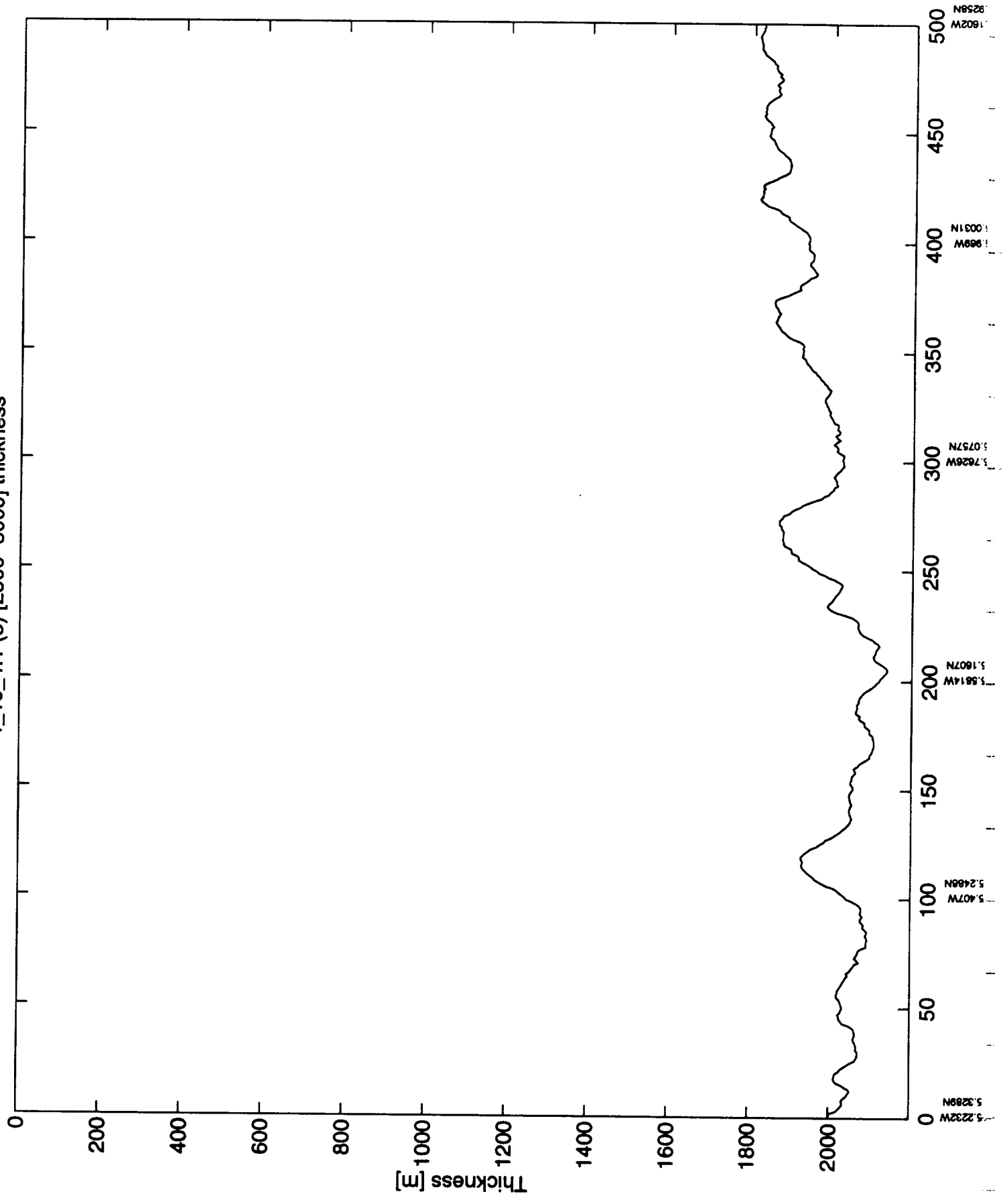


r_10_4.1 (3) [2500-3200]

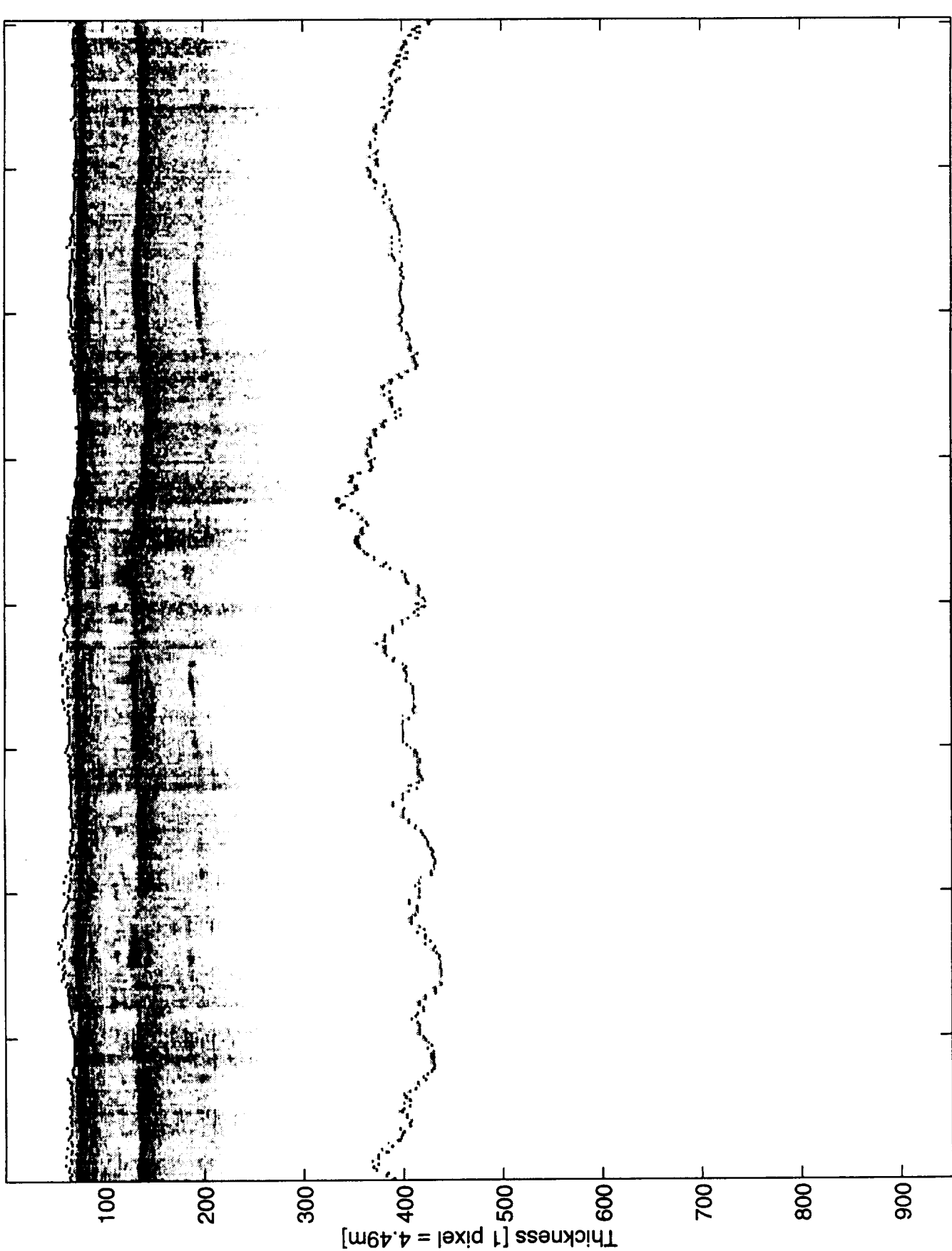


65.2232W
65.407W
65.248N
65.5814W
65.1807N
65.7826W
65.0757N
65.0031N
65.989W
65.0031N
46.1802W
64.9258N
46.2148W
64.8187N
64.7892N
46.3971W

r_10_4.1 (3) [2500-3000] thickness

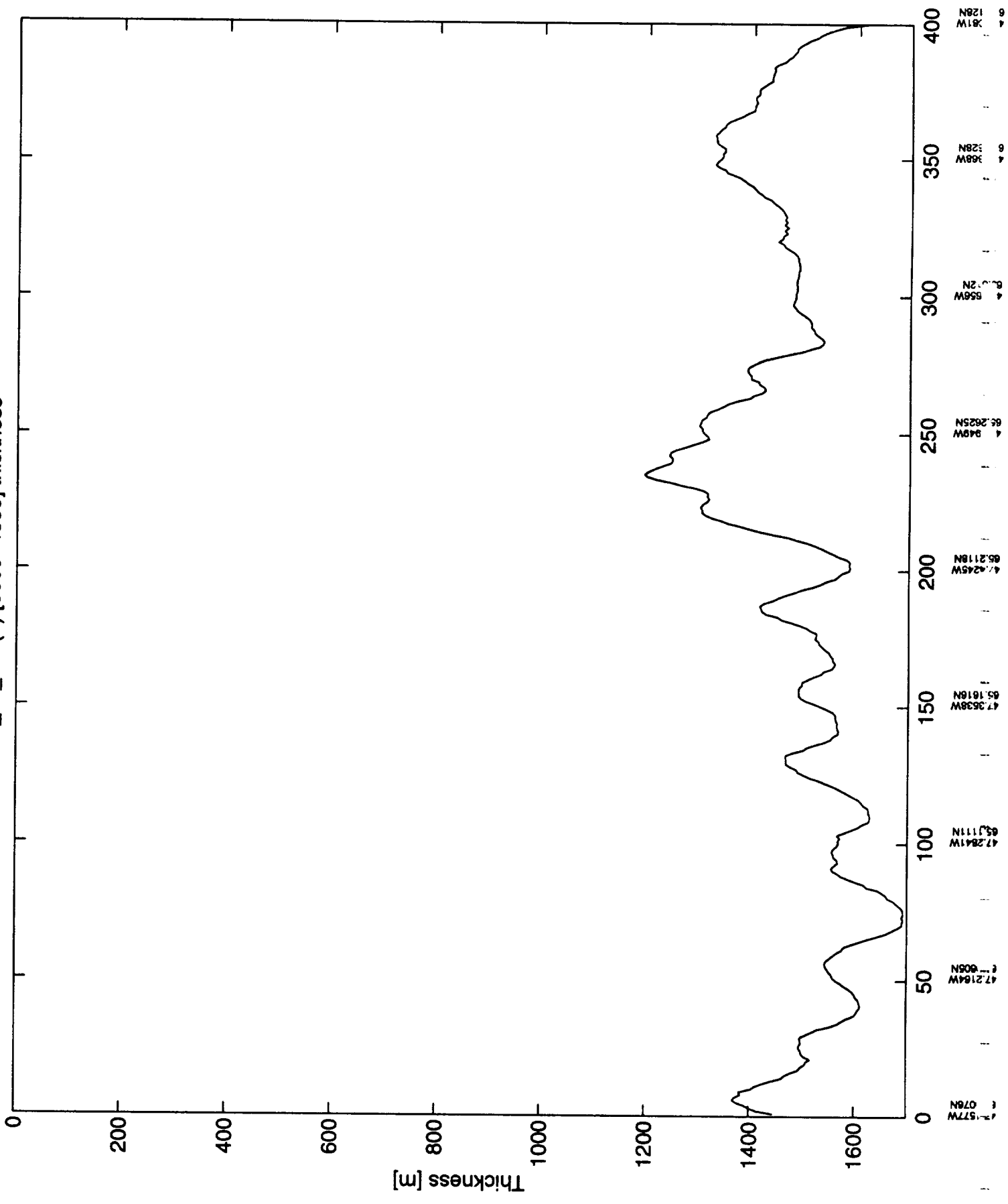


r_10_4.1 (4) [3600-4000]

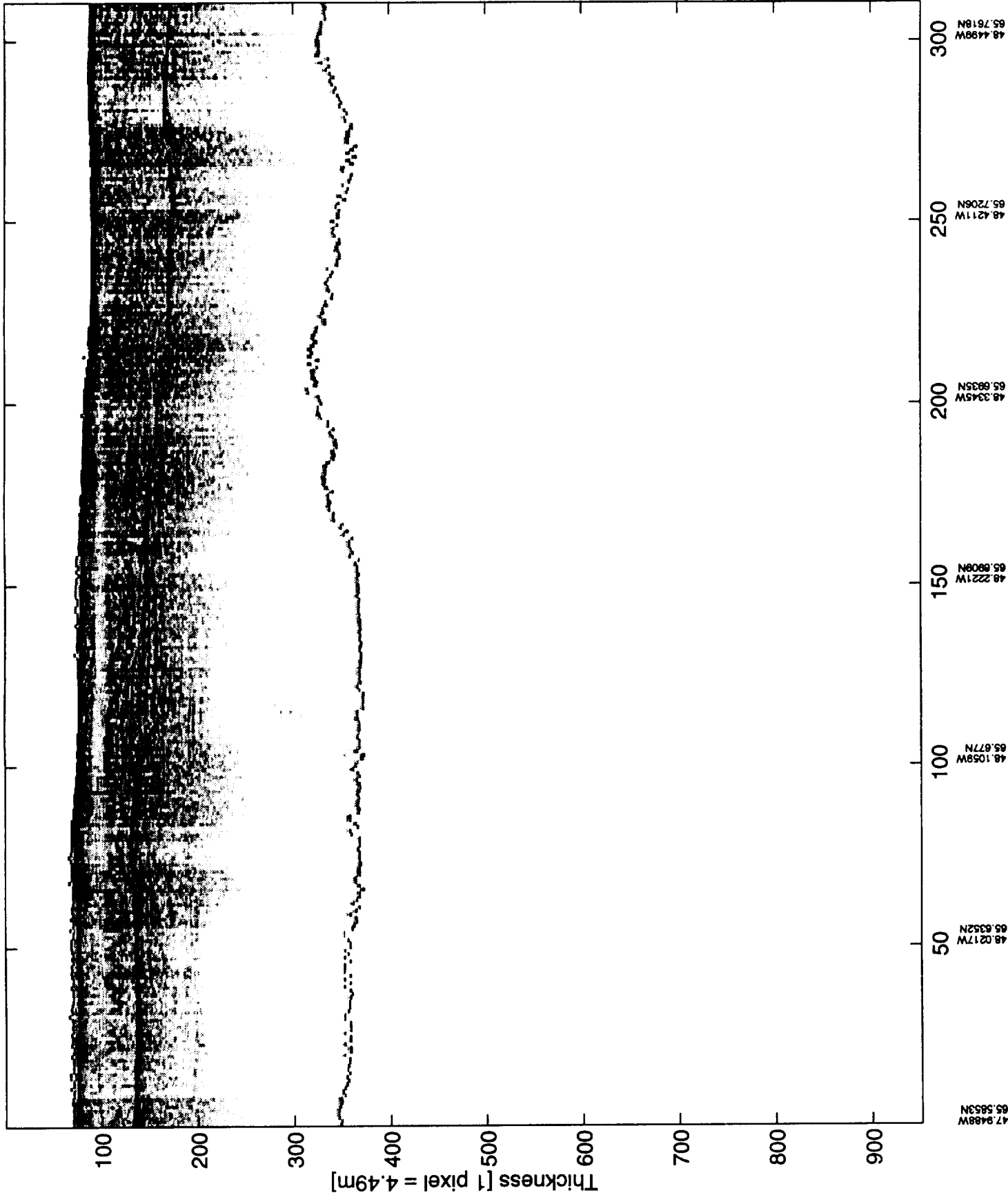


65.0076N
47.1577W
65.1111N
47.2841W
65.2118N
47.4245W
65.312N
47.5656W
65.4128N
47.7081W

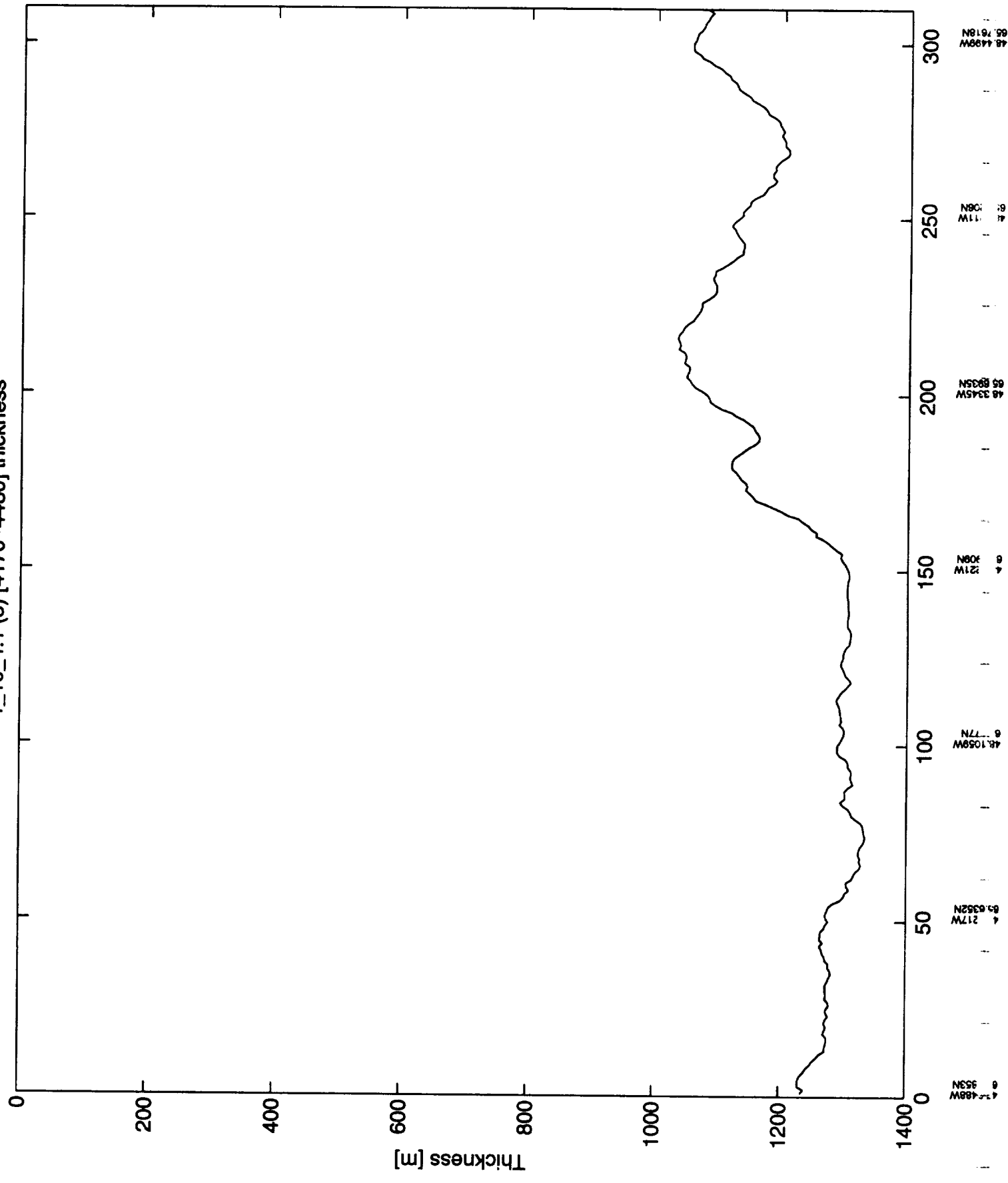
r_10_4.1 (4) [3600-4000] thickness



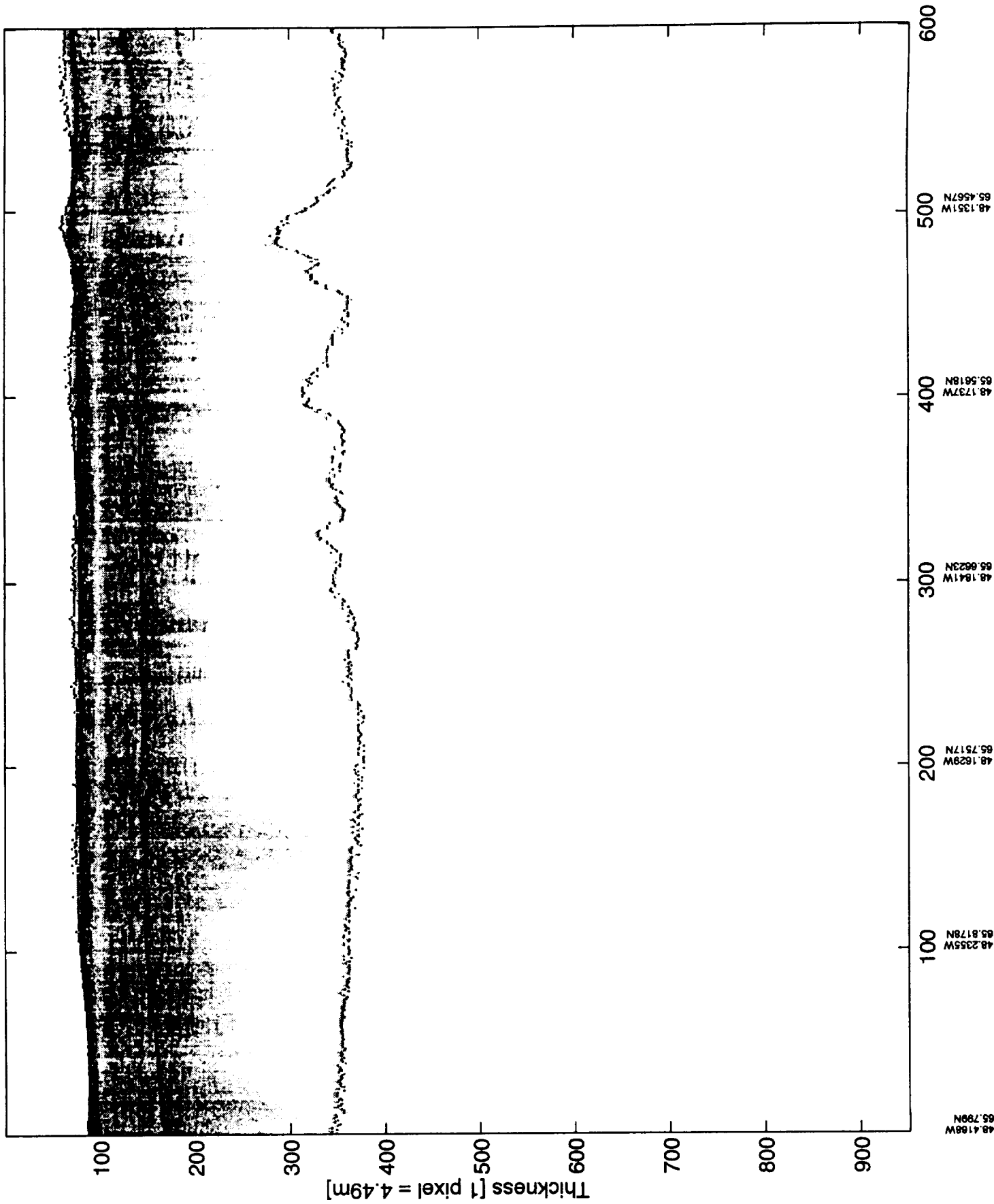
r_10_4.1 (5) [4170-4480]



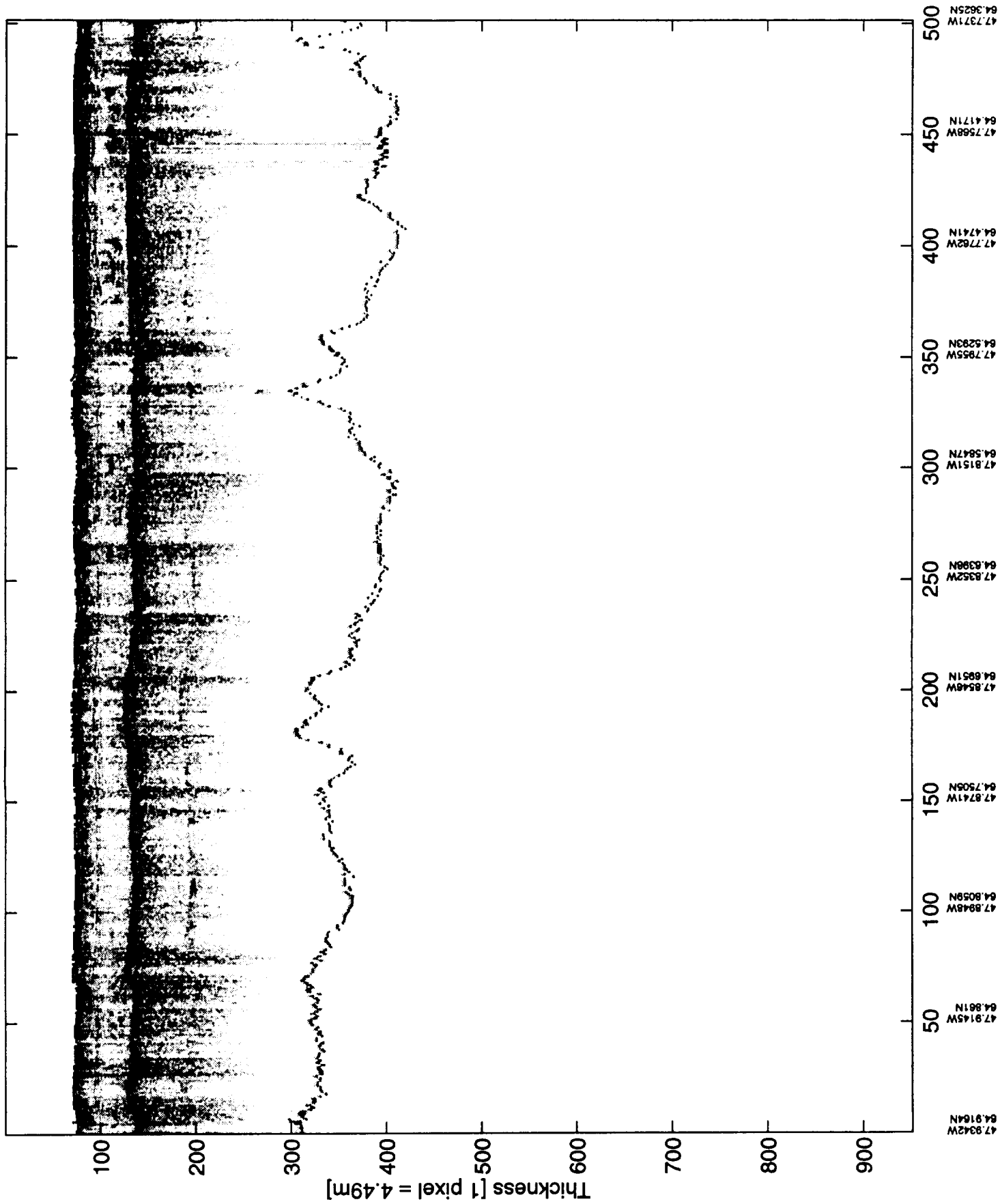
r_10_4.1 (5) [4170-4480] thickness



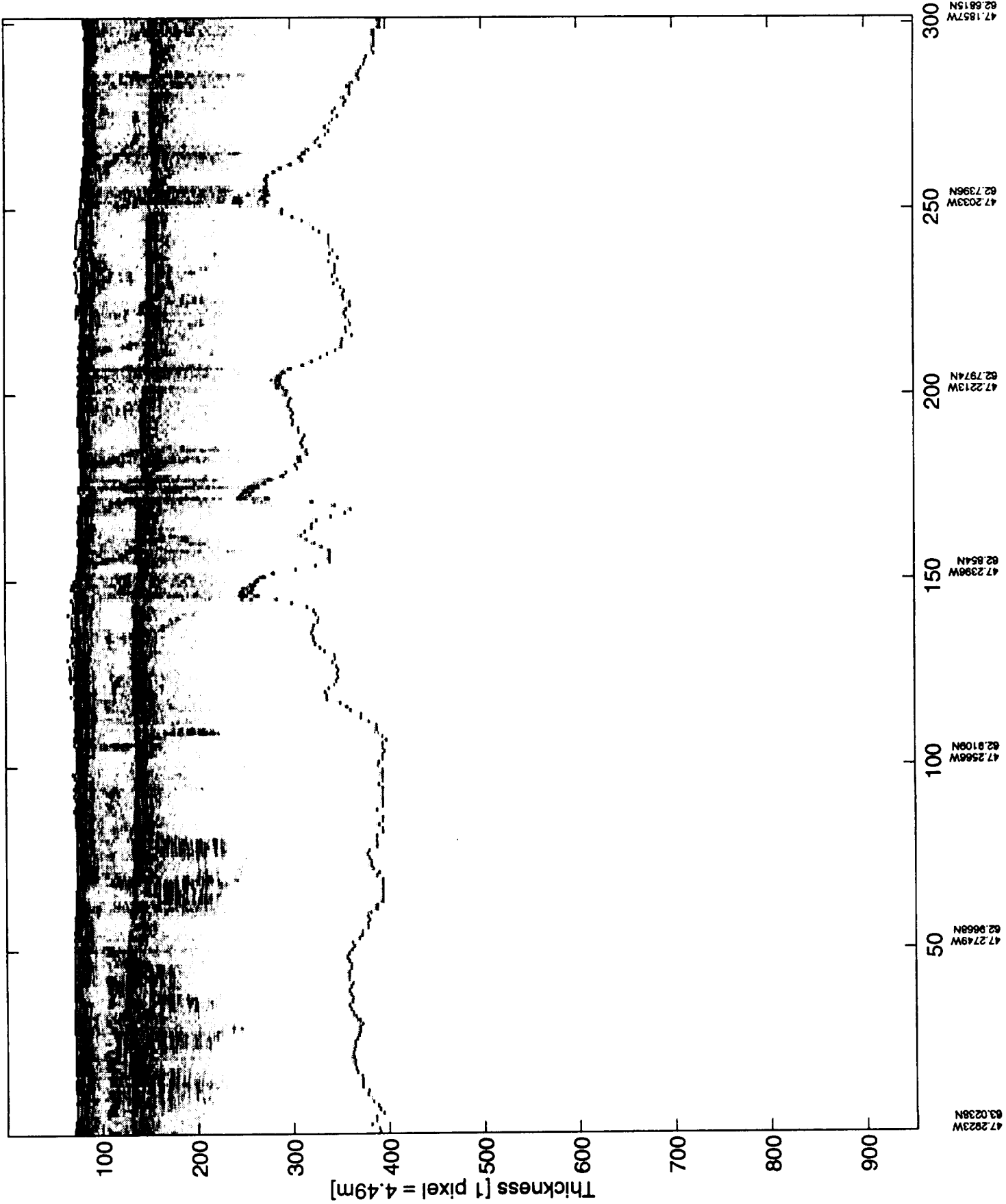
r_10_5.1 (1) [0-600]



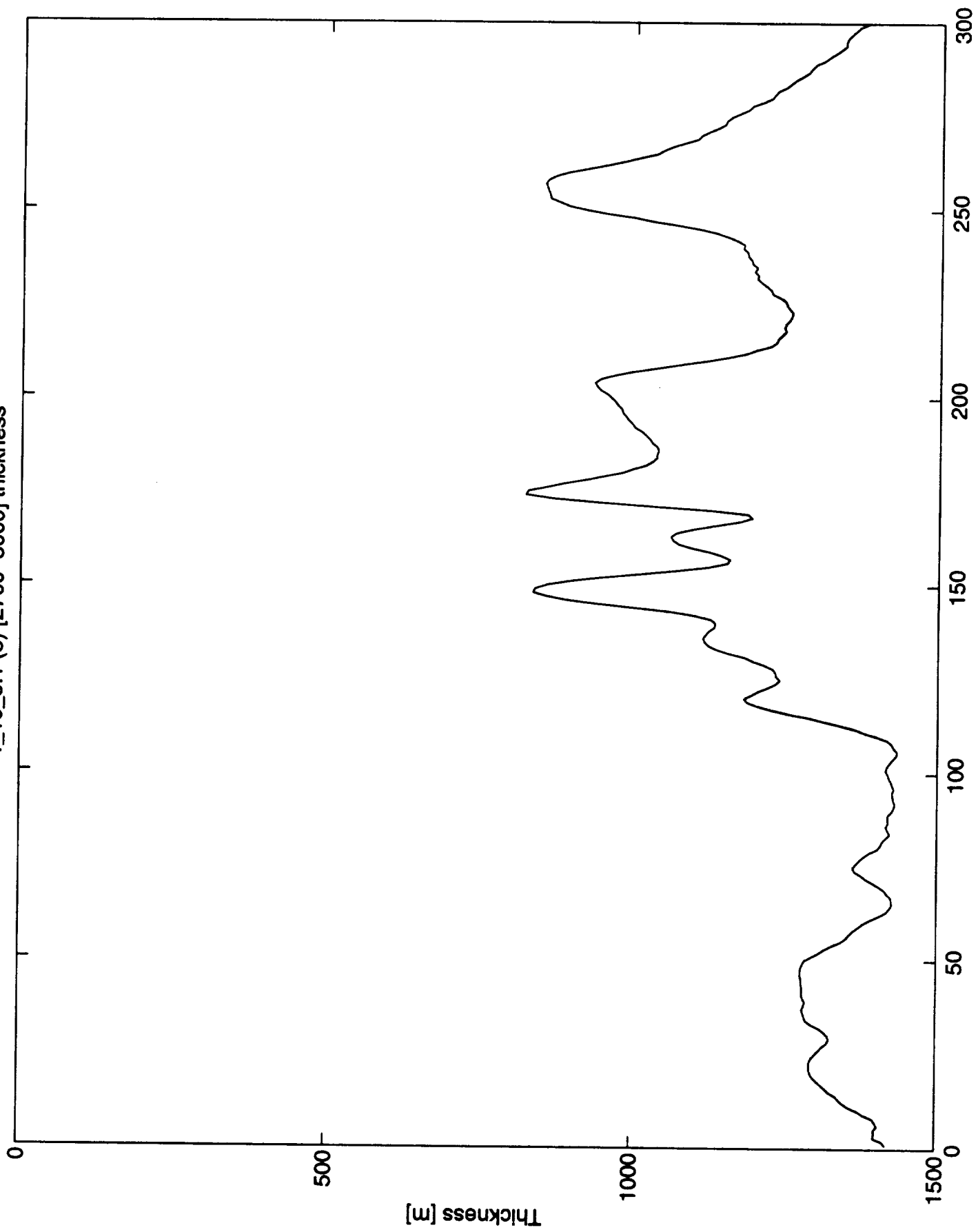
r_10_5.1 (2) [1000 1500]



r_10_5.1 (3) [2700 3000]

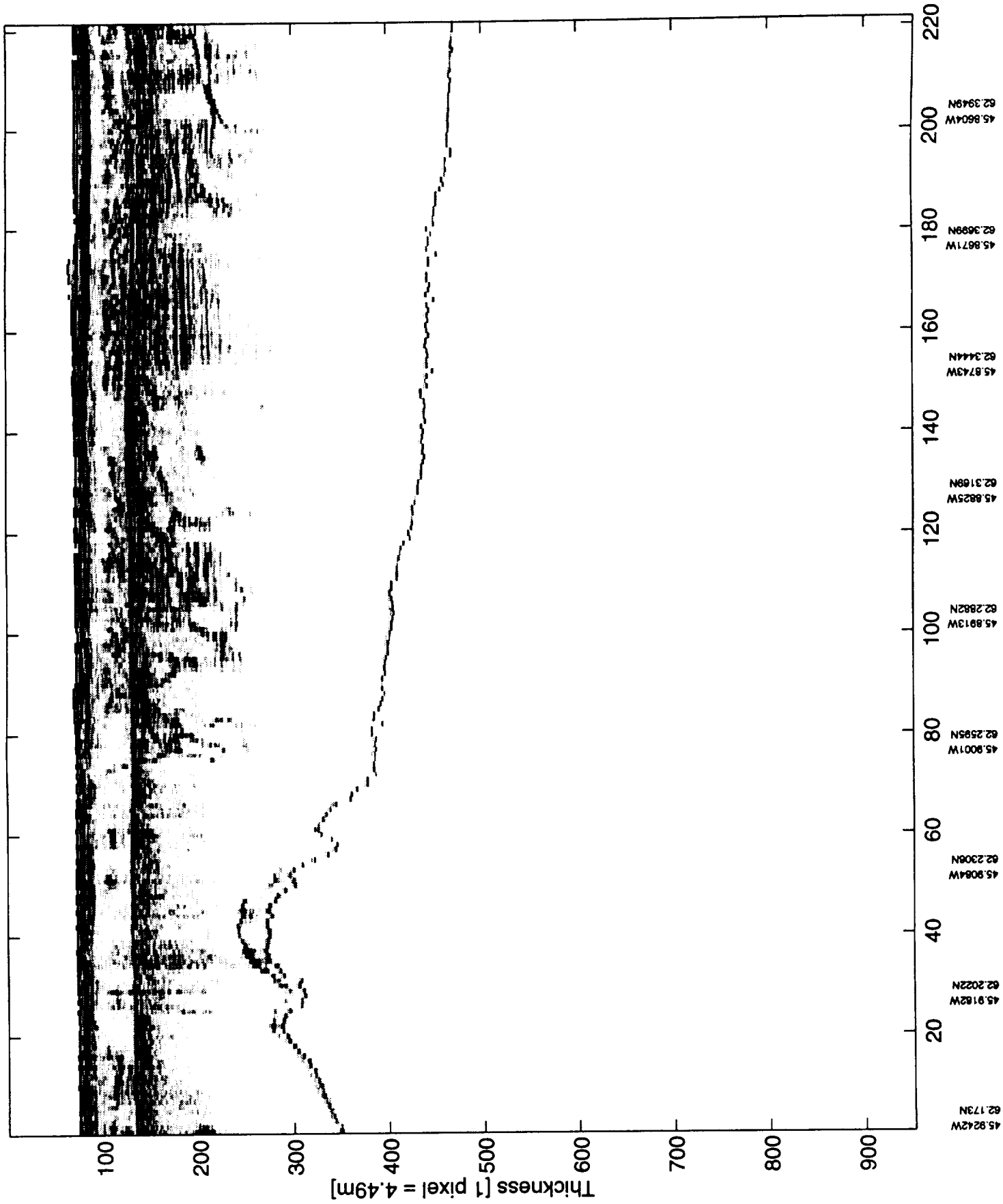


r_10_5.1 (3) [2700-3000] thickness

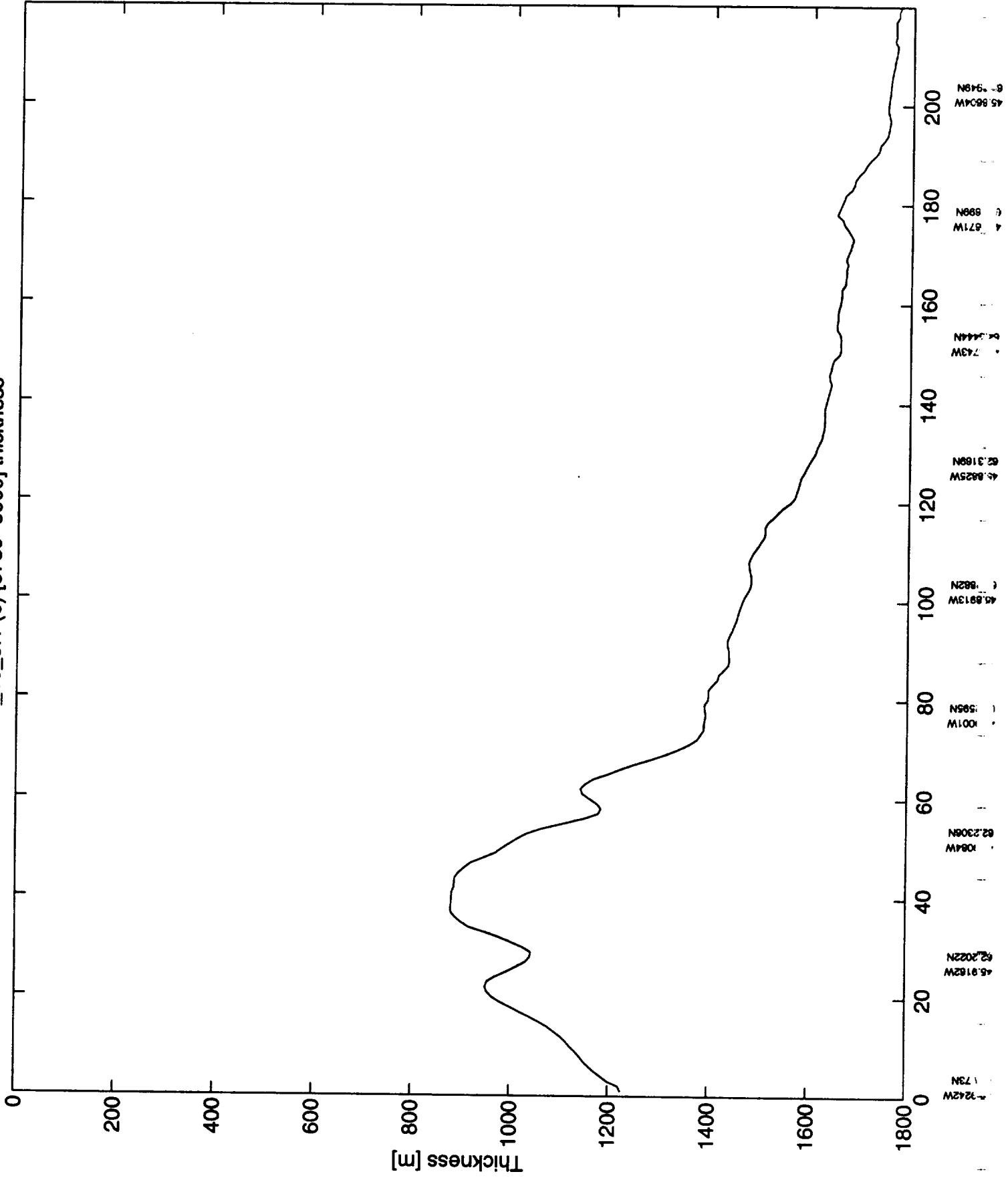


NE 31
MC 12
2033W
1390
NP 3M
1554N
2395W
NE 3M
1554N
2395W
NE 3M
1554N
2395W
NE 3M
1554N
2395W

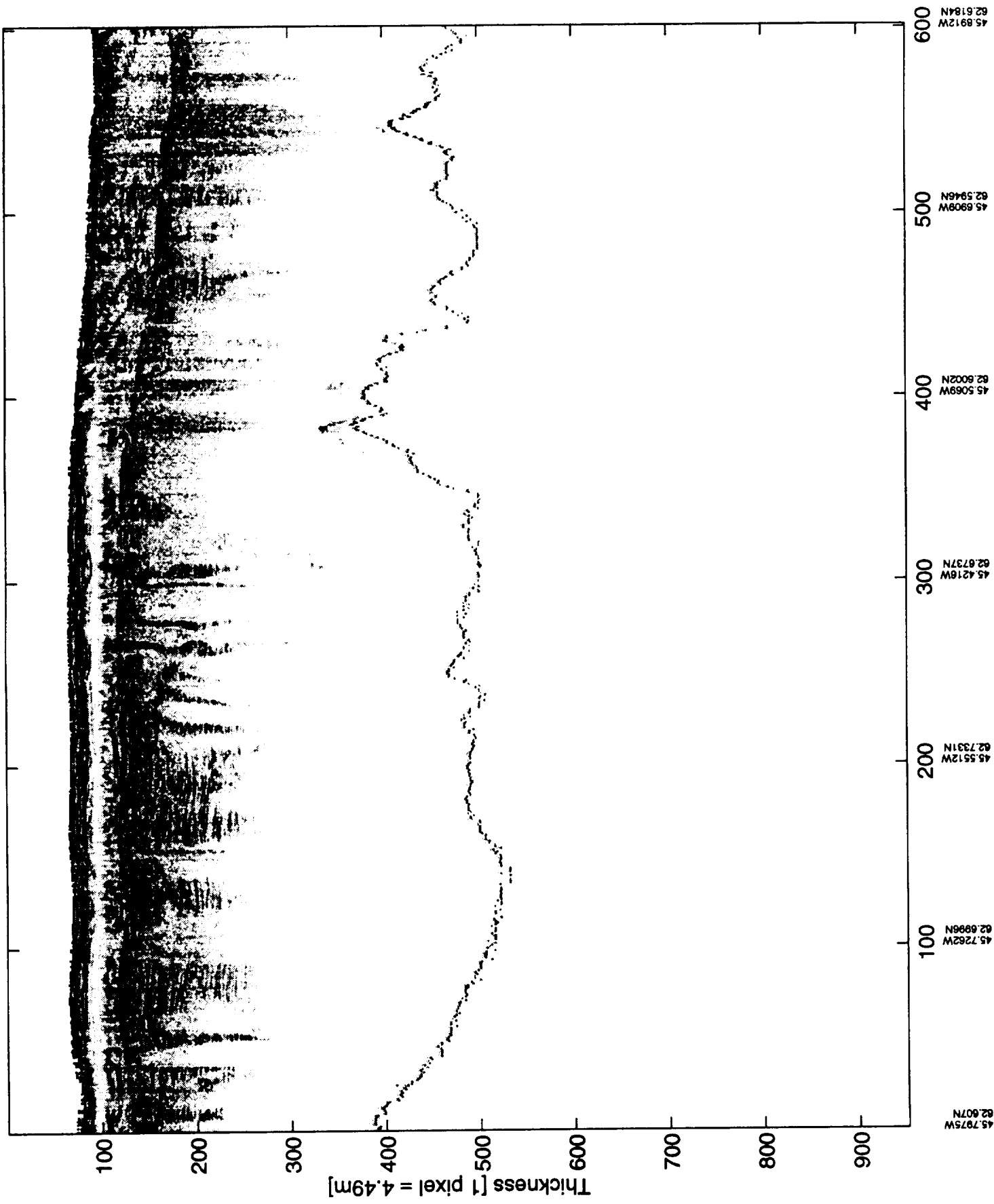
r_10_5.1 (6) [5780 6000]



r_10_5.1 (6) [5780-6000] thickness

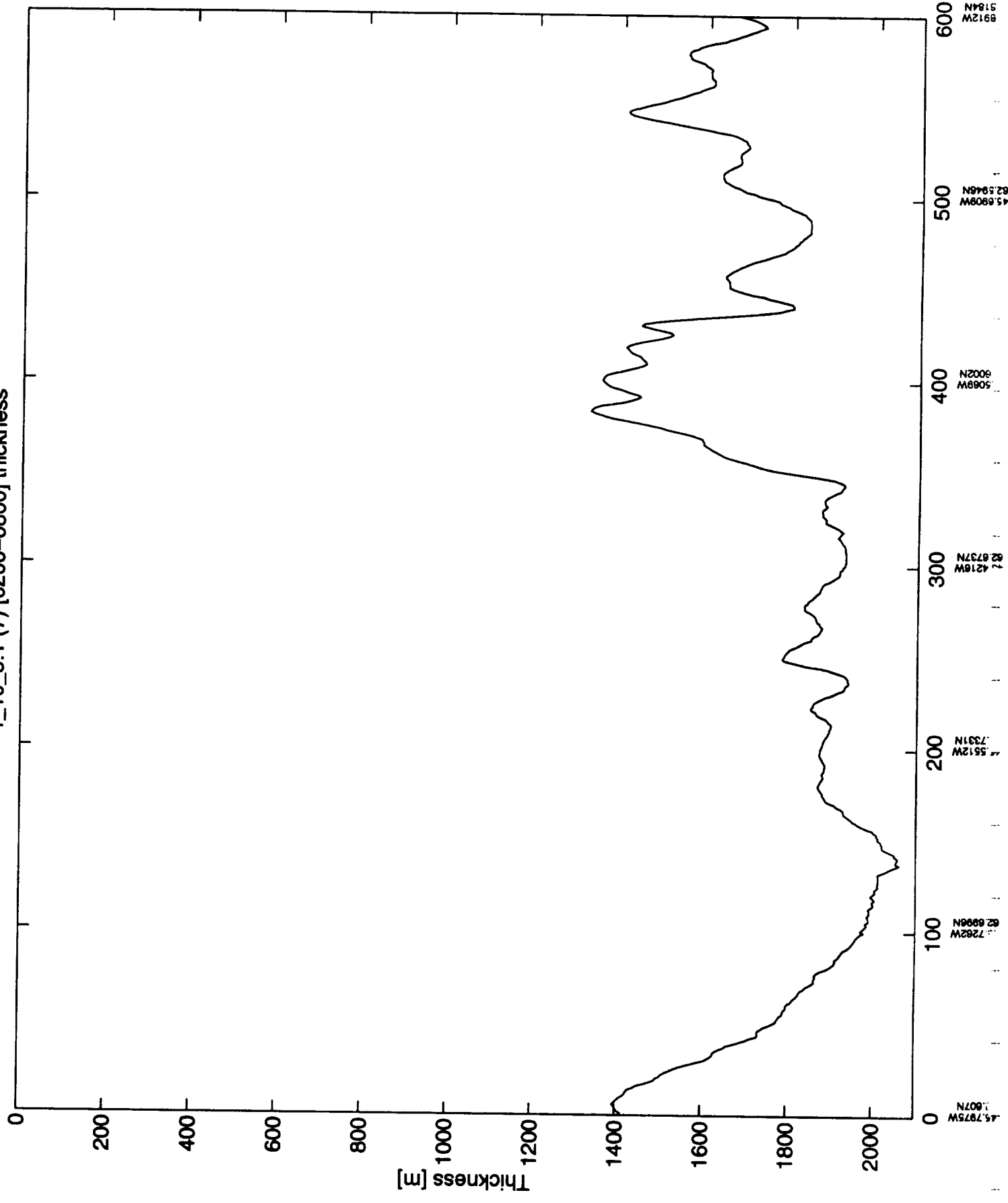


r_10_5.1 (7) [6200 6800]

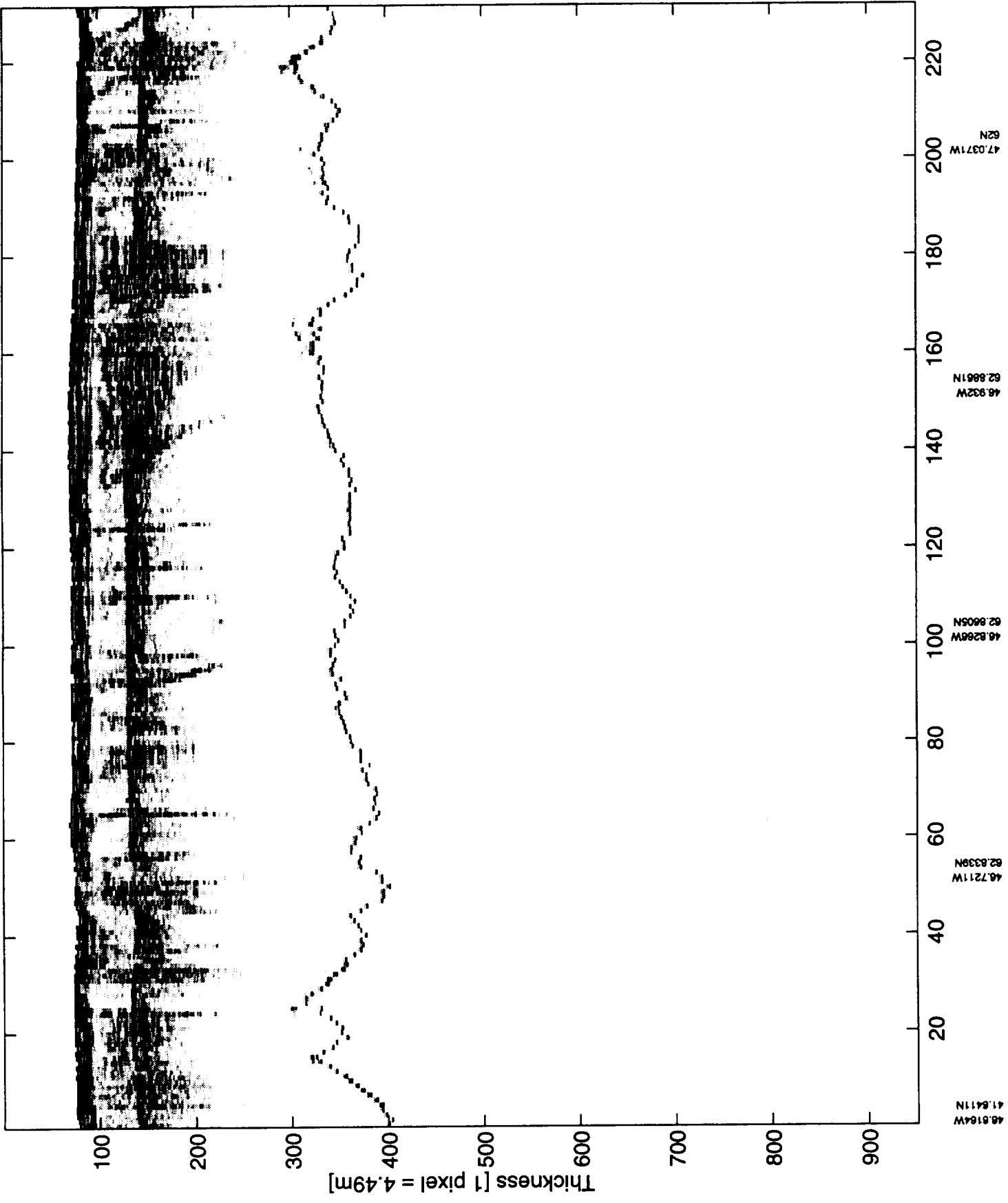


45.7975W 62.607N
45.7262W 62.6996N
45.5512W 62.7331N
45.4218W 62.8737N
45.5069W 62.8002N
45.6909W 62.5946N
45.8912W 62.6184N

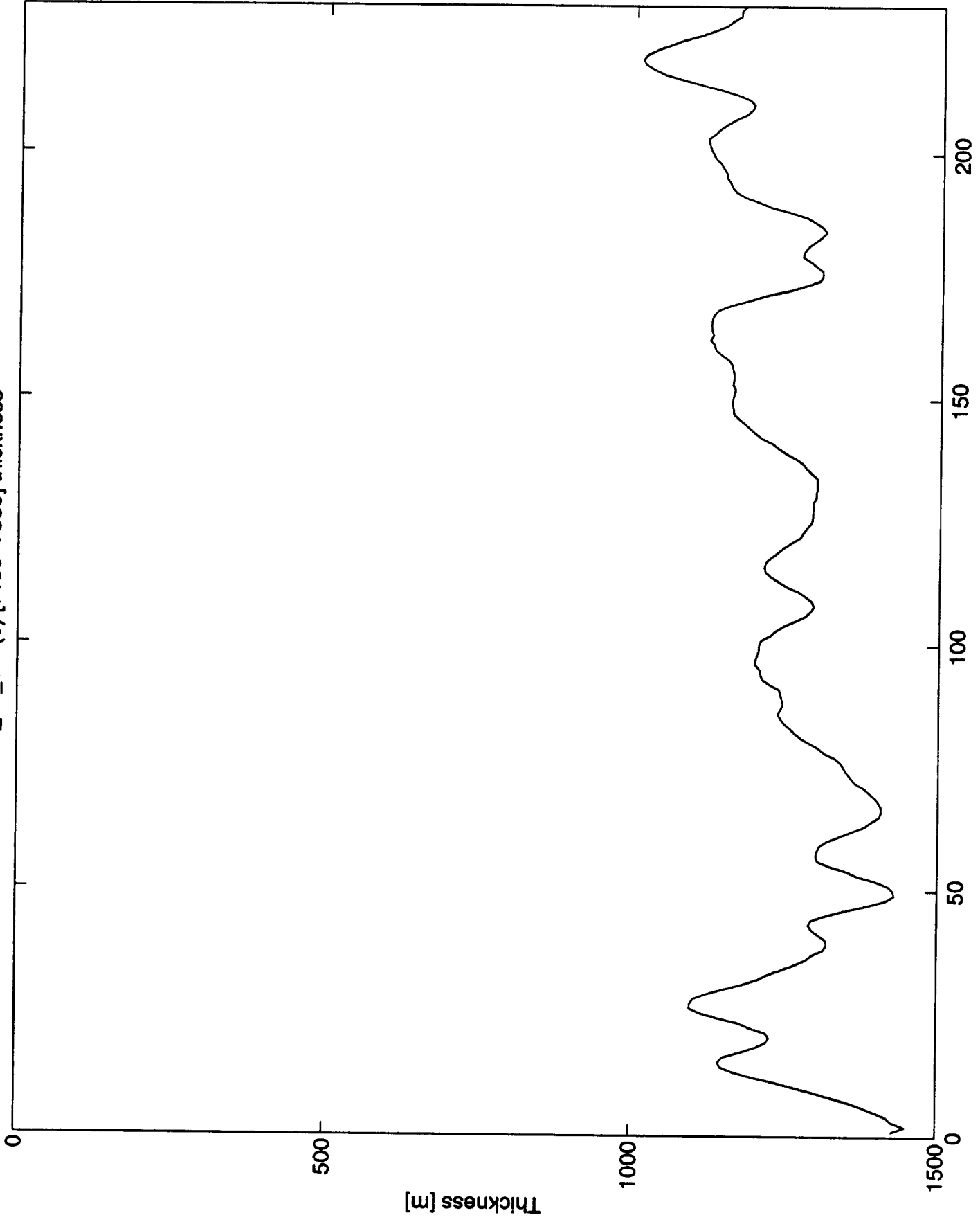
r_10_5.1 (7) [6200-6800] thickness



r_10_5.1 (8) [7150 7380]



r_10_5.1 (8) [7150-7380] thickness

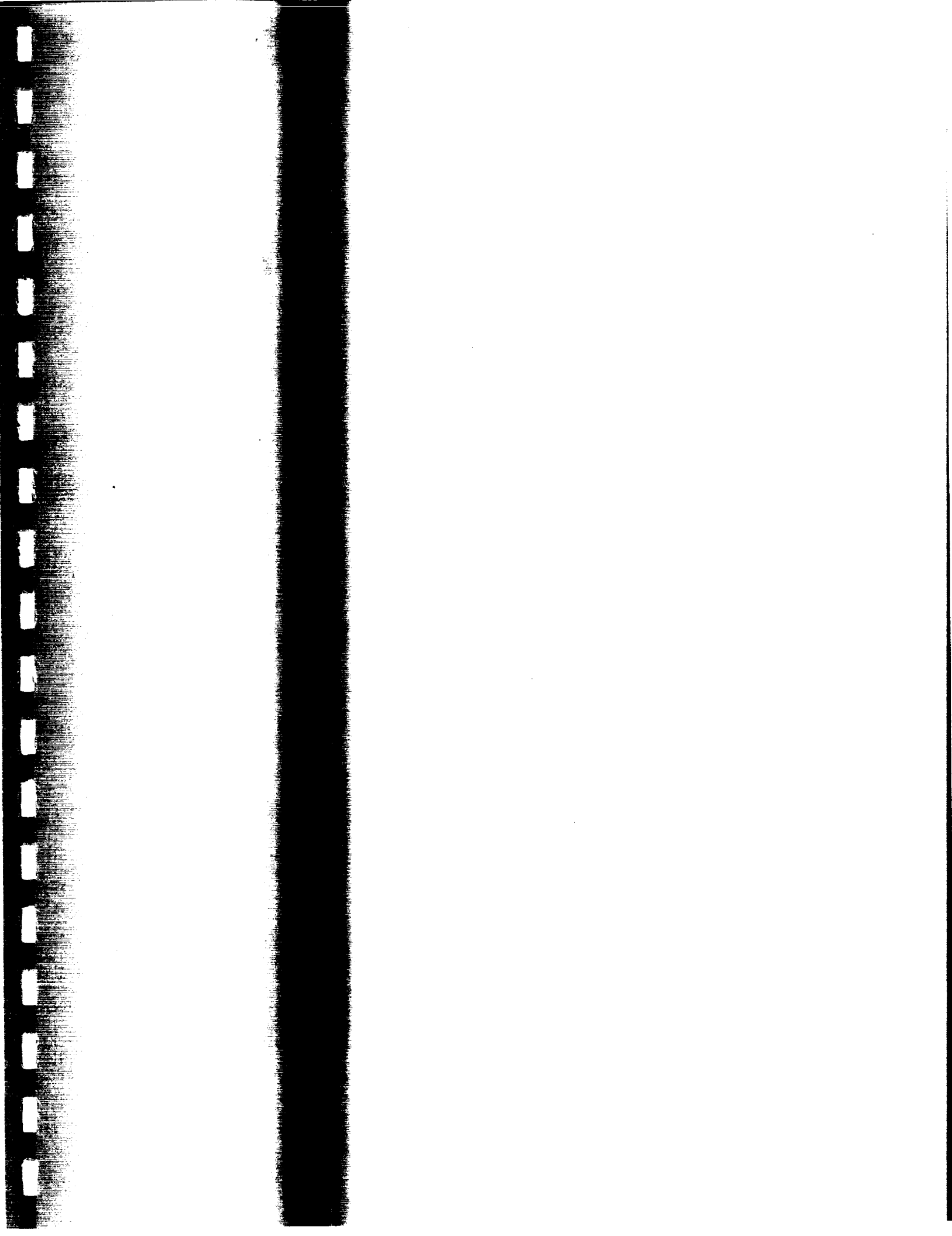


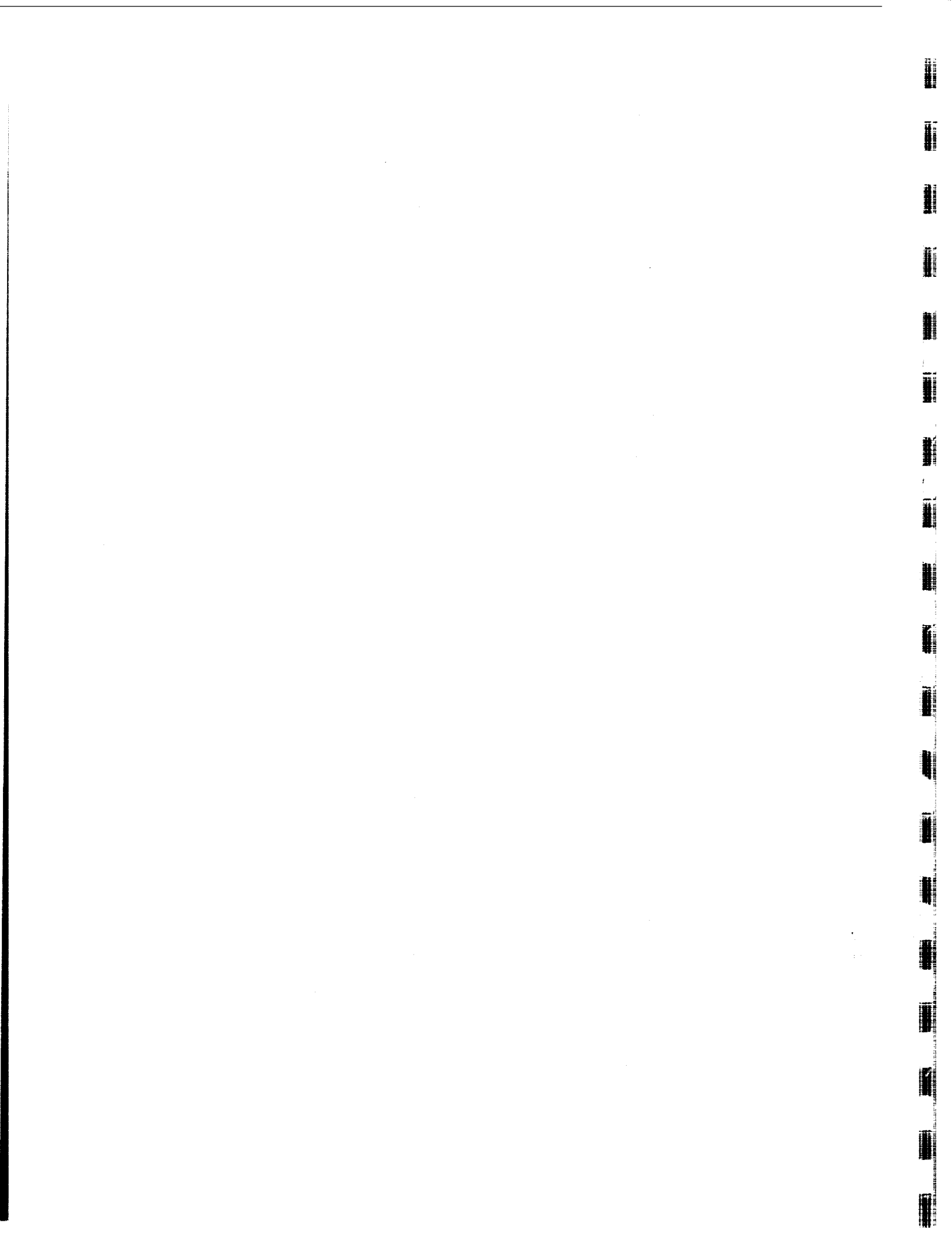
1 11W
2 11N
3 11W
4 11N
5 11W
6 11N
7 11W
8 11N
9 11W
10 11N
11 11W
12 11N
13 11W
14 11N
15 11W
16 11N
17 11W
18 11N
19 11W
20 11N

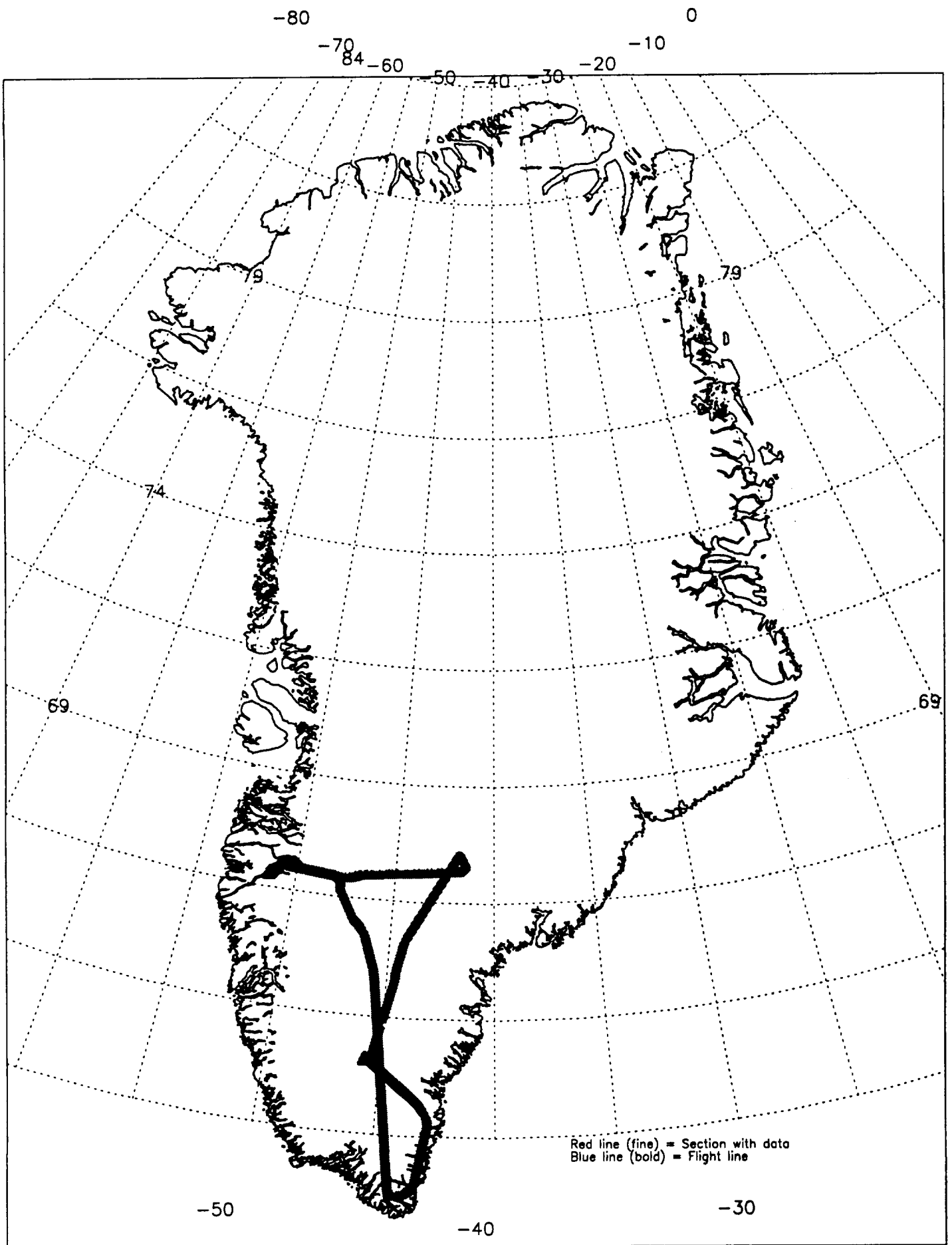
Appendix E

July 1, 1993





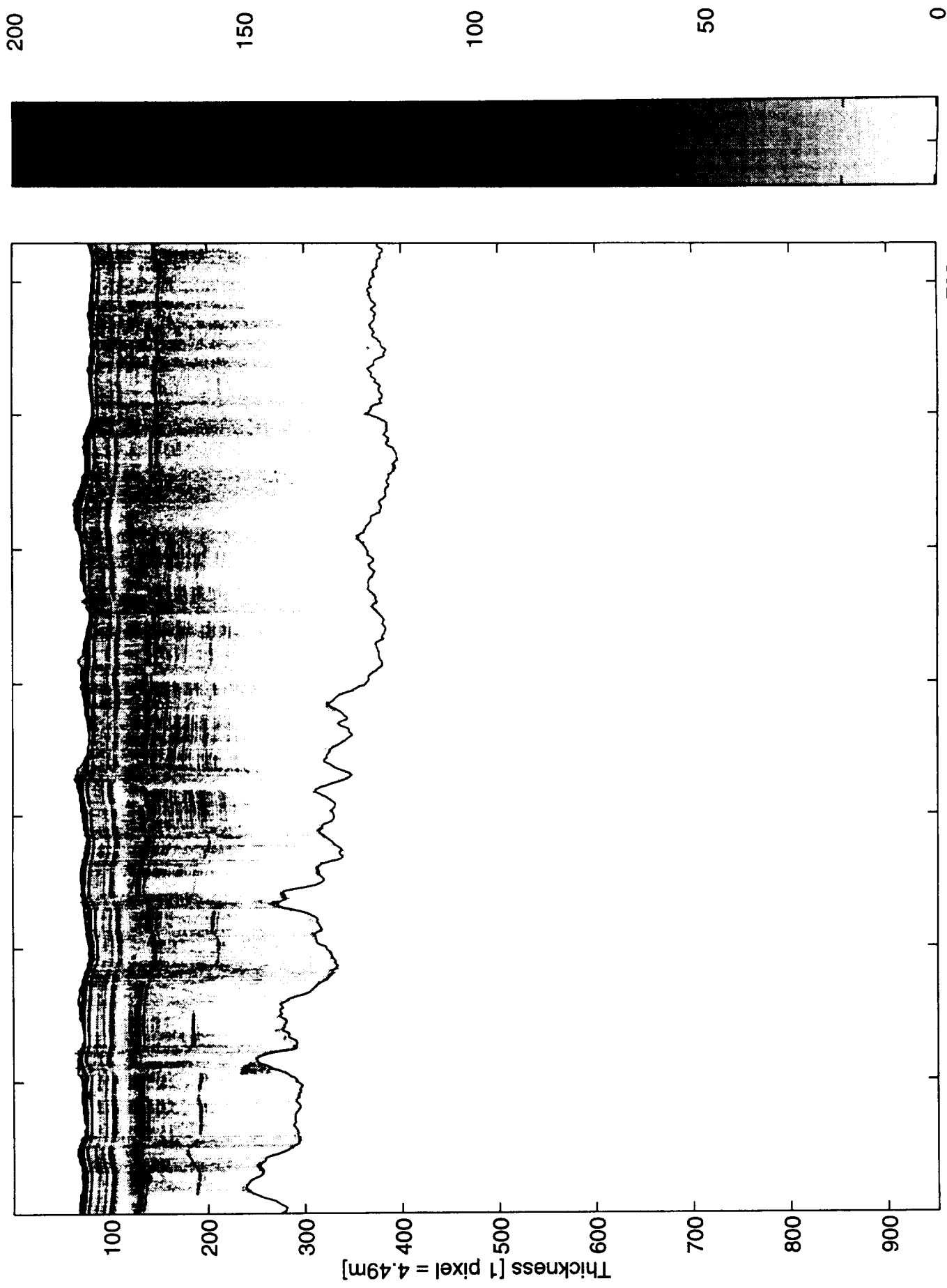




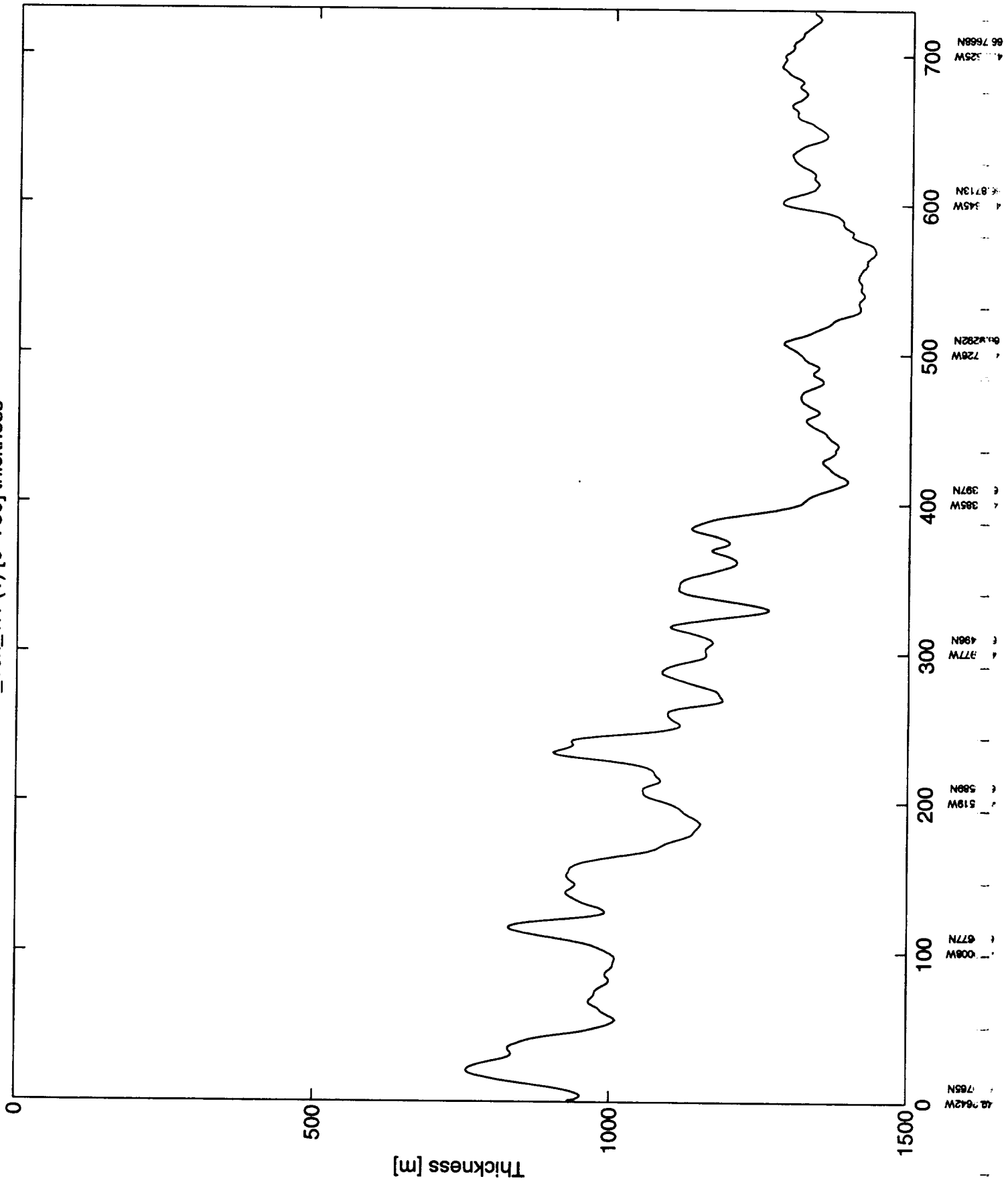
July 1, 1993 (r_10x)



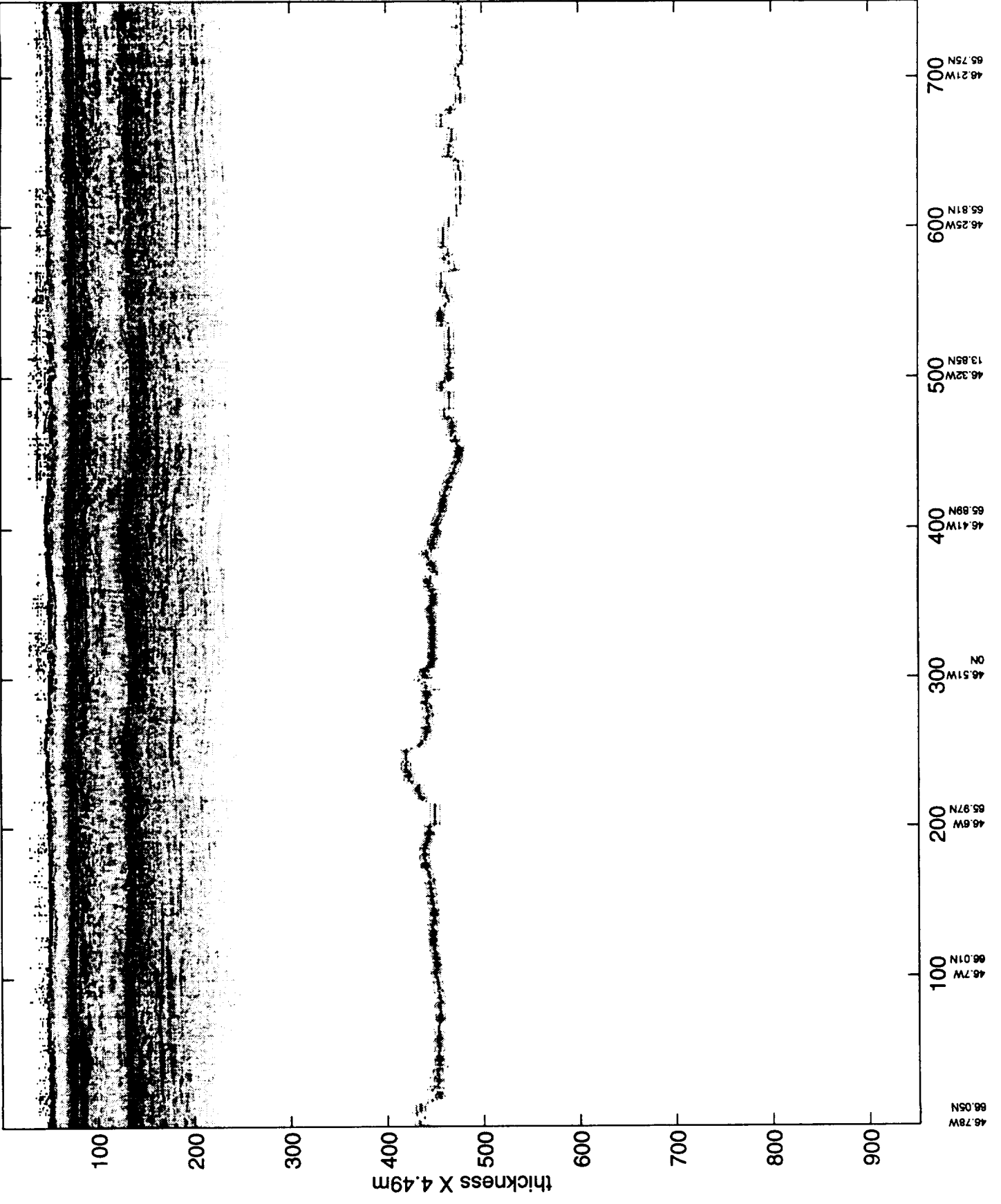
r_10x_1.1 (1) [0-730]

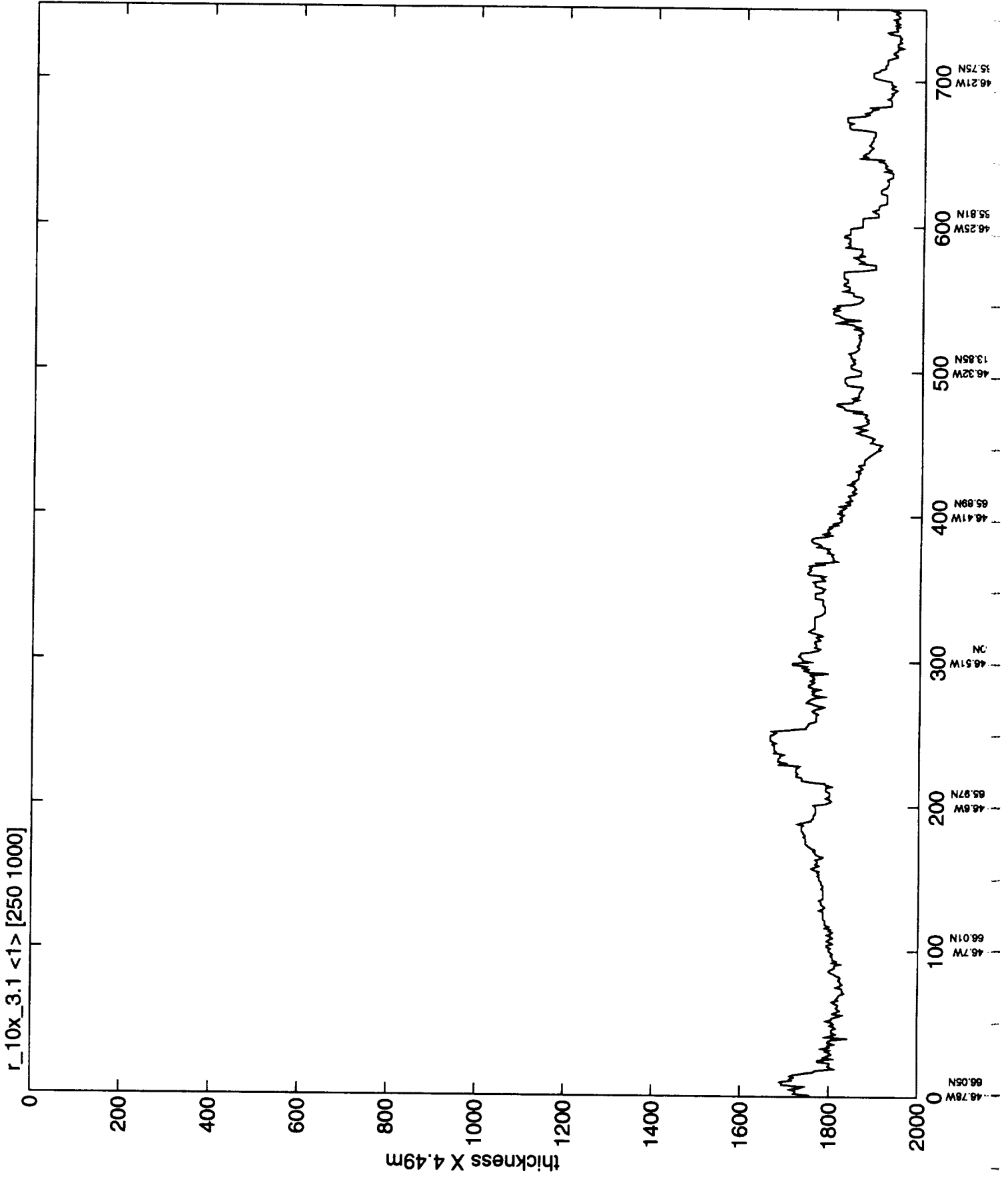


r_10x_1.1 (1) [0-730] thickness

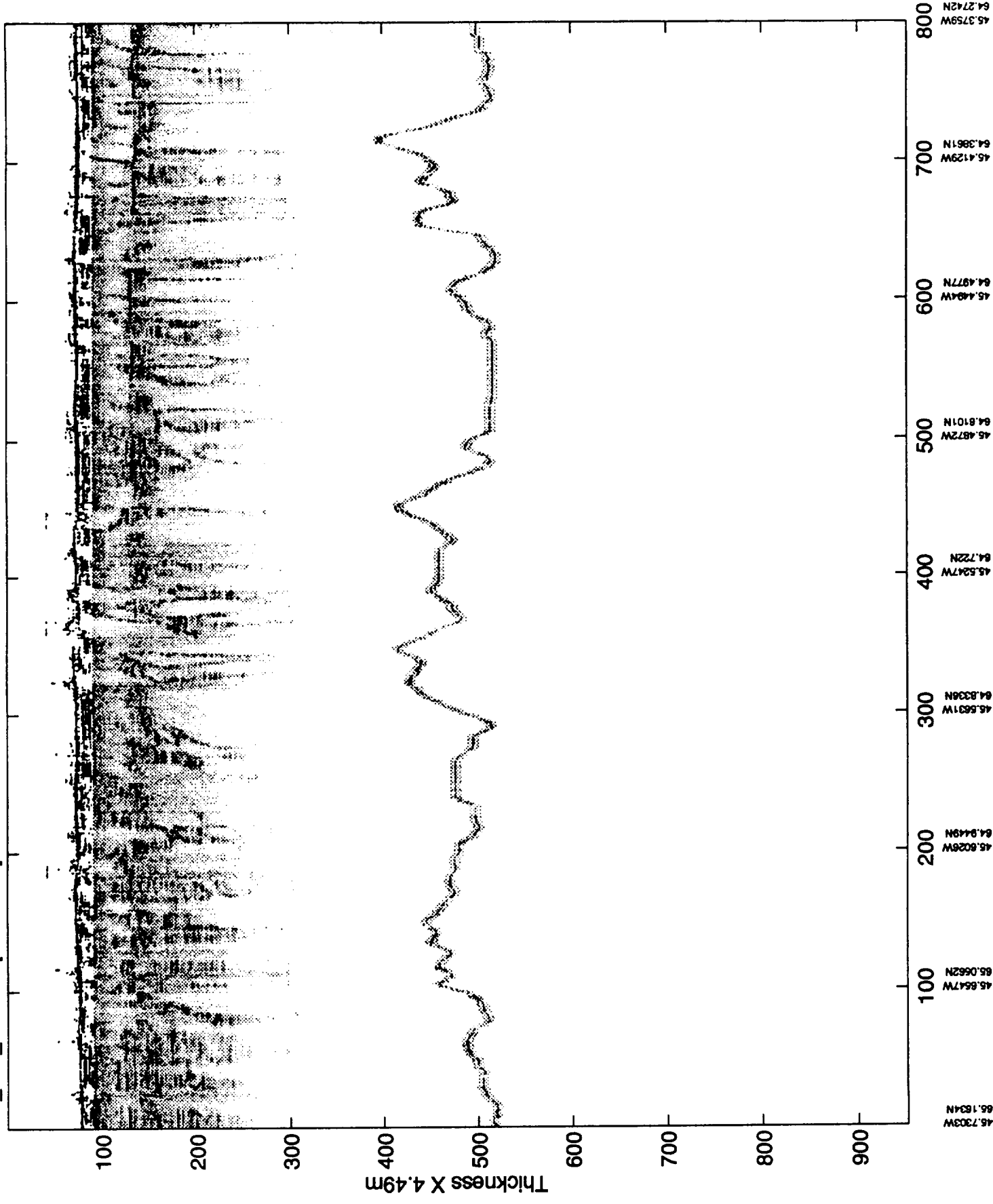


r_10x_3.1 <1> [250 1000]



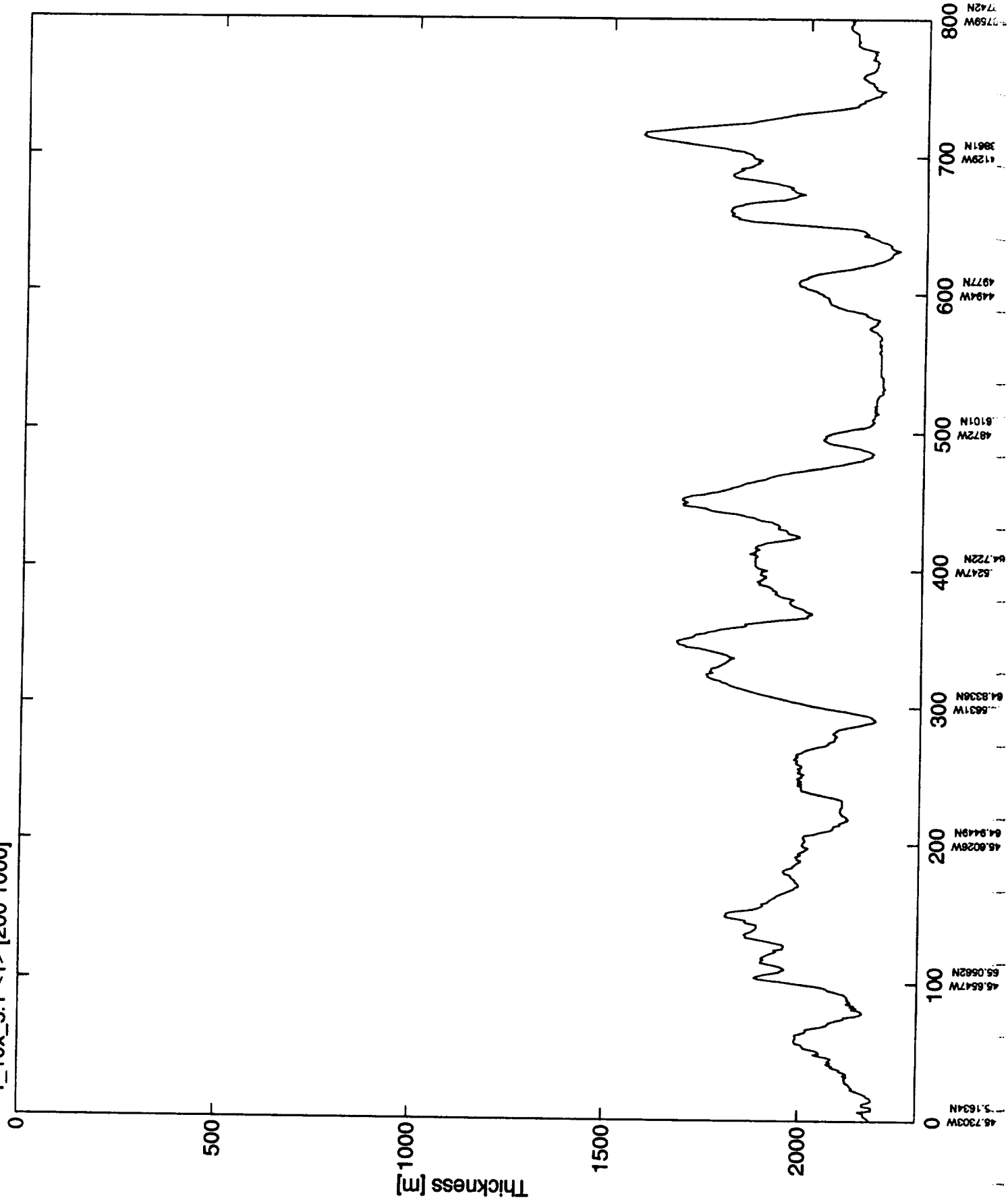


r_10x_5.1 <1> [200 1000]

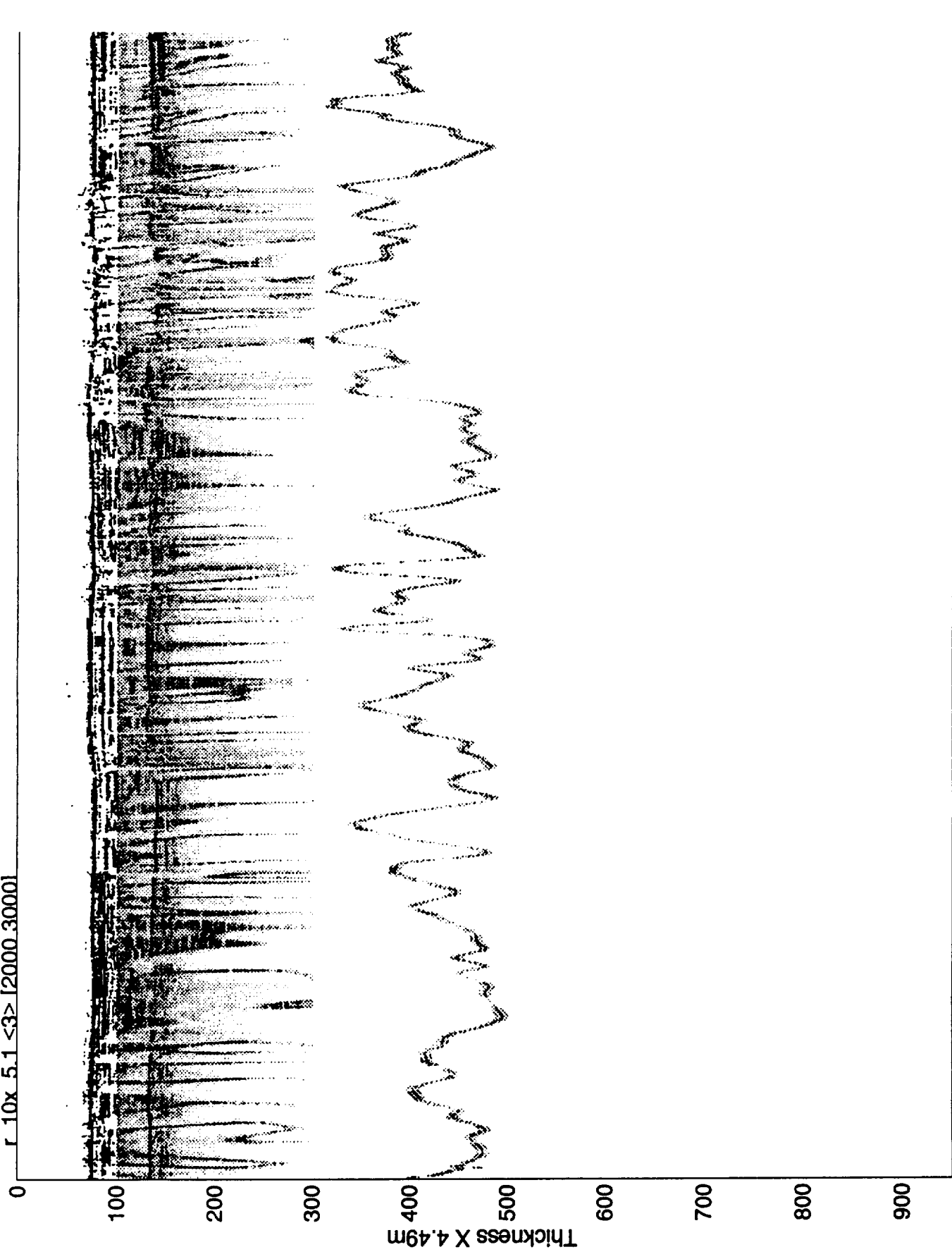


65.7303W
65.1834N
45.6647W
65.0662N
45.6026W
64.9449N
45.5631W
64.8336N
45.5247W
64.722N
45.4827W
64.8101N
45.4844W
64.4977N
45.4129W
64.3861N
45.3759W
64.2742N

r_10x_5.1 <1> [200 1000]



r 10x 5.1 <3> [2000.3000]



- 45.024W 63.1805N
- 44.937W 63.0513N
- 44.9607W 62.9419N
- 44.928W 62.831N
- 44.8955W 62.7196N
- 44.8629W 62.6083N
- 44.8305W 62.4967N
- 44.7961W 62.3844N
- 44.7665W 62.2726N
- 44.7339W 62.1574N
- 44.7016W 62.0423N

r 10x 5.1 <3> [2000 3000]

0

200

400

600

800

1000

1200

1400

1600

1800

2000

Thickness [m]

0

100

200

300

400

500

600

700

800

900

1000

63.1605N

4.9937W

62.9419N

1.9287W

44.8955N

2.6083N

44.8306W

2.4967N

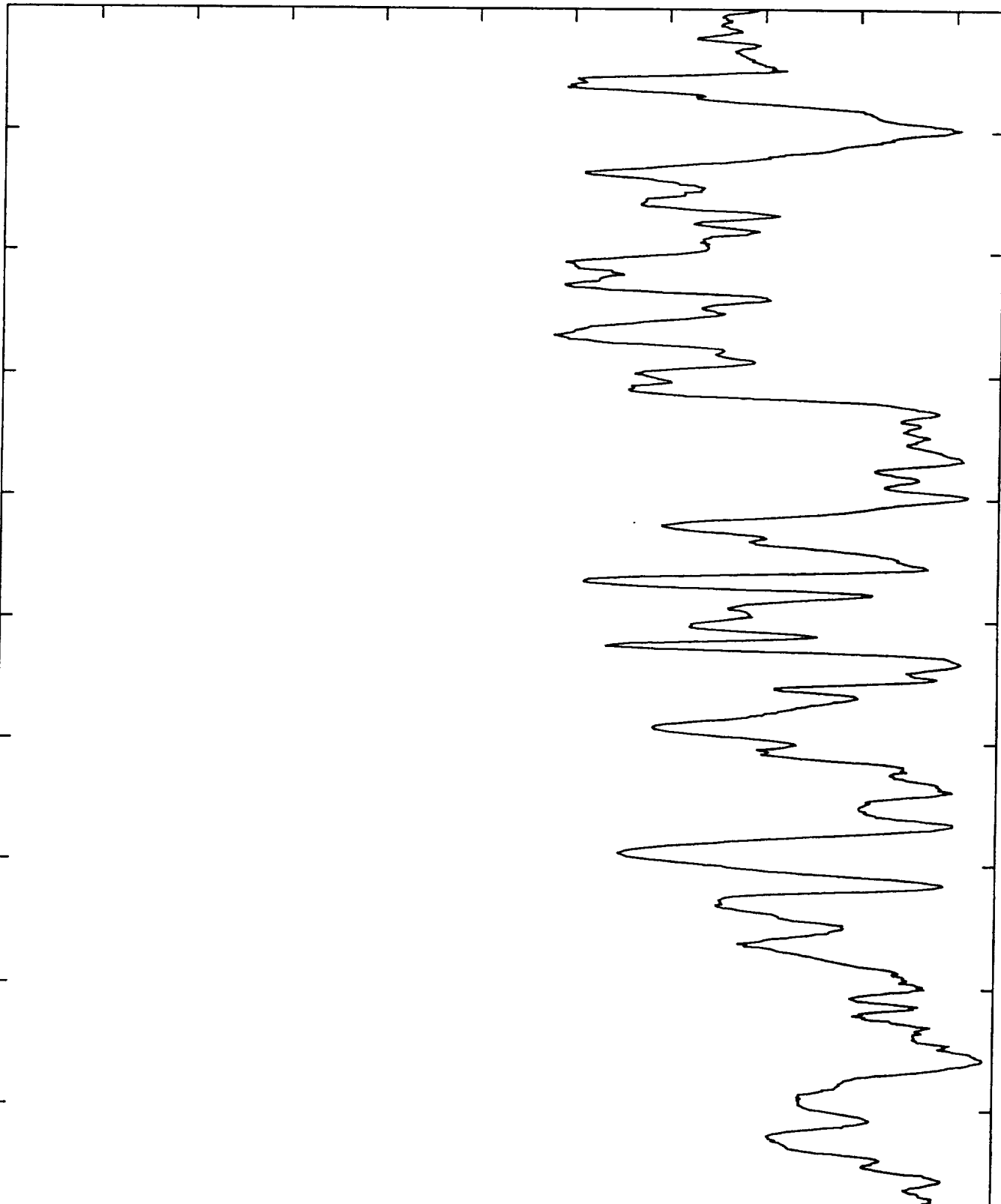
44.7665W

2.728N

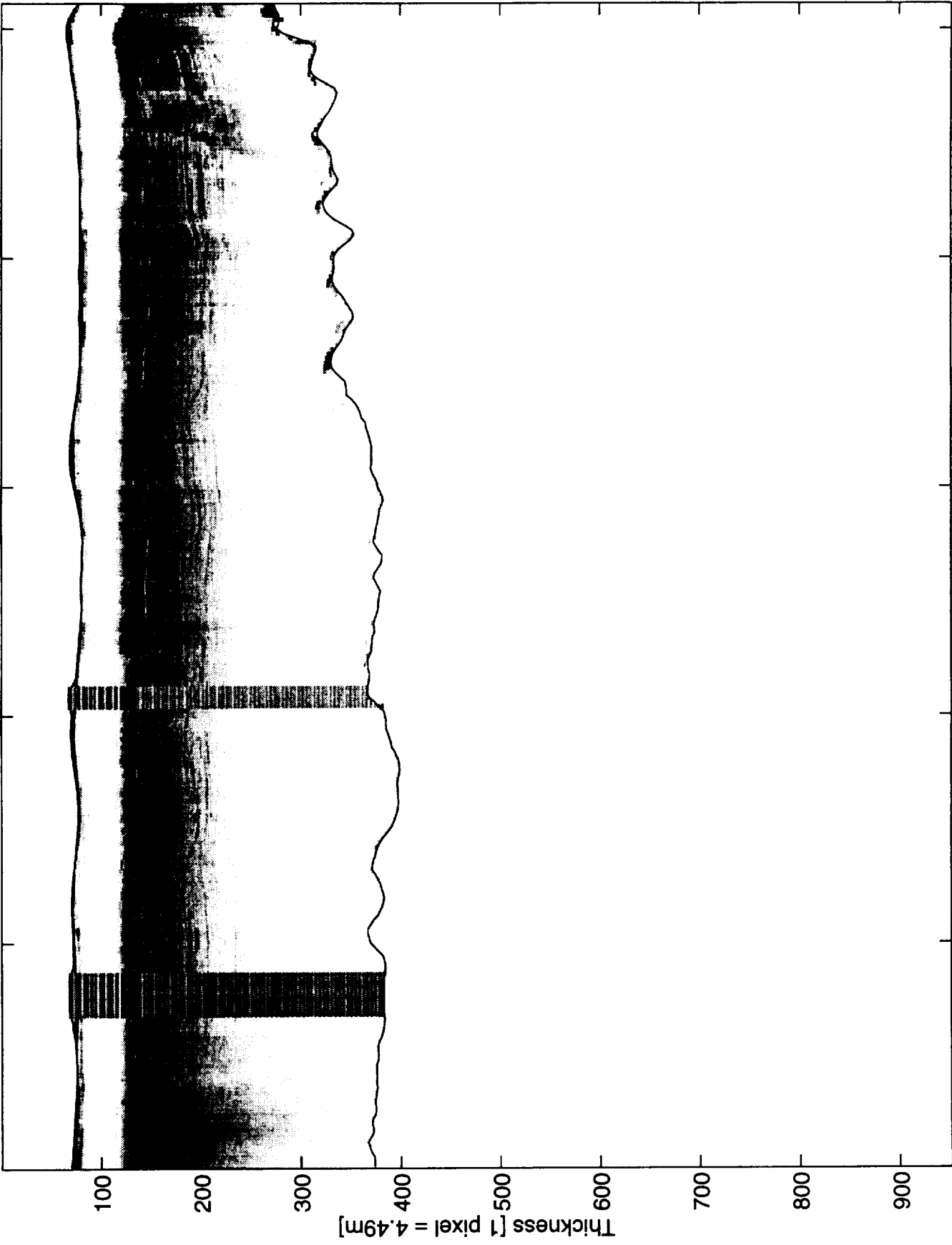
44.7016W

2.1574N

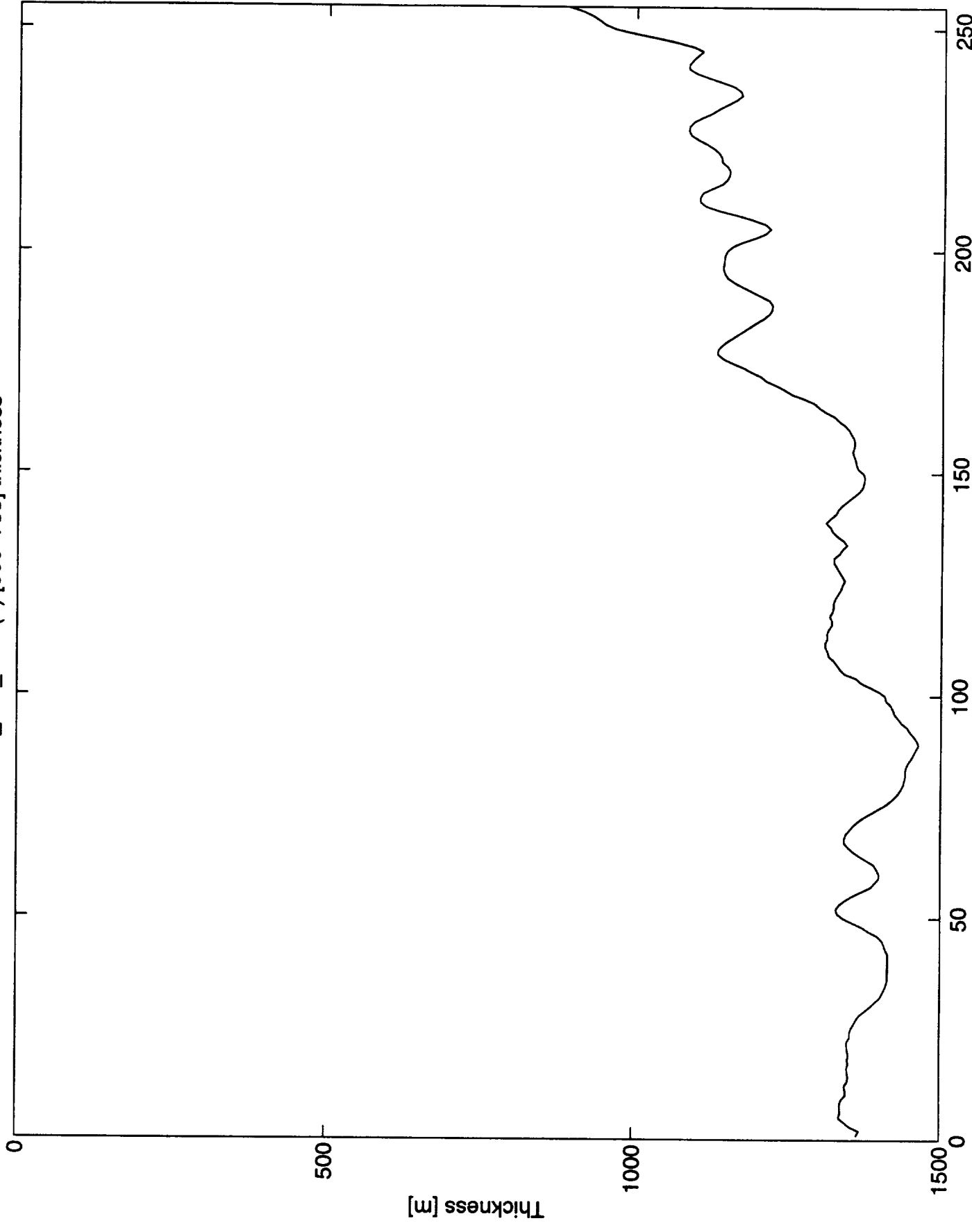
44.7016N



r_10x_11.1 (1) [500-755]



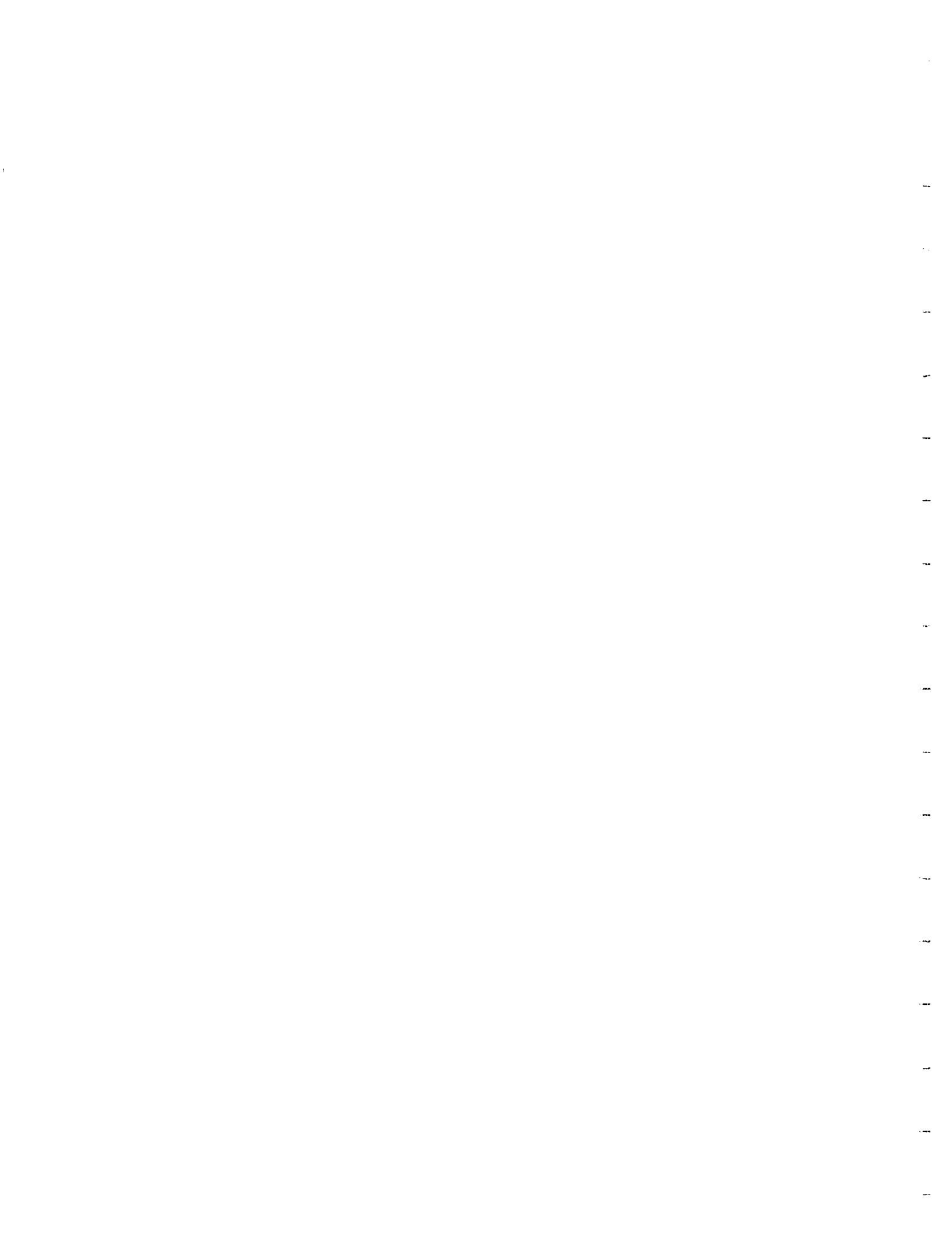
r_10x_11.1 (1) [500-755] thickness

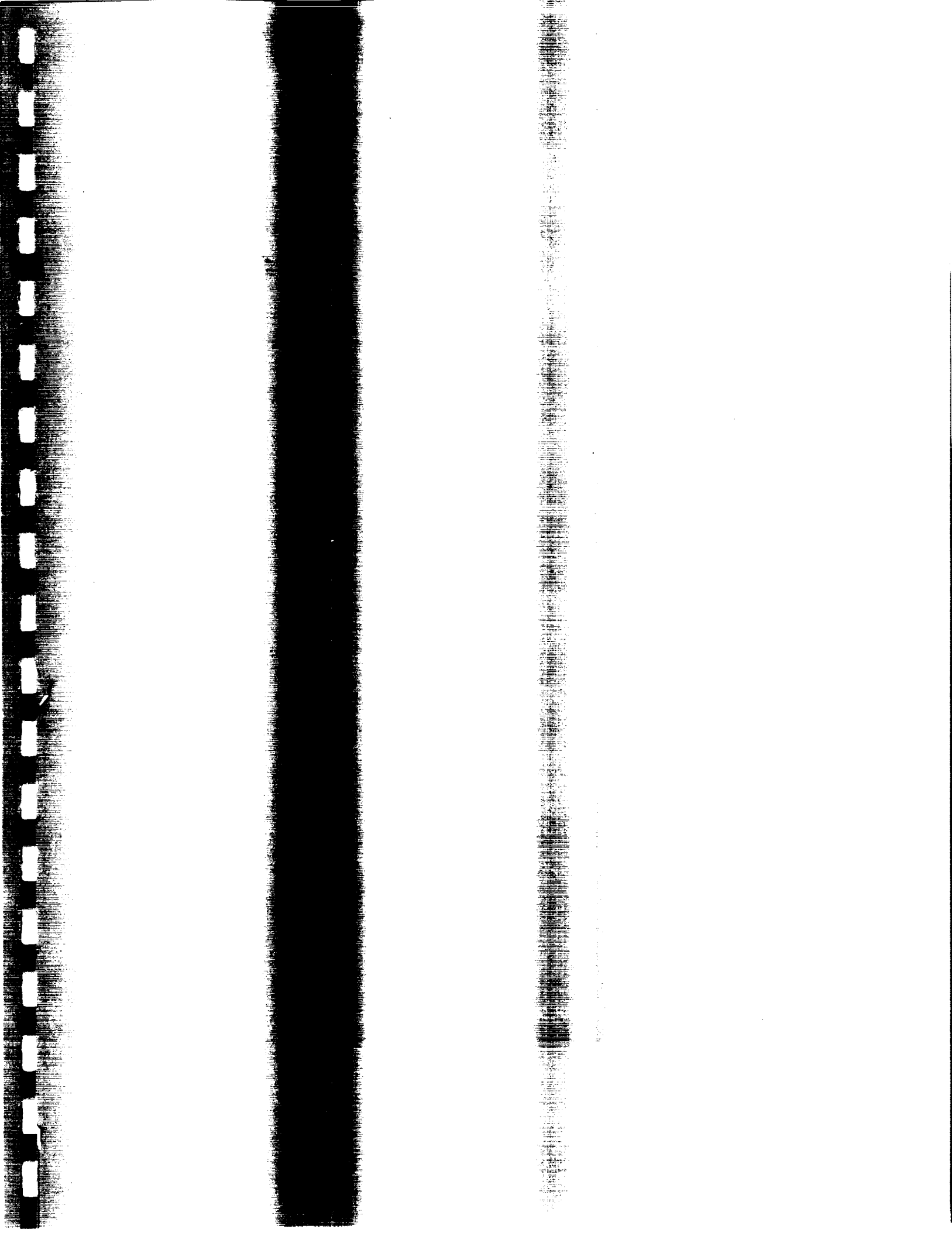


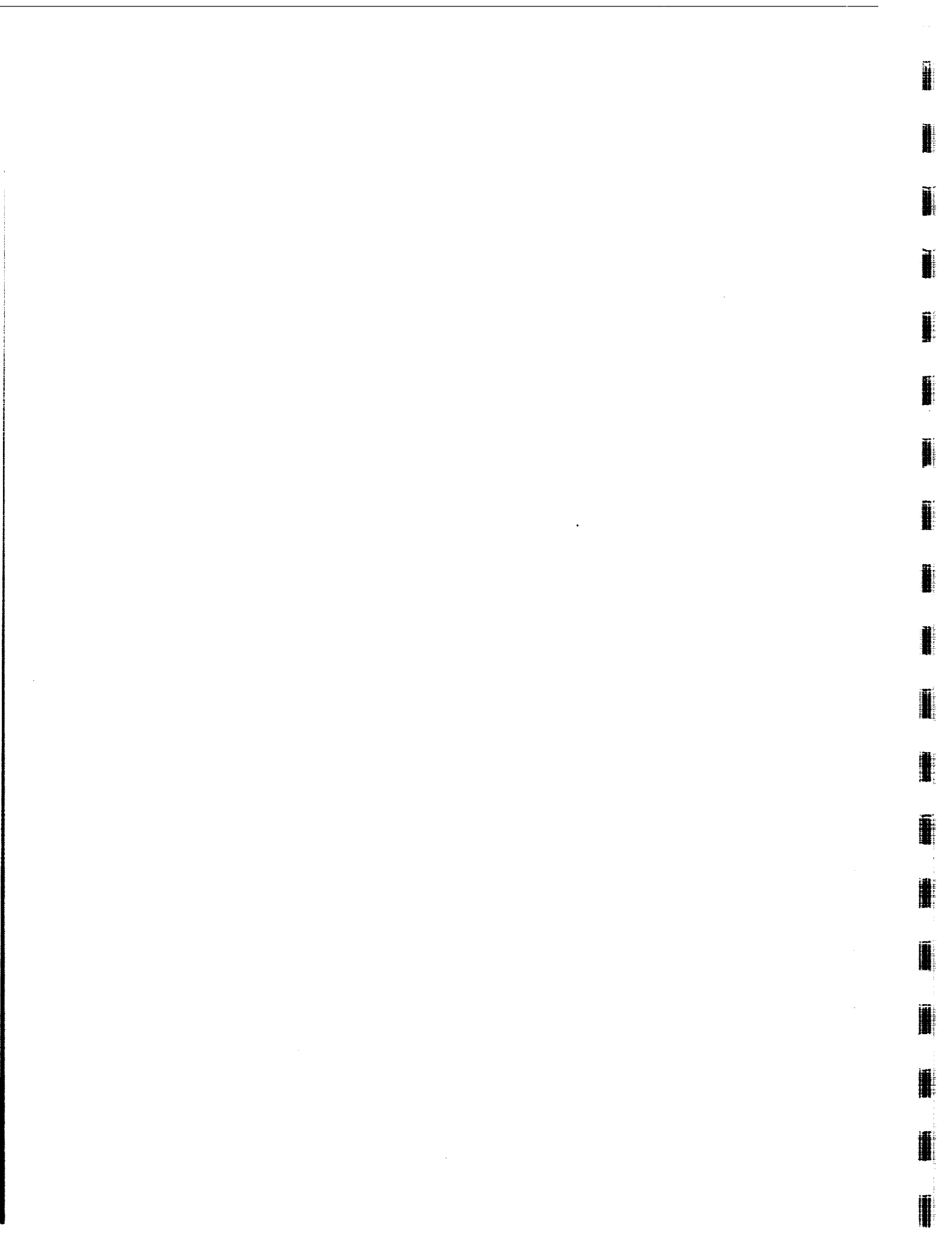
7.33M N 8.33N
7.53M N 8.33N
7.53M N 8.33N
8.150M N 8.33N
8.150M N 8.33N
8.472M N 8.33N
8.625M N 8.33N

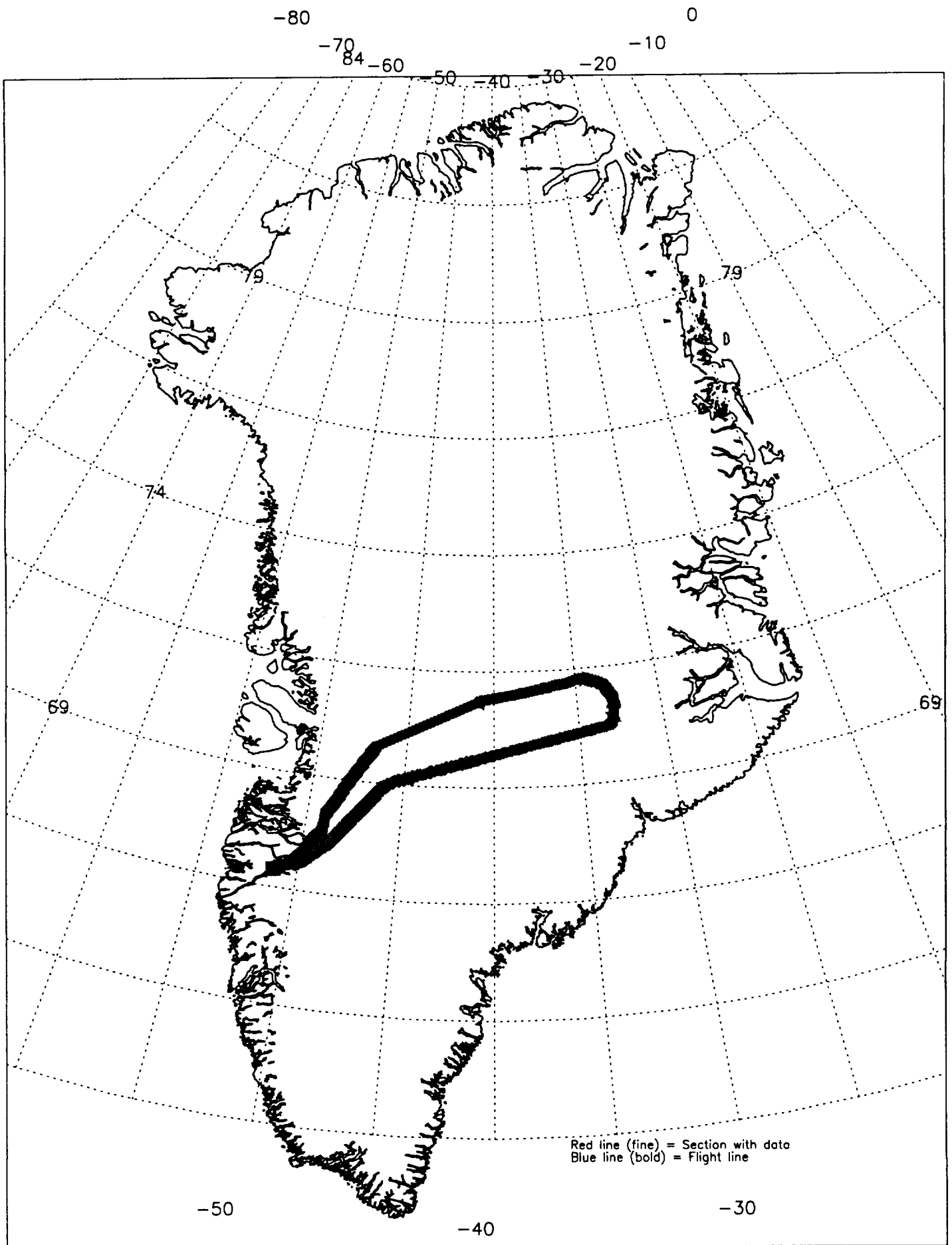
Appendix F

July 2, 1993

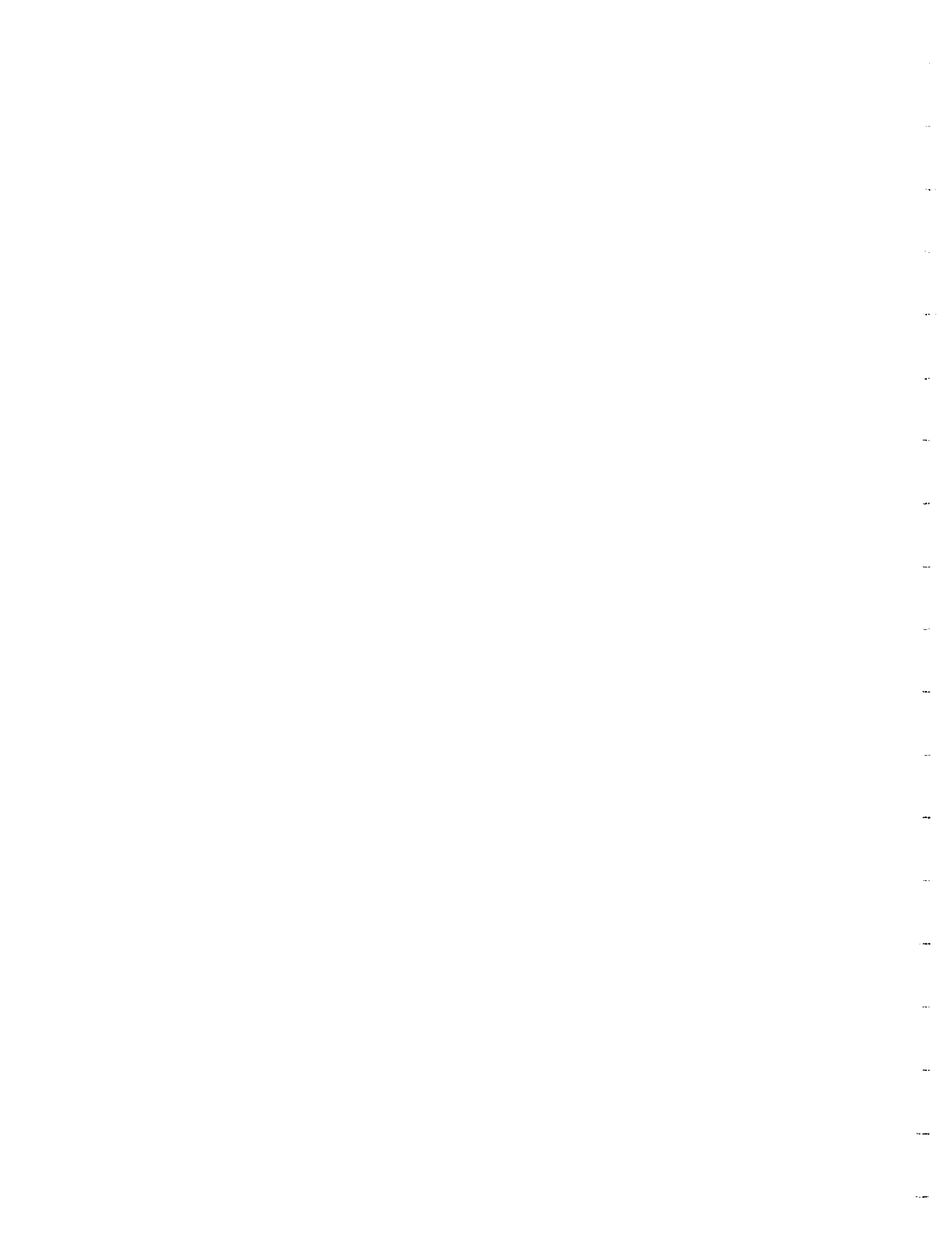




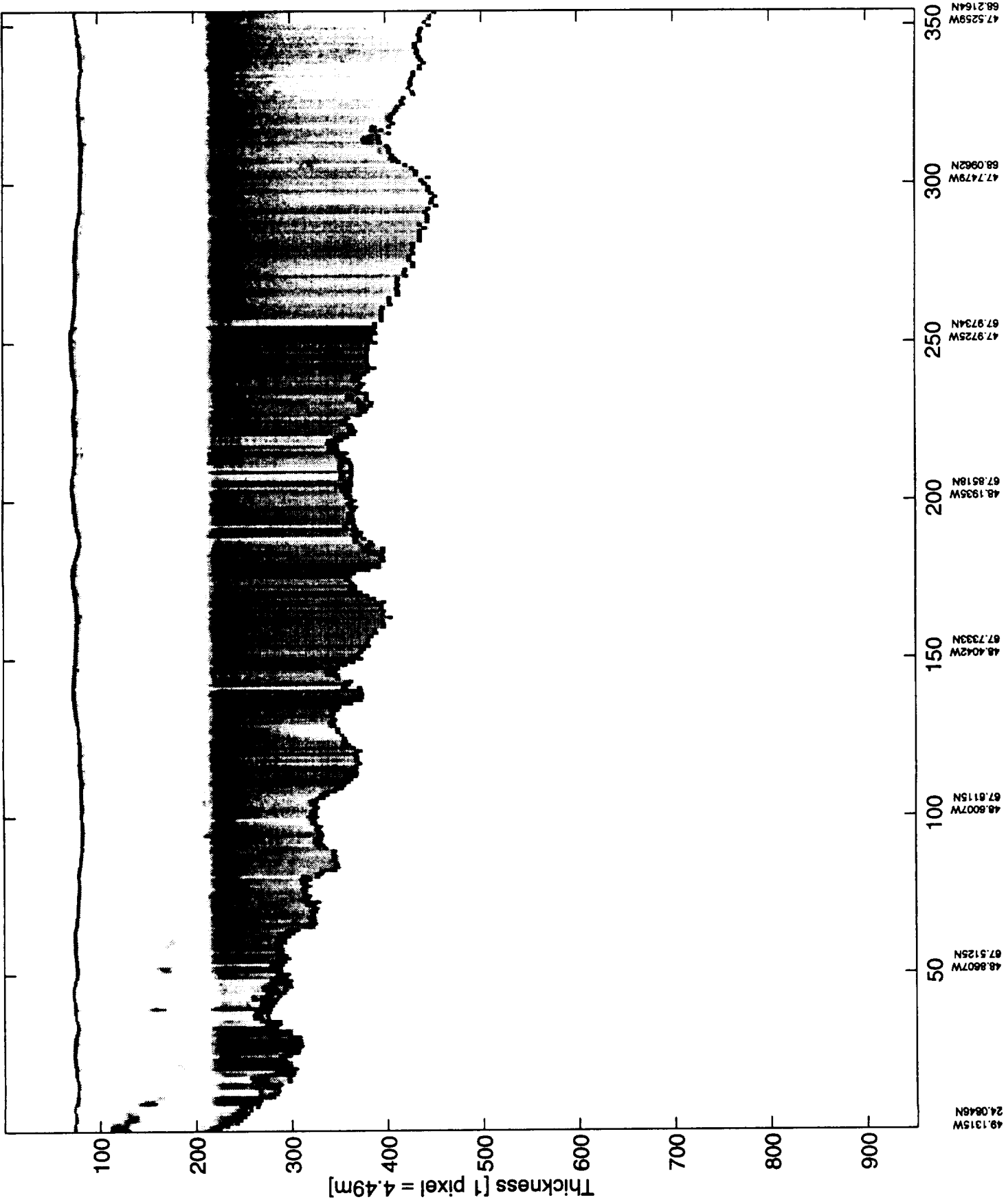




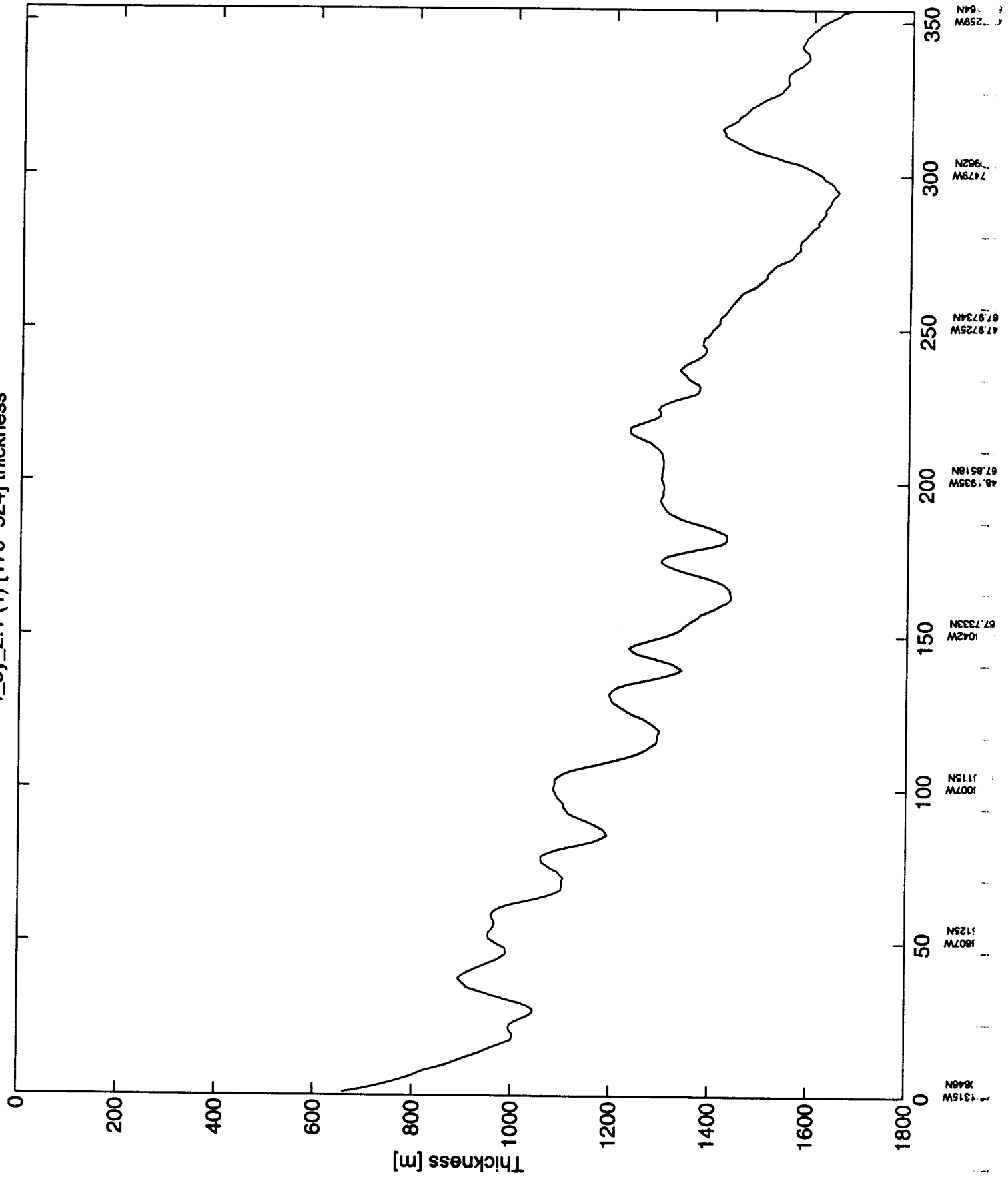
July 2, 1993 (r_5y)



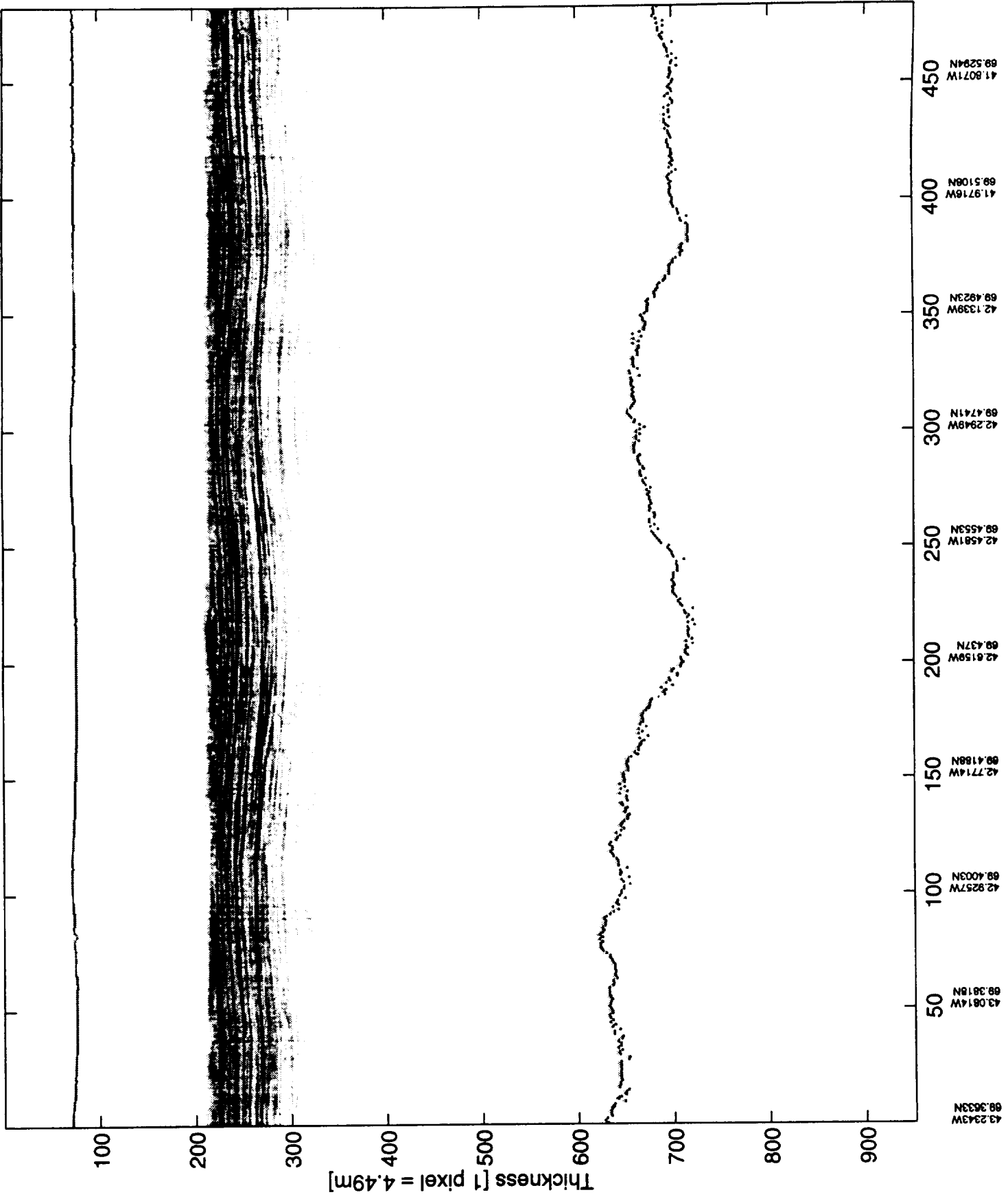
r_5y_2.1 (1) [170-524]



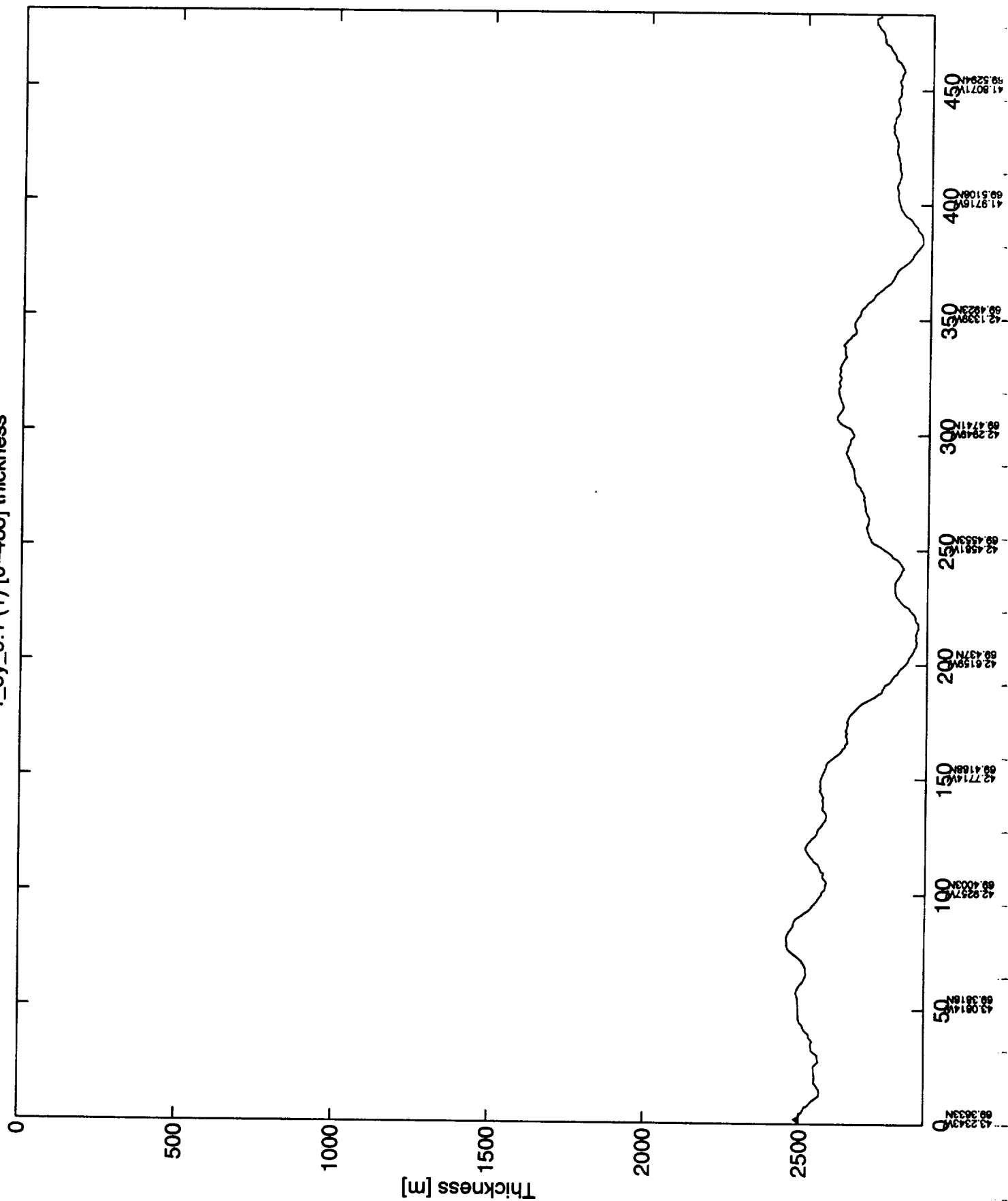
r_5y_2.1 (1) [170-524] thickness



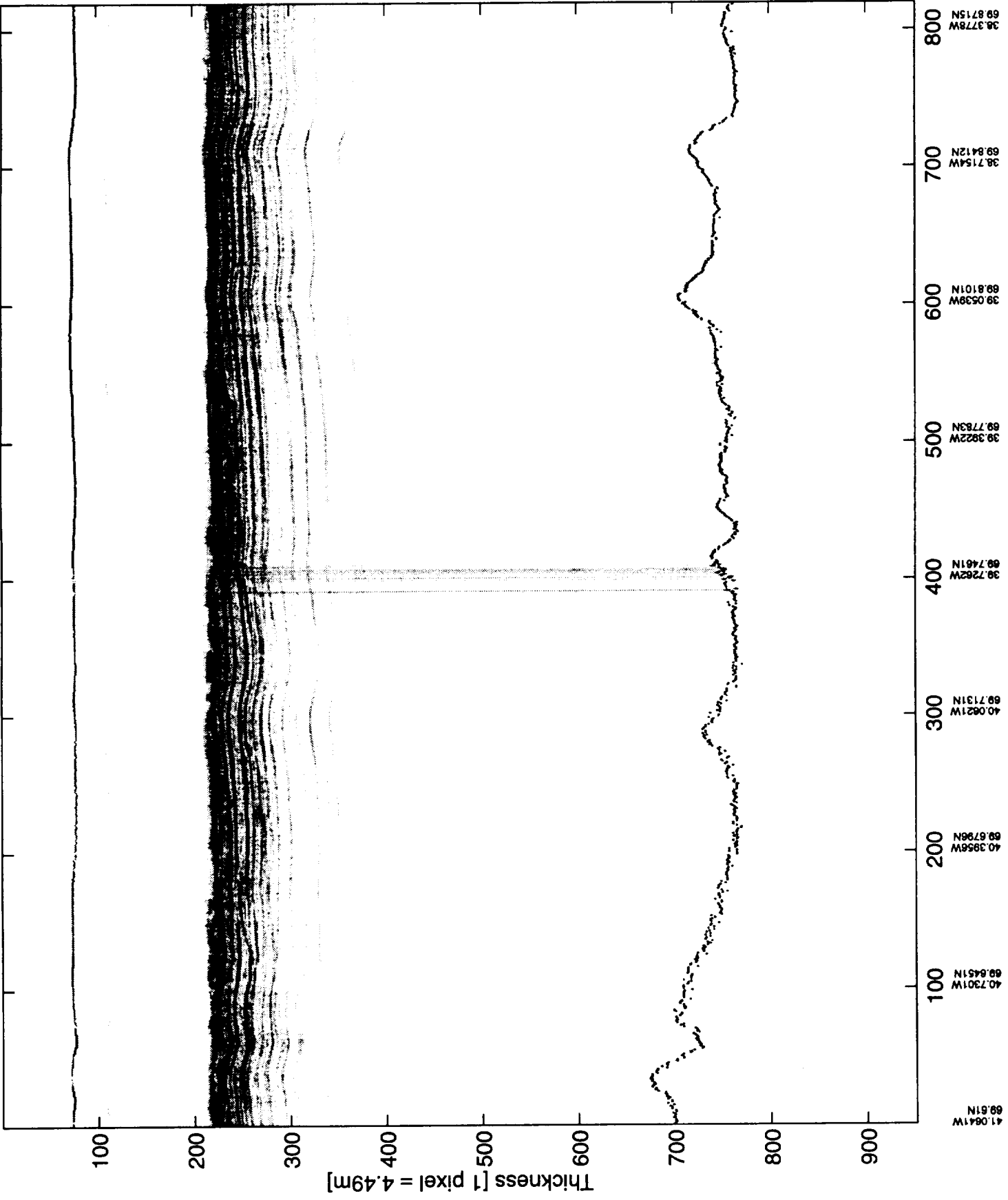
r_5y_9.1 (1) [0-483]



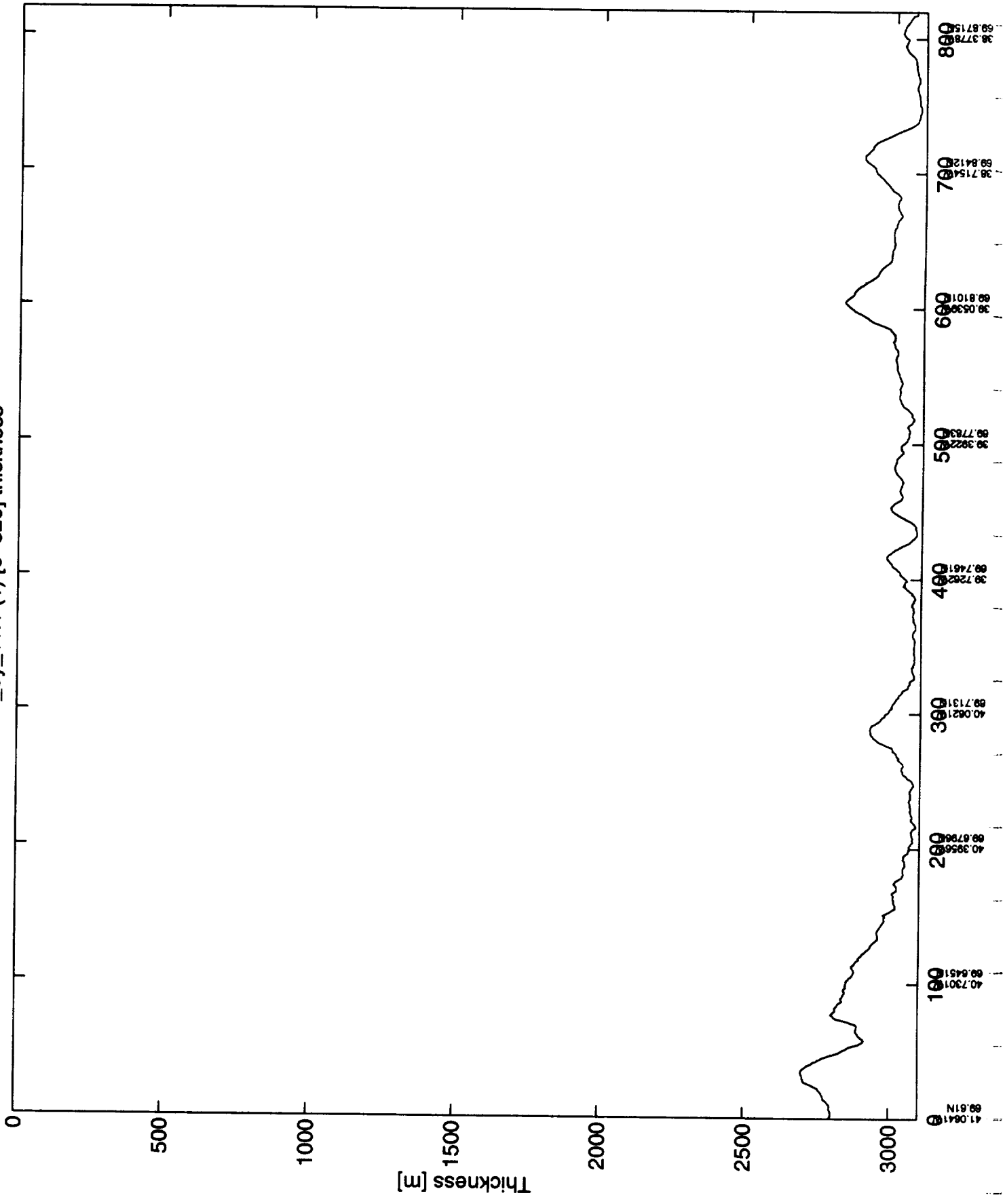
r_5y_9.1 (1) [0-483] thickness



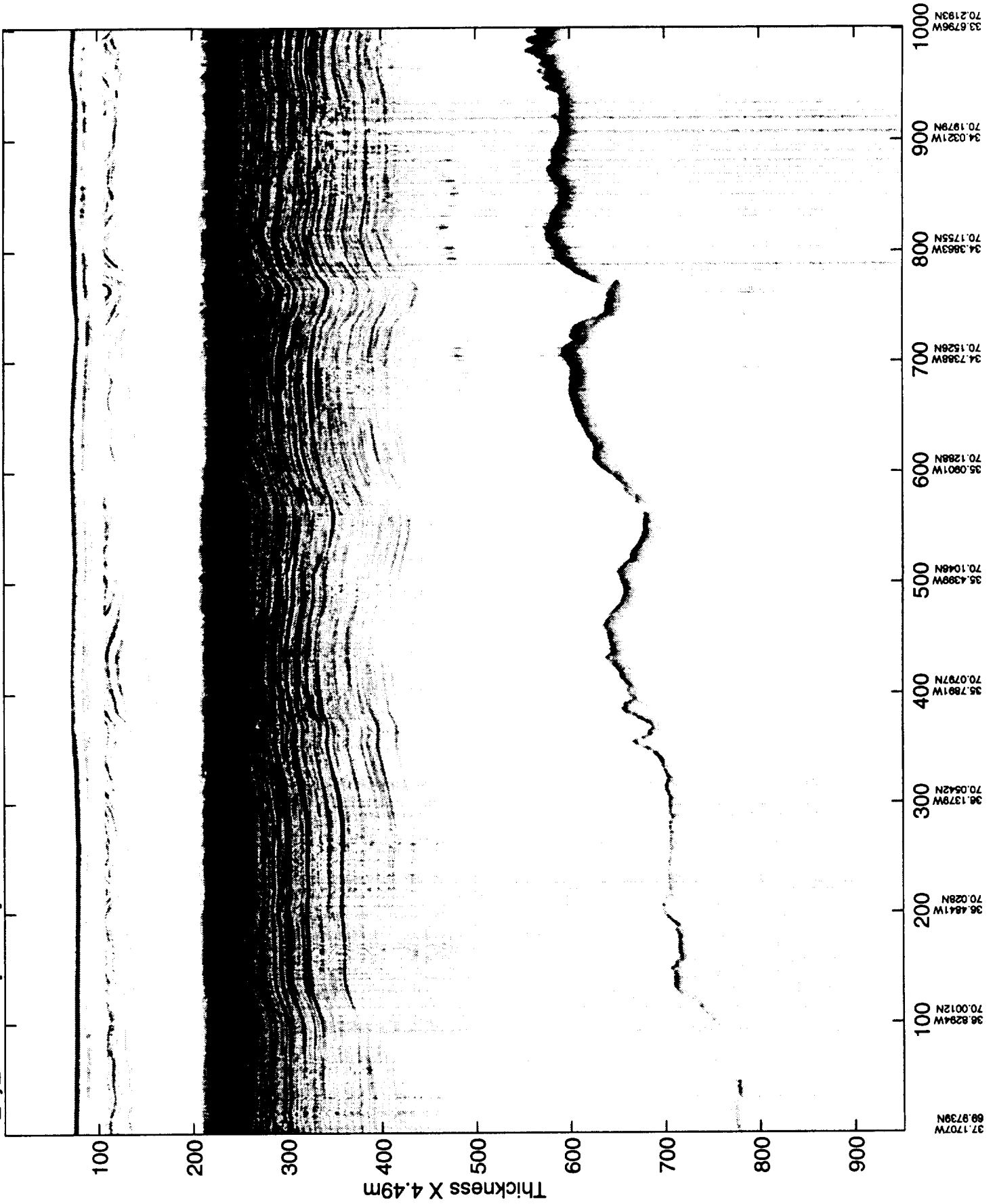
r_5y_11.1 (1) [0-810]



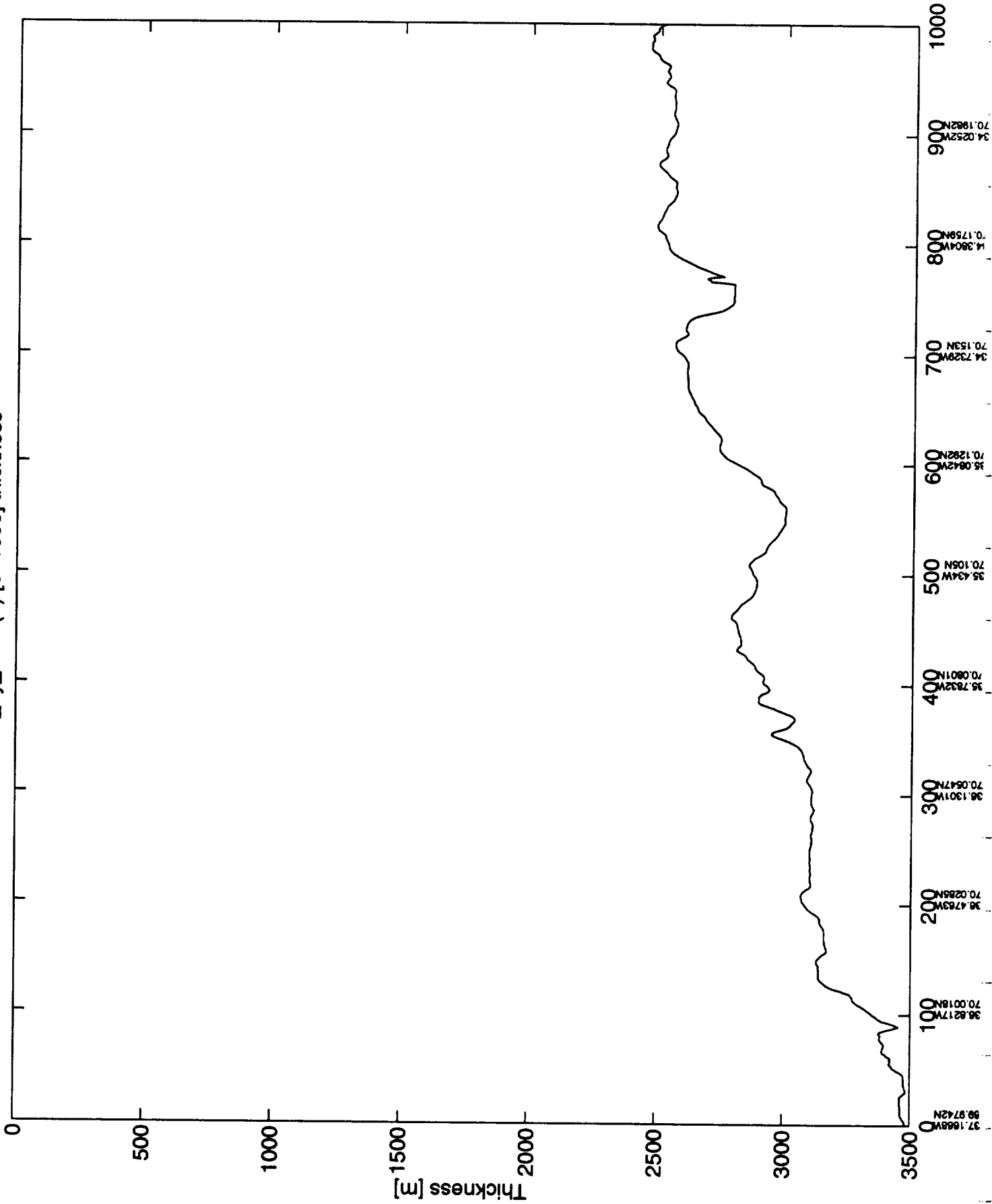
r_5y_11.1 (1) [0-820] thickness



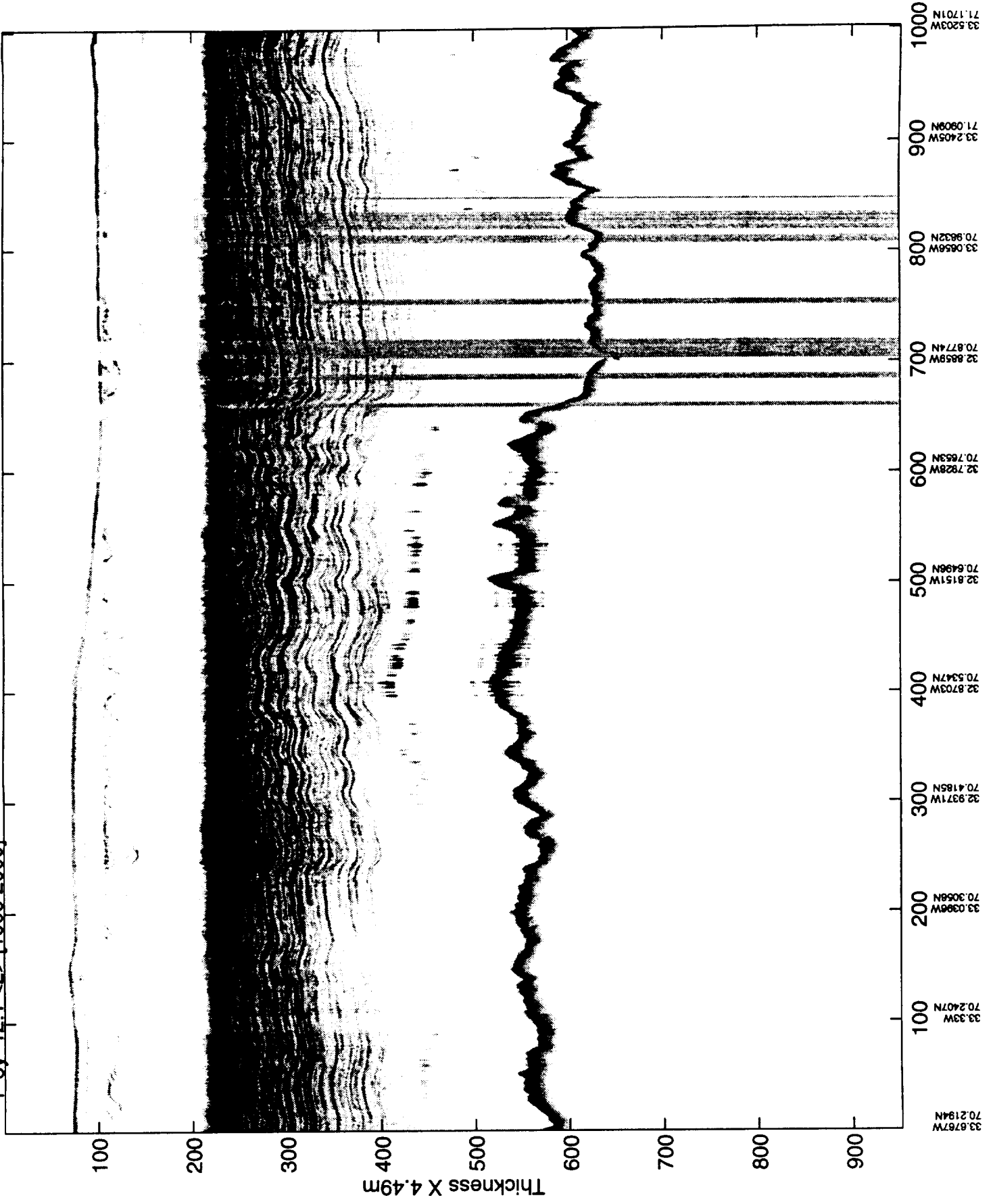
r_5y_12.1 <1> [0 1000]



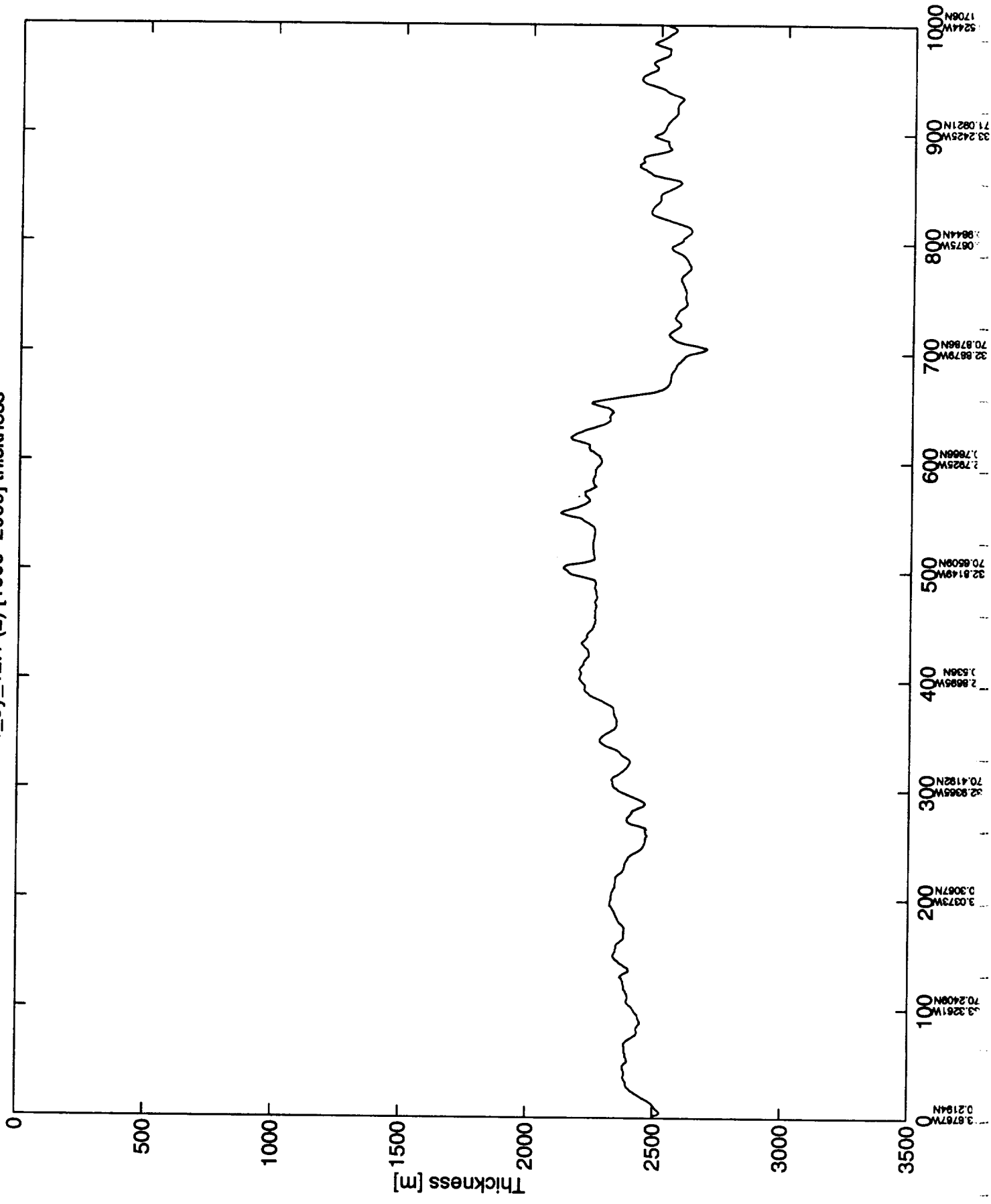
r_5y_12.1 (1) [0-1000] thickness



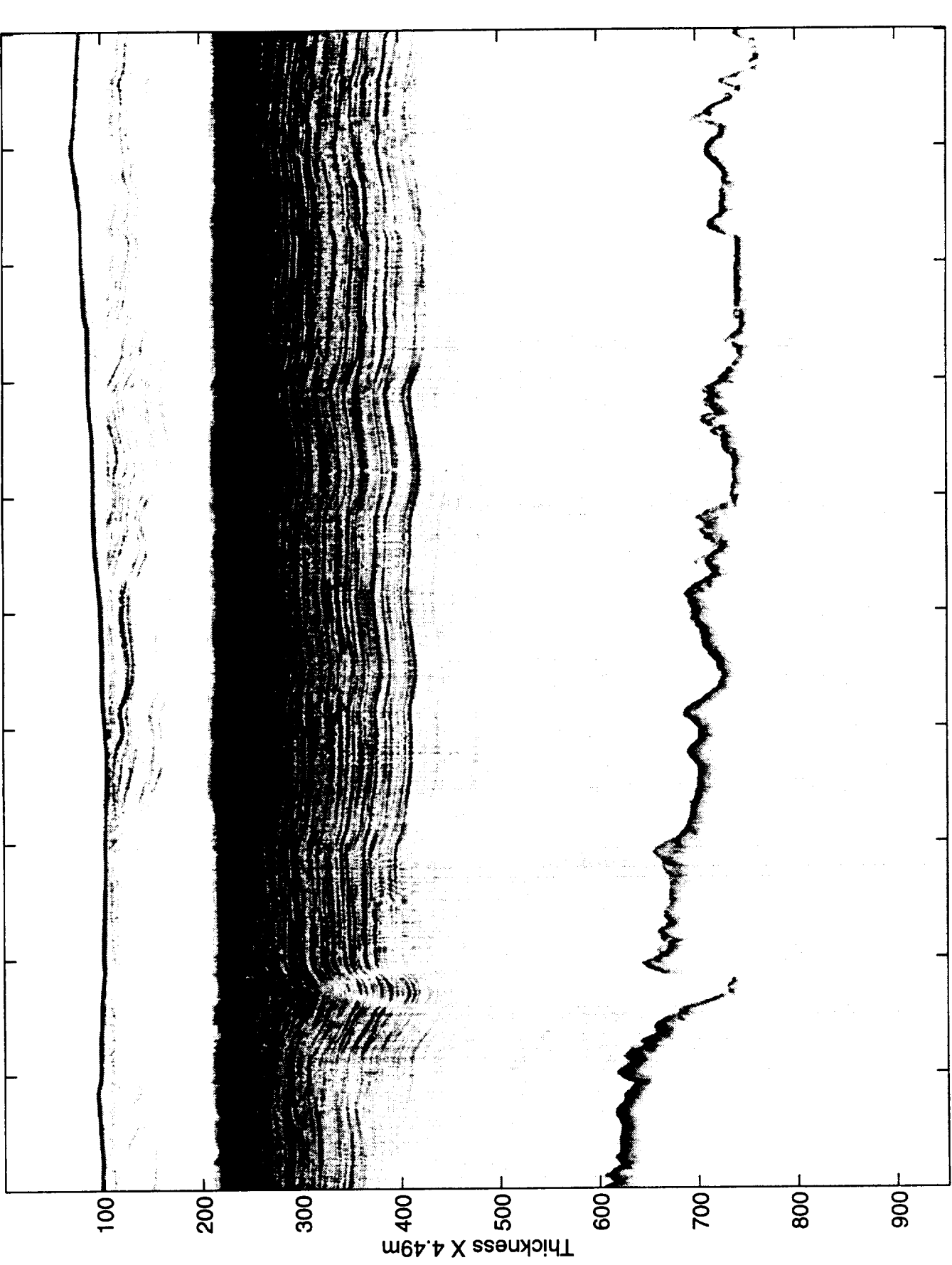
r 5y 12.1 <2> [1000 2000]



r_5y_12.1 (2) [1000-2000] thickness

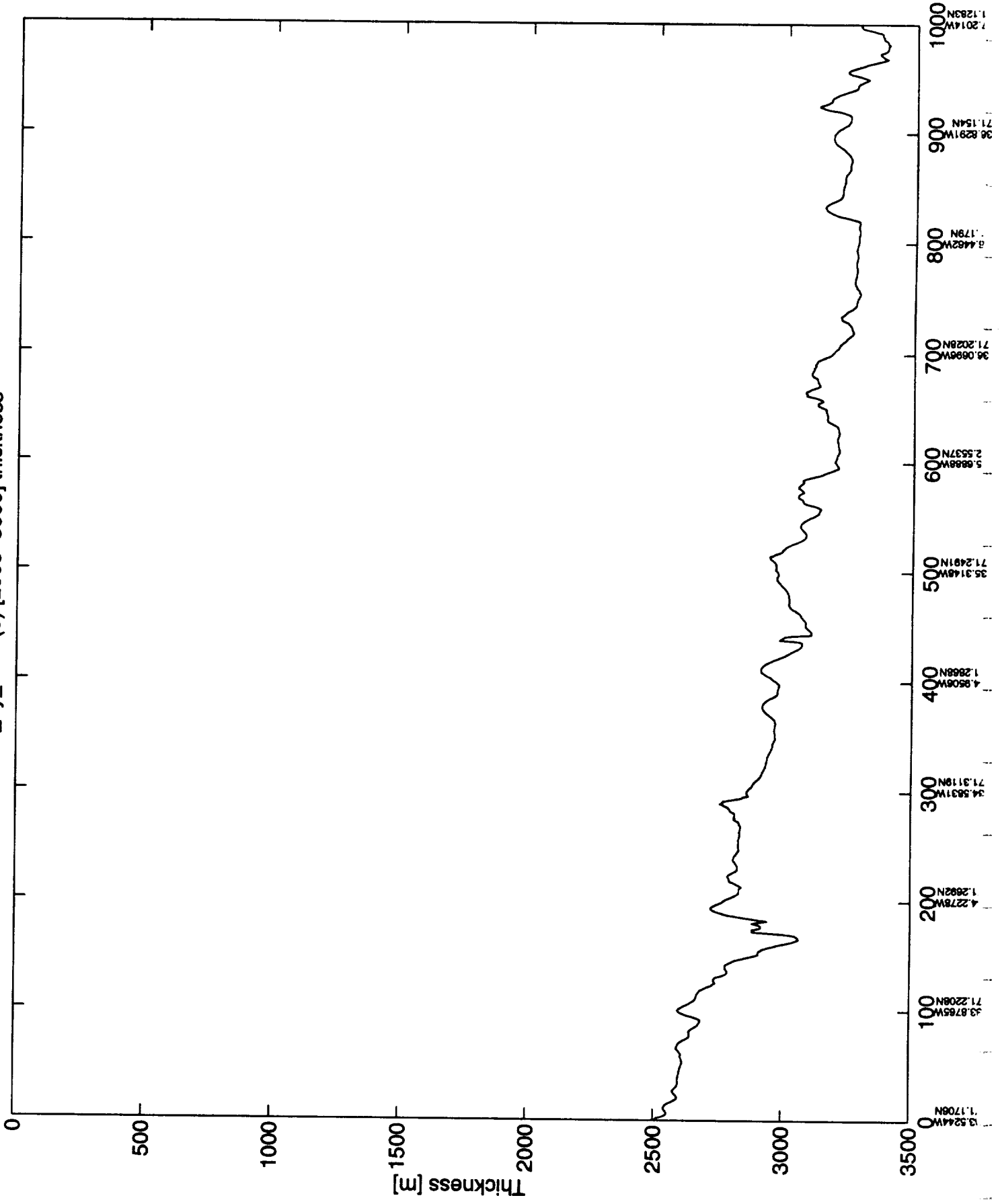


r_5y_12.1 <3> [2000 3000]

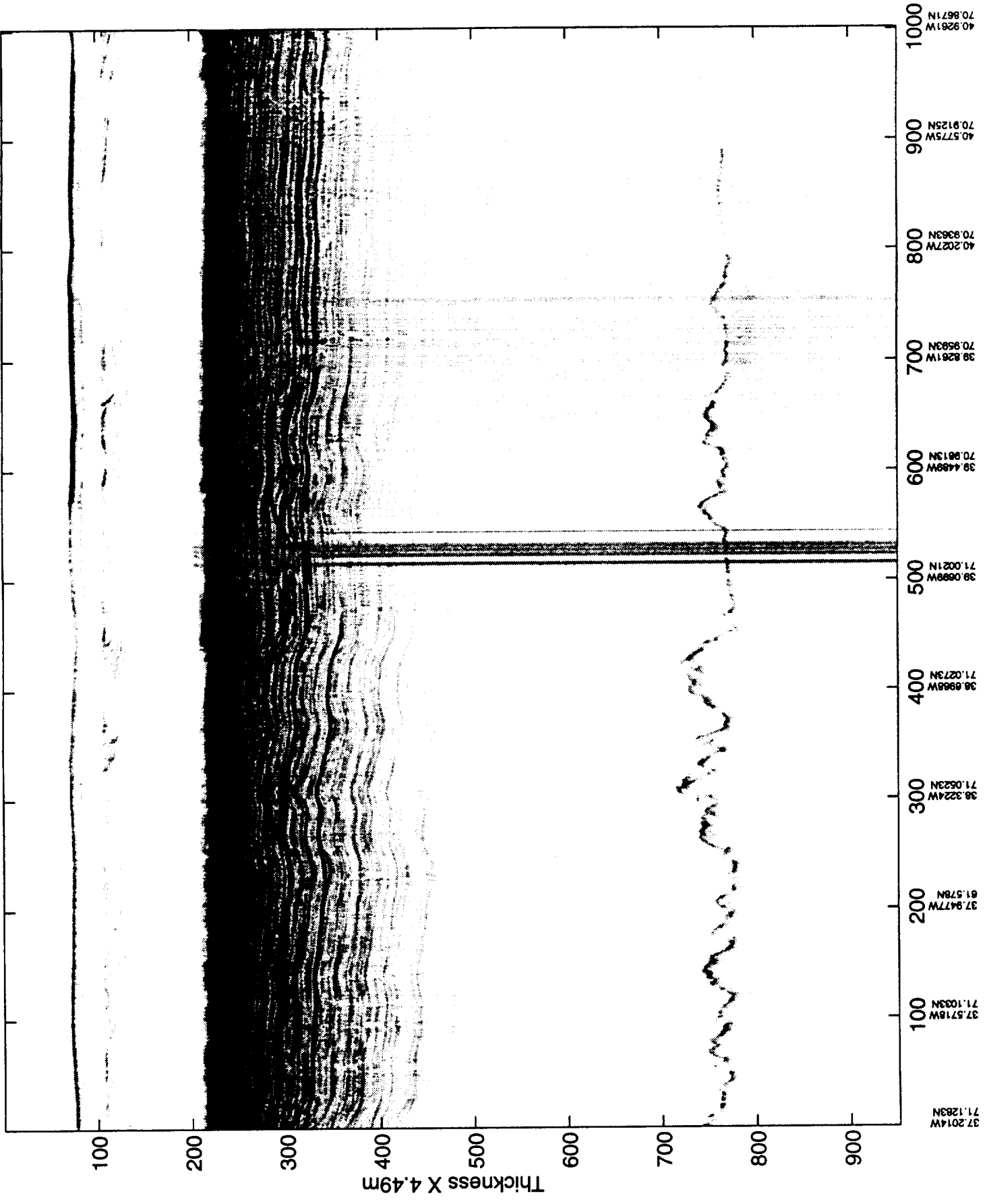


71.1706N
33.5244W
33.6726W
71.2202N
34.2239W
71.2666N
34.5789W
71.3118N
34.9466W
71.2872N
35.3108W
71.2485N
35.6845W
71.2208N
36.0654W
71.203N
36.4411W
71.1791N
36.8248W
71.1542N
37.1994W
71.1284N

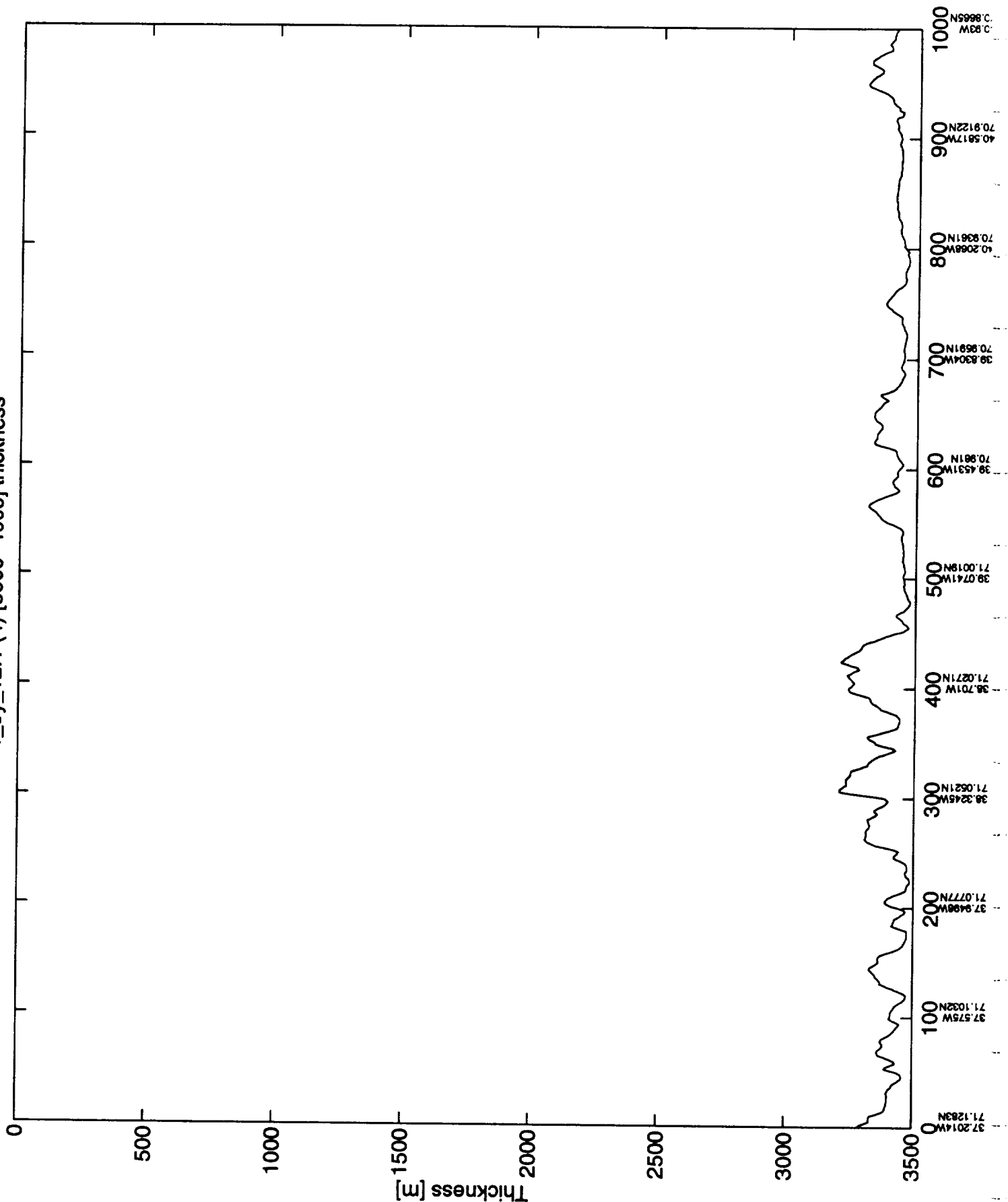
r_5y_12.1 (3) [2000-3000] thickness



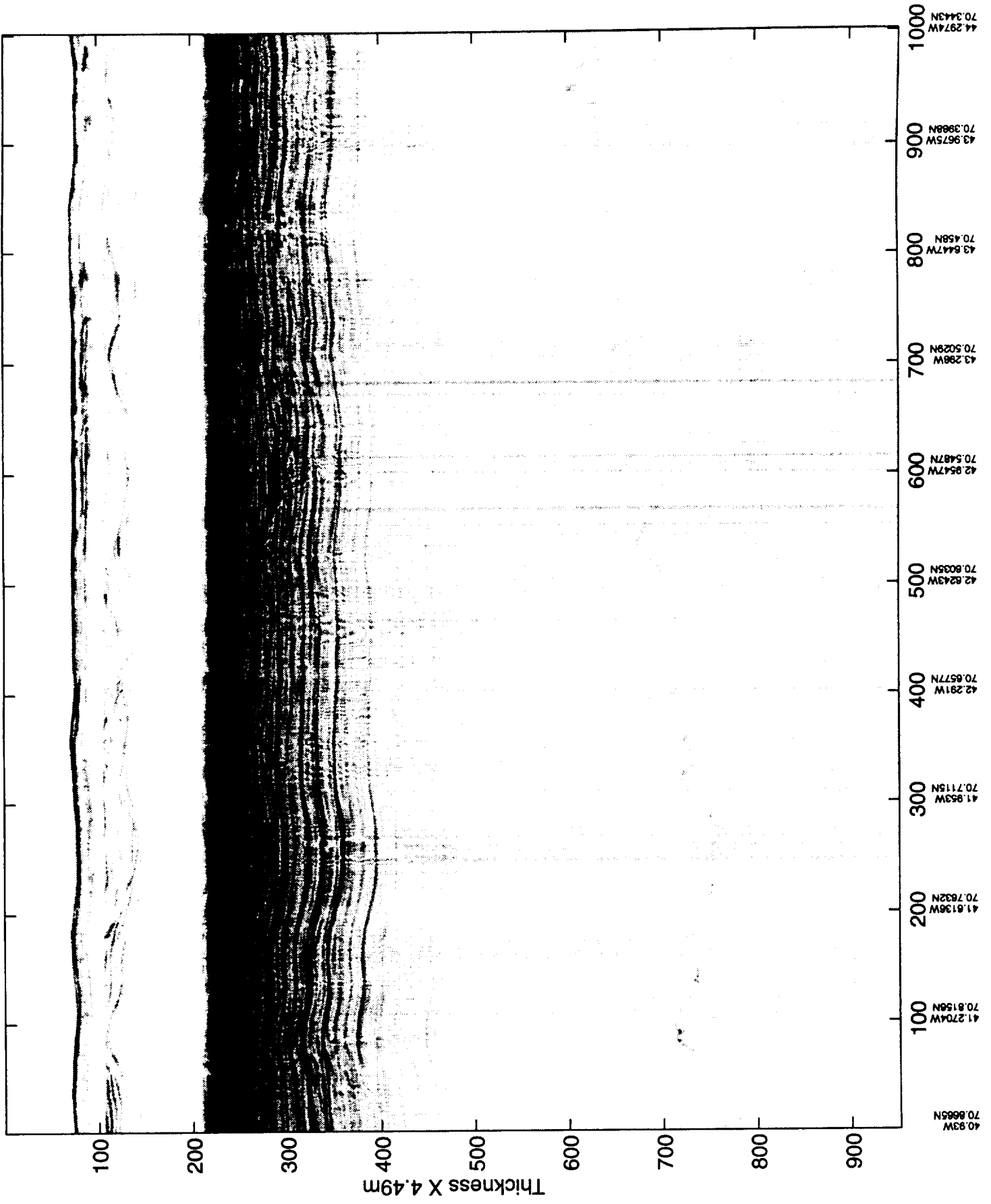
r_5y_12.1 <4> [3000 4000]



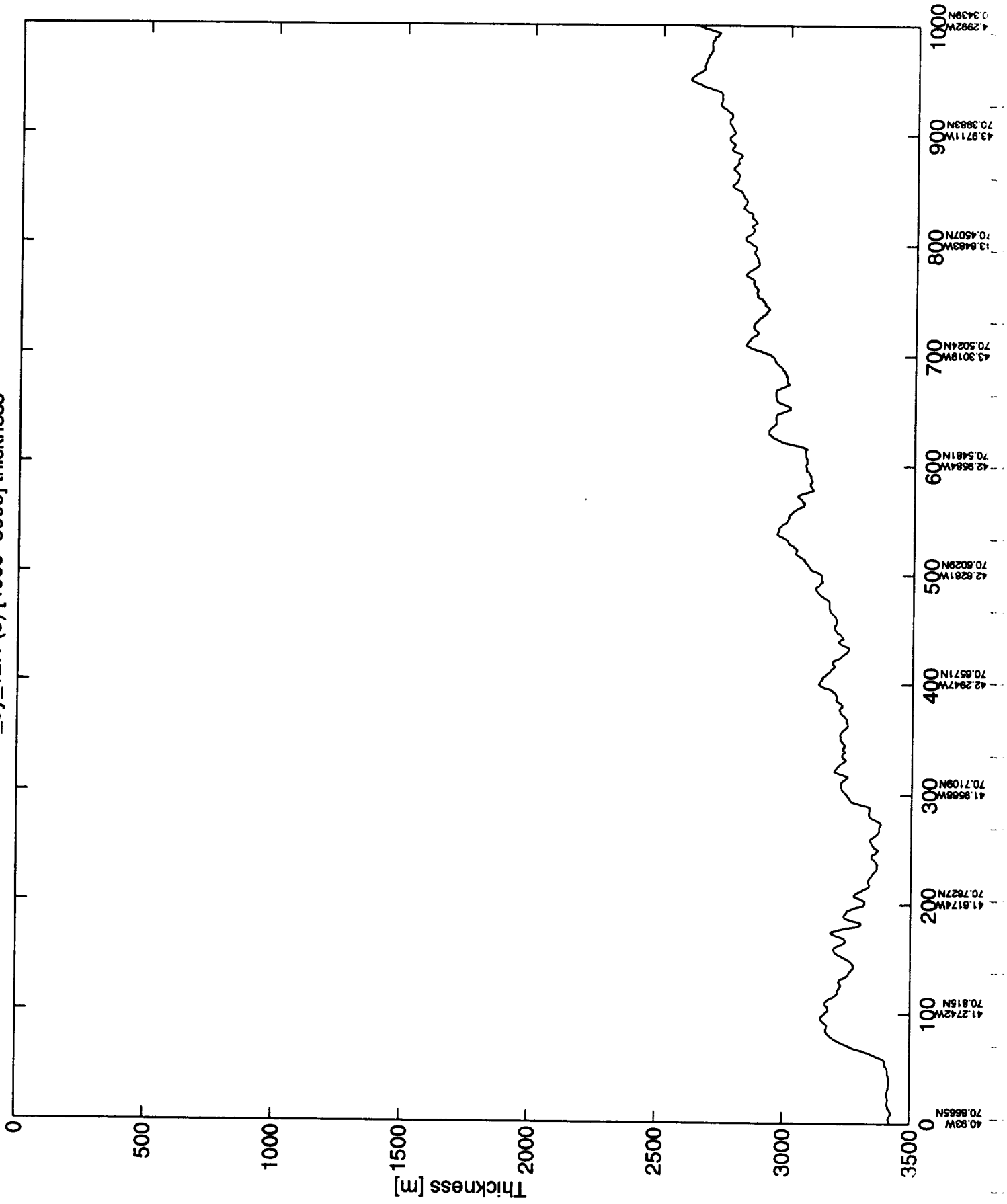
r_5y_12.1 (4) [3000-4000] thickness



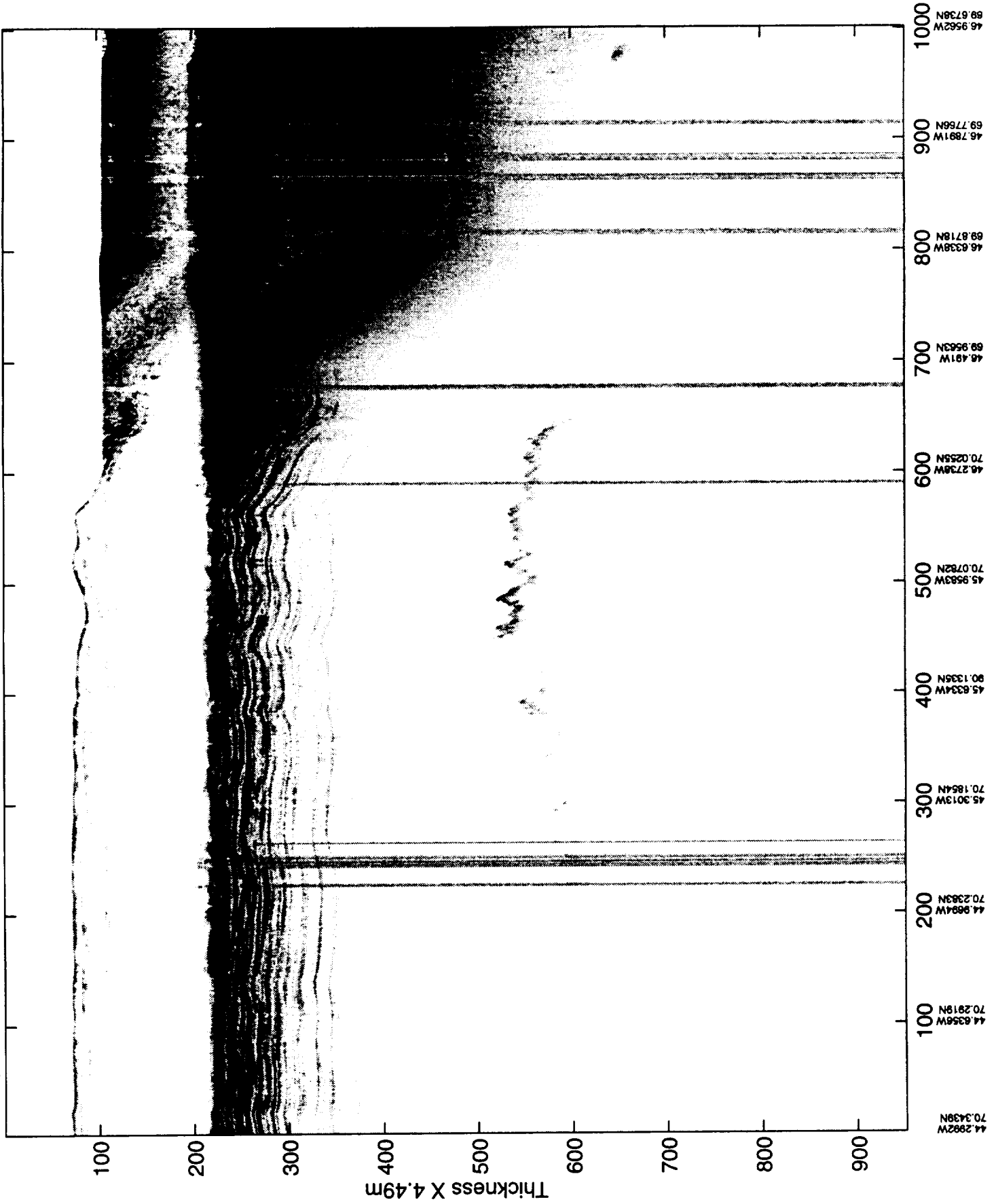
r_5y_12.1 <5> [4000 5000]



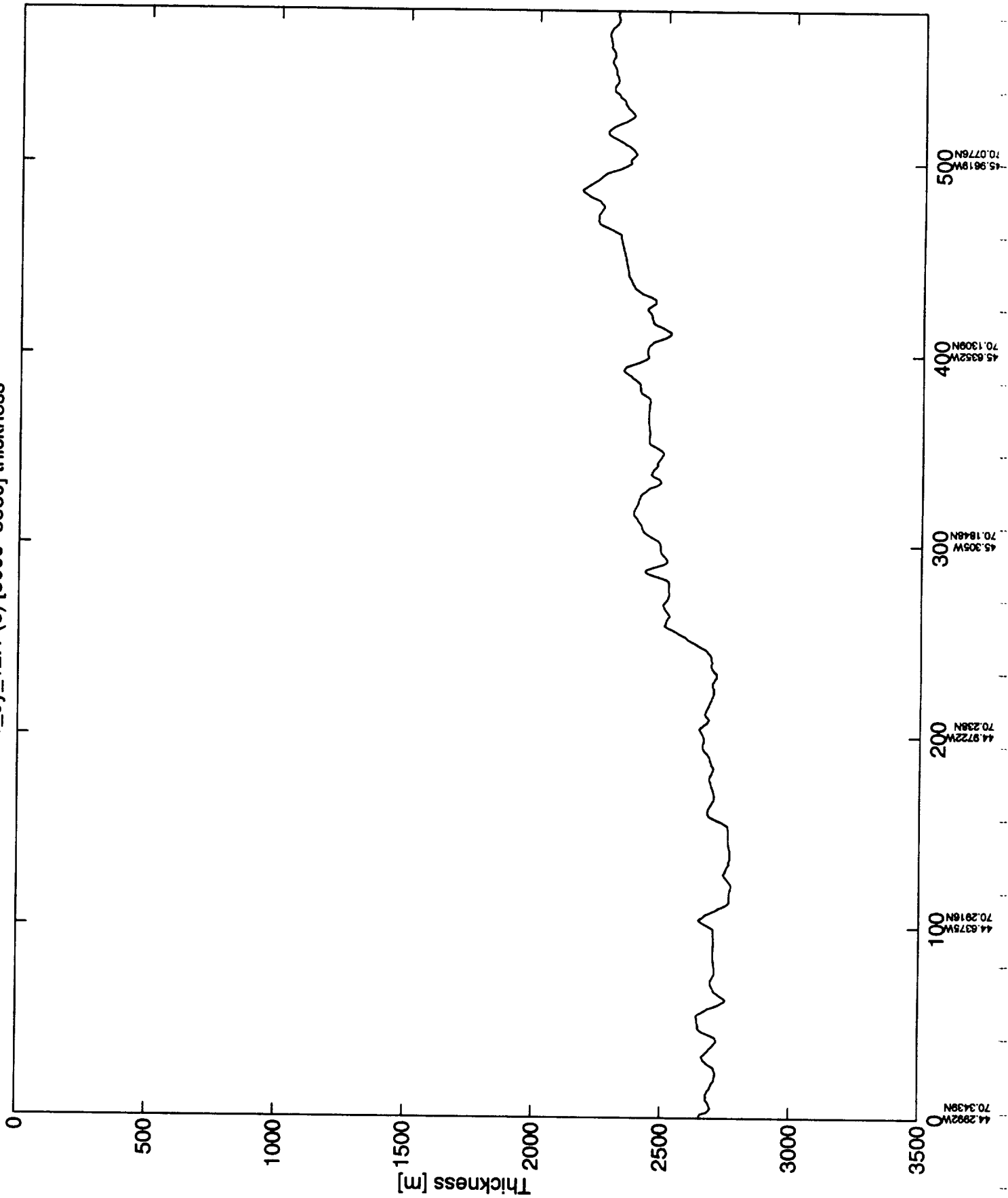
r_5y_12.1 (5) [4000-5000] thickness



r_5y_12.1 <6> [5000 6000]

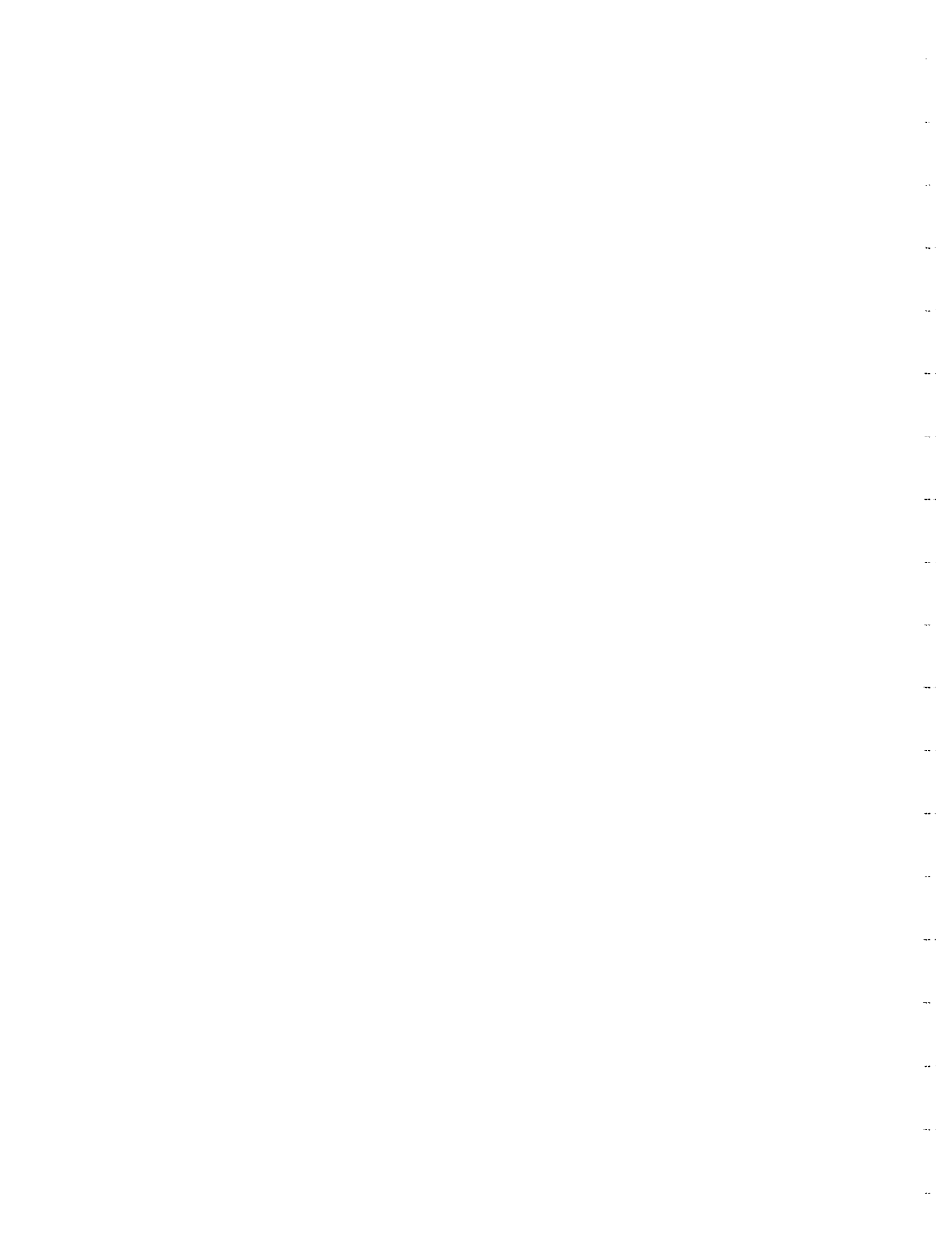


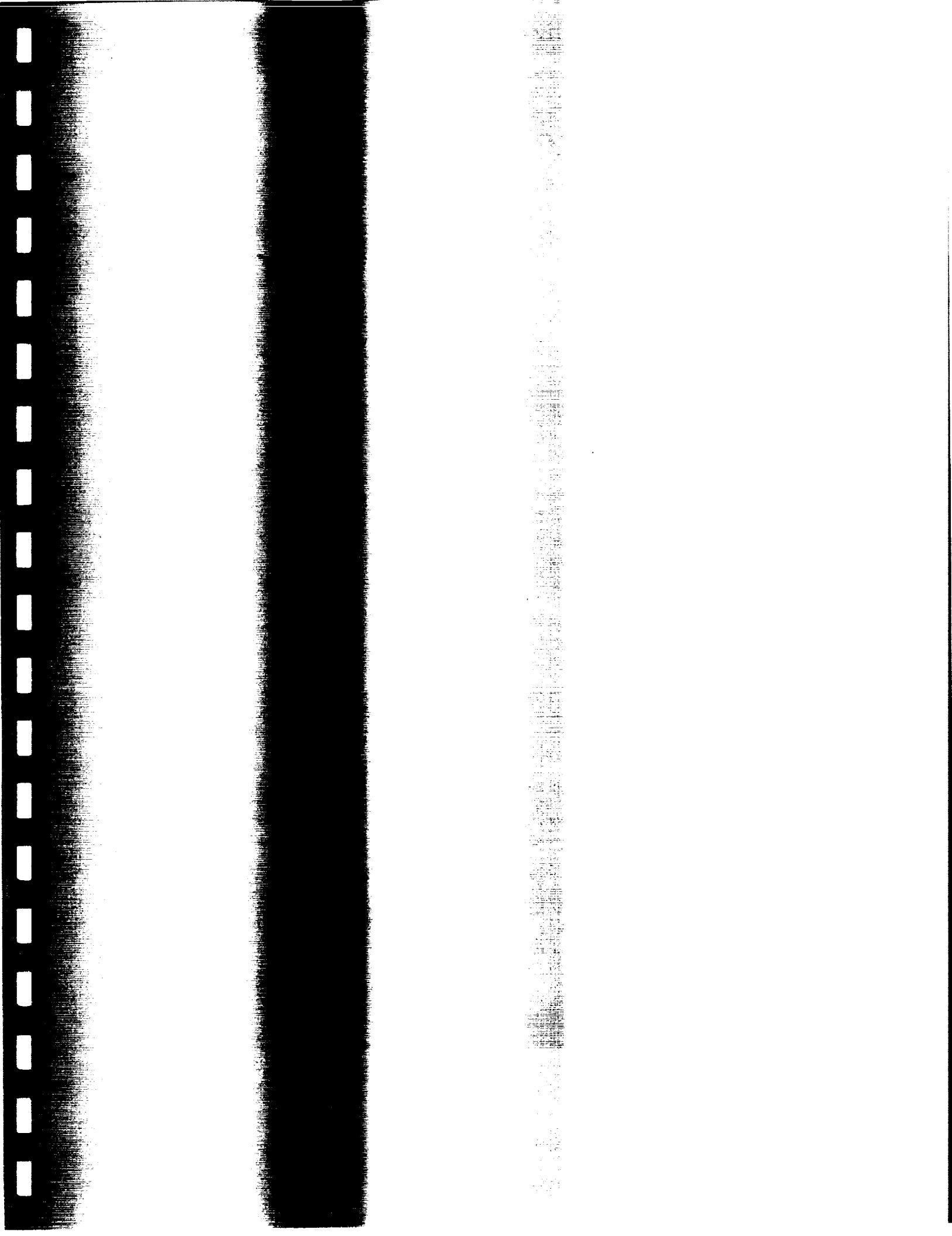
r_5y_12.1 (6) [5000-5580] thickness

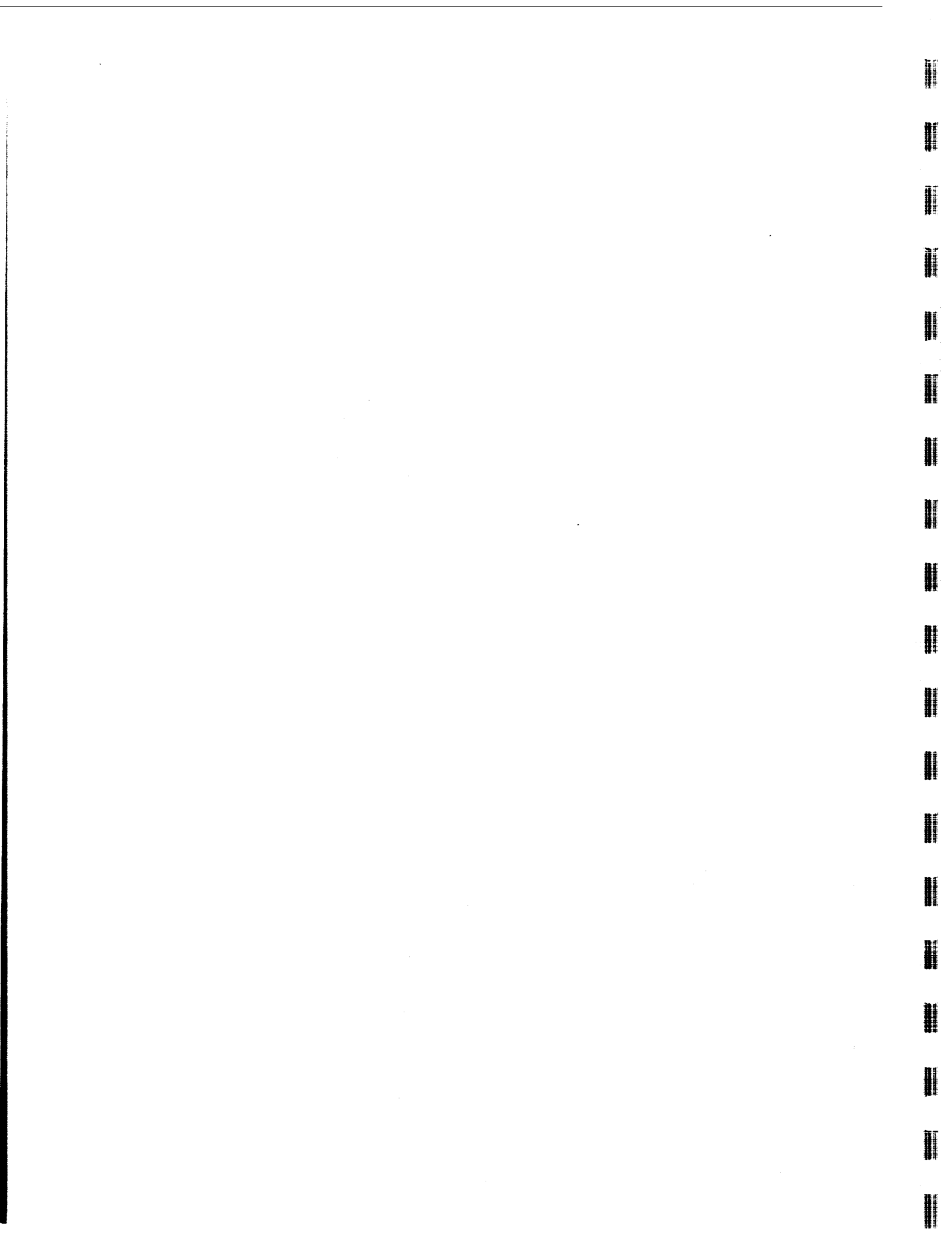


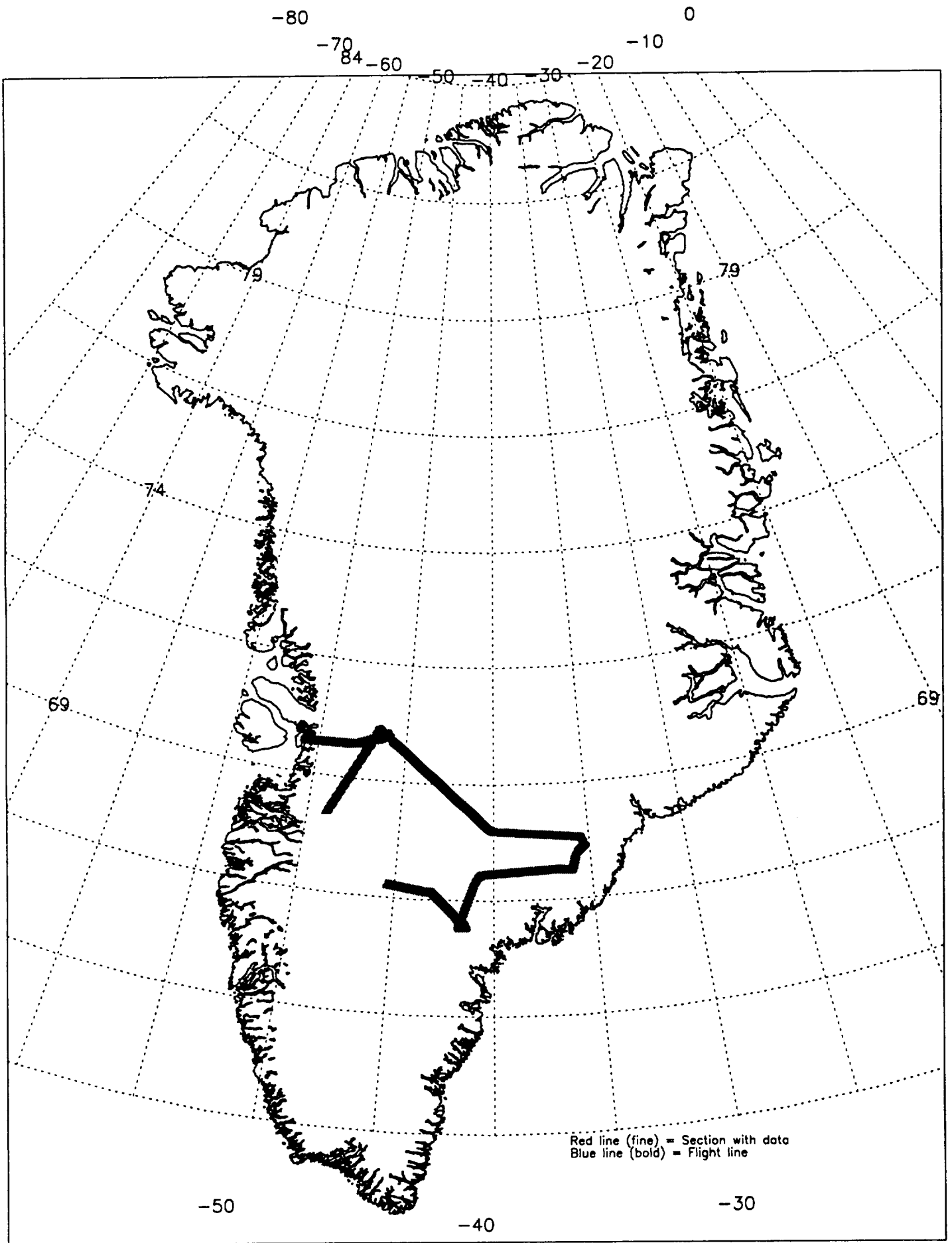
Appendix G

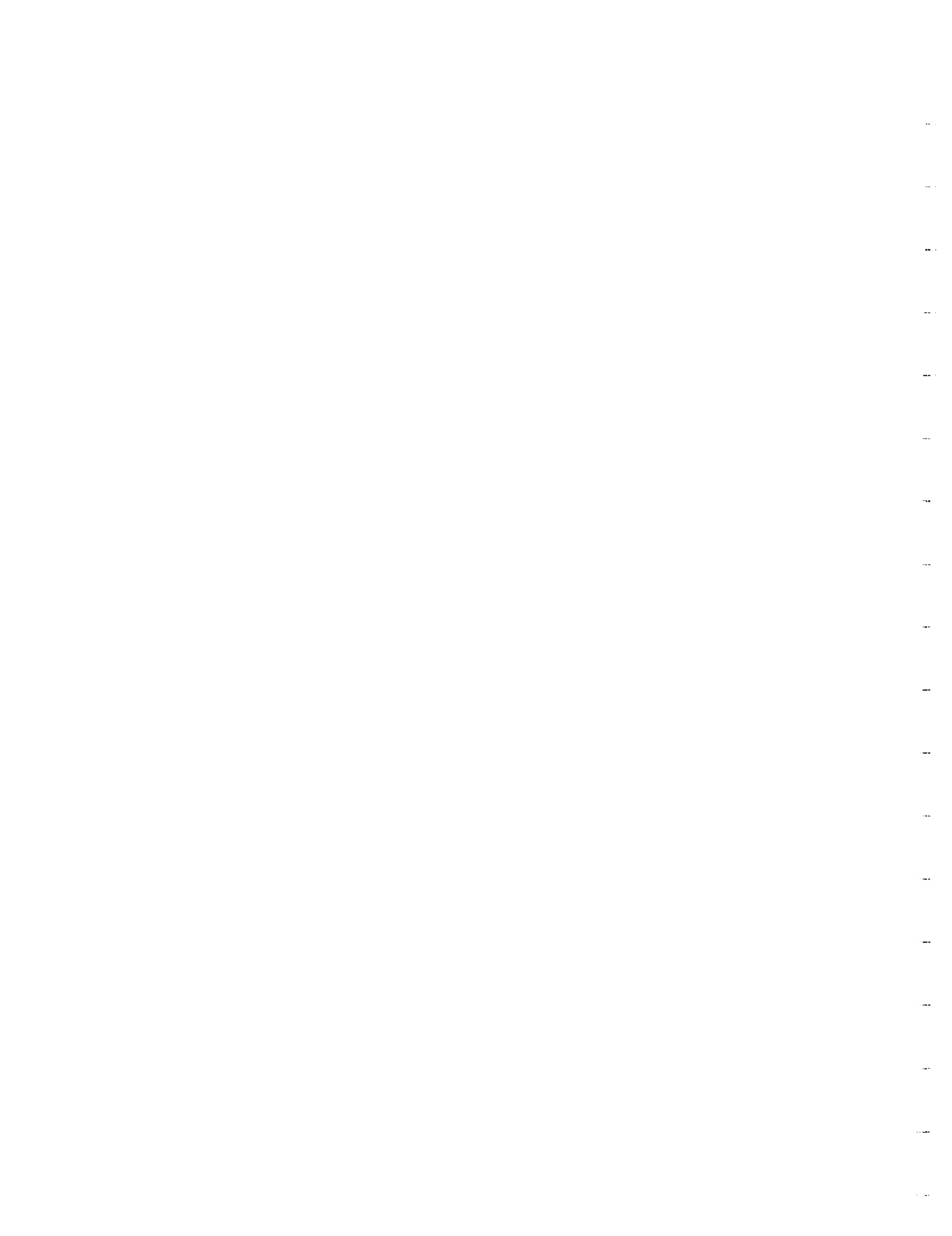
July 3, 1993



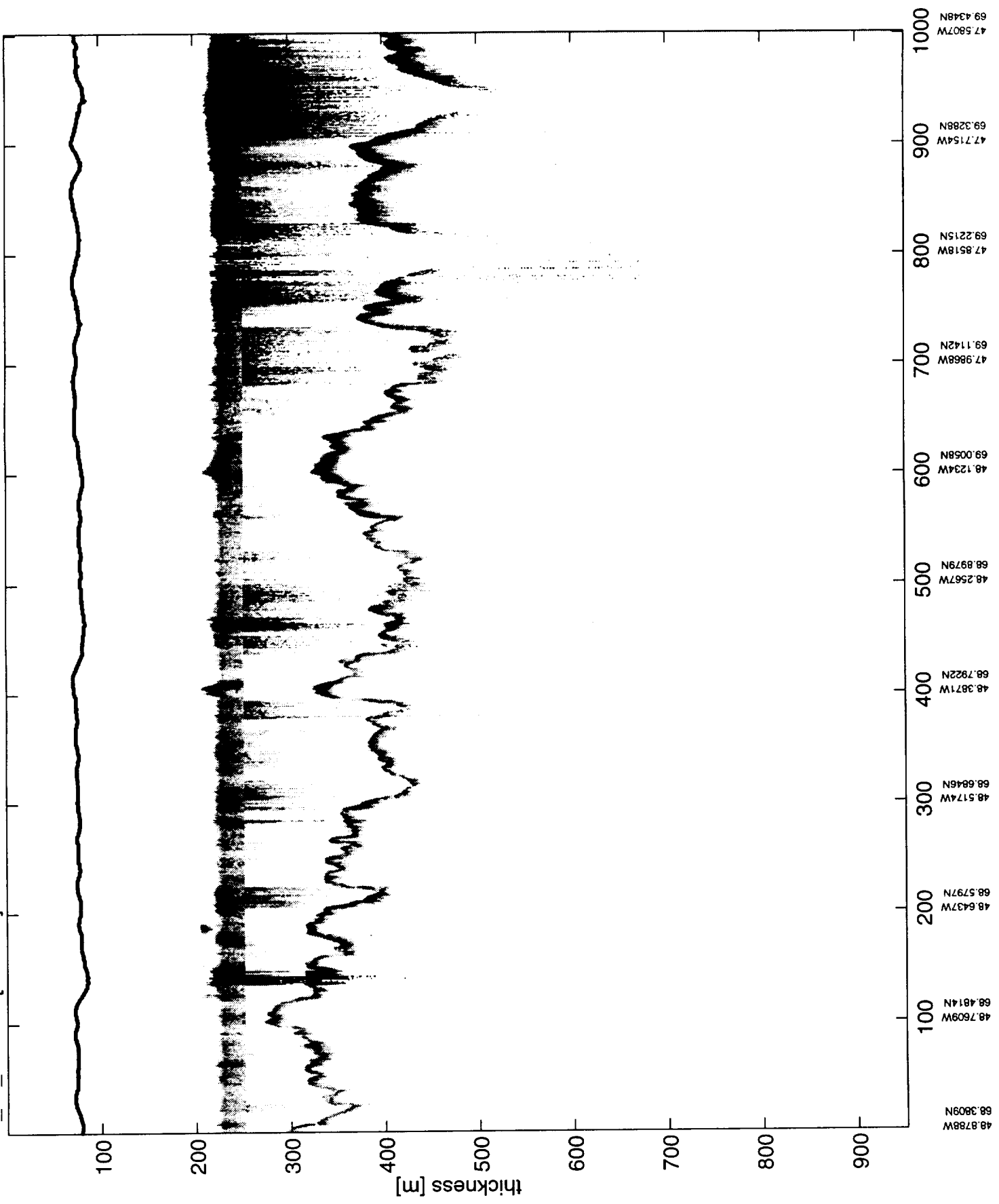




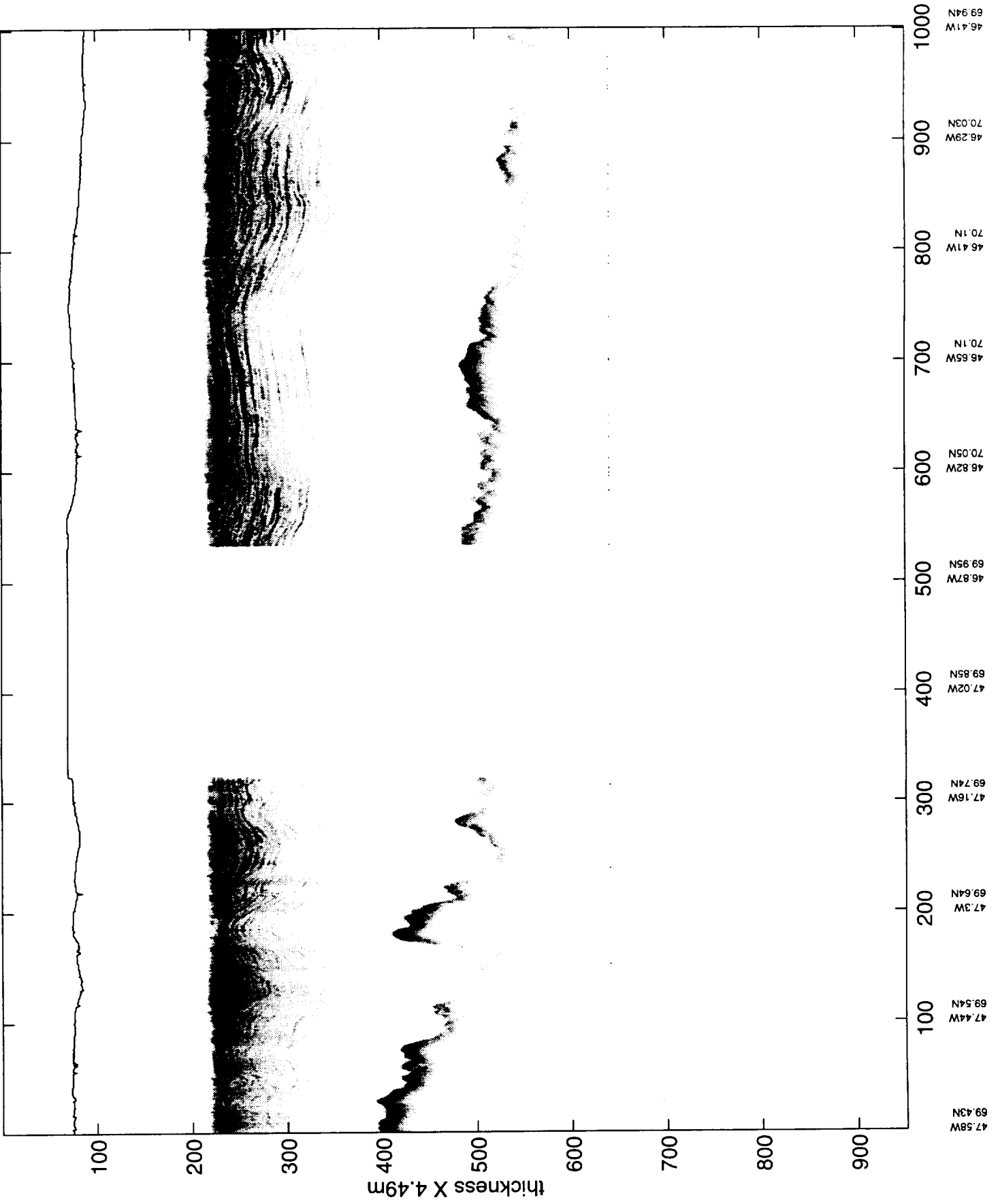




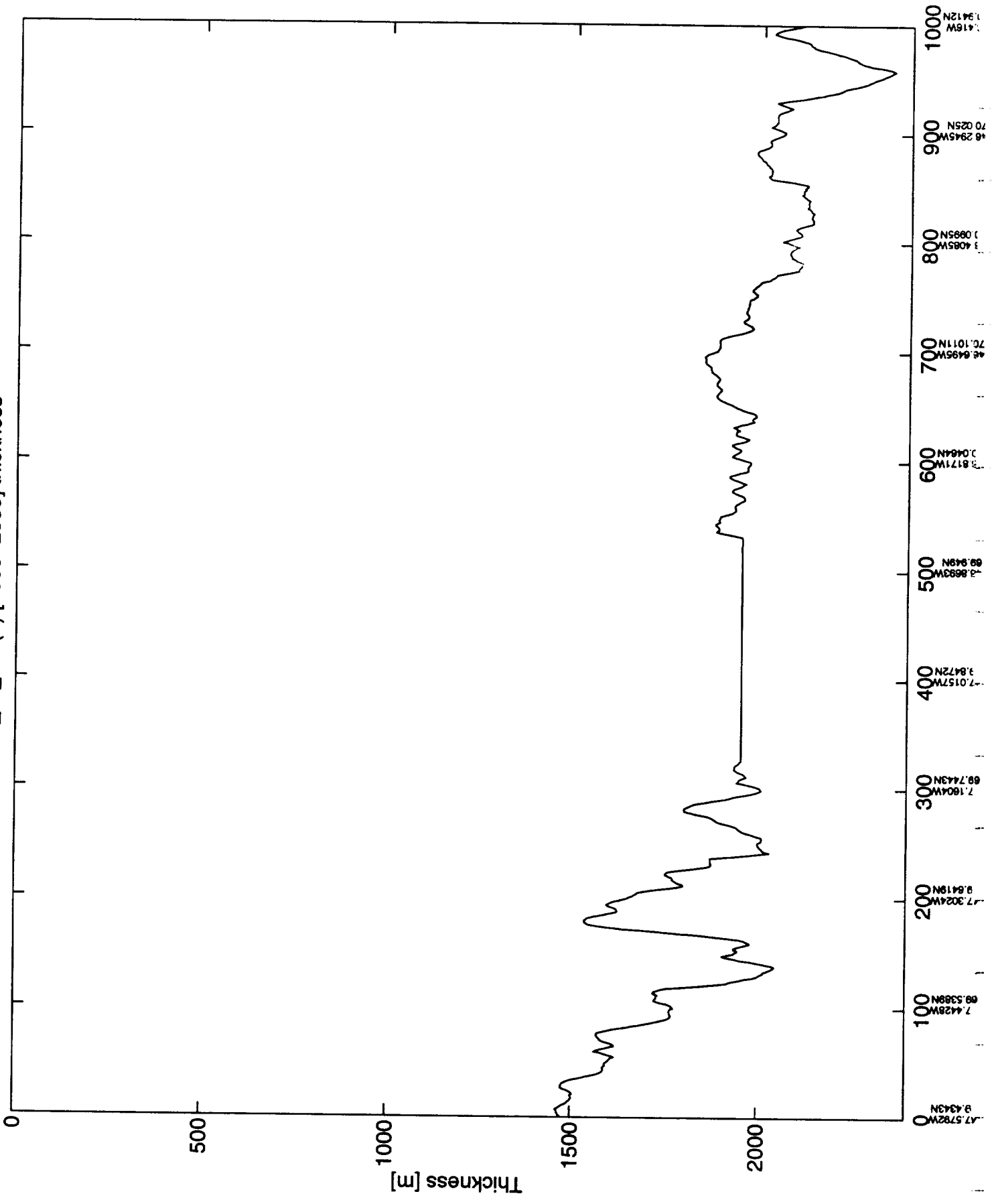
r_4x_2.1 <1> [0-1000]



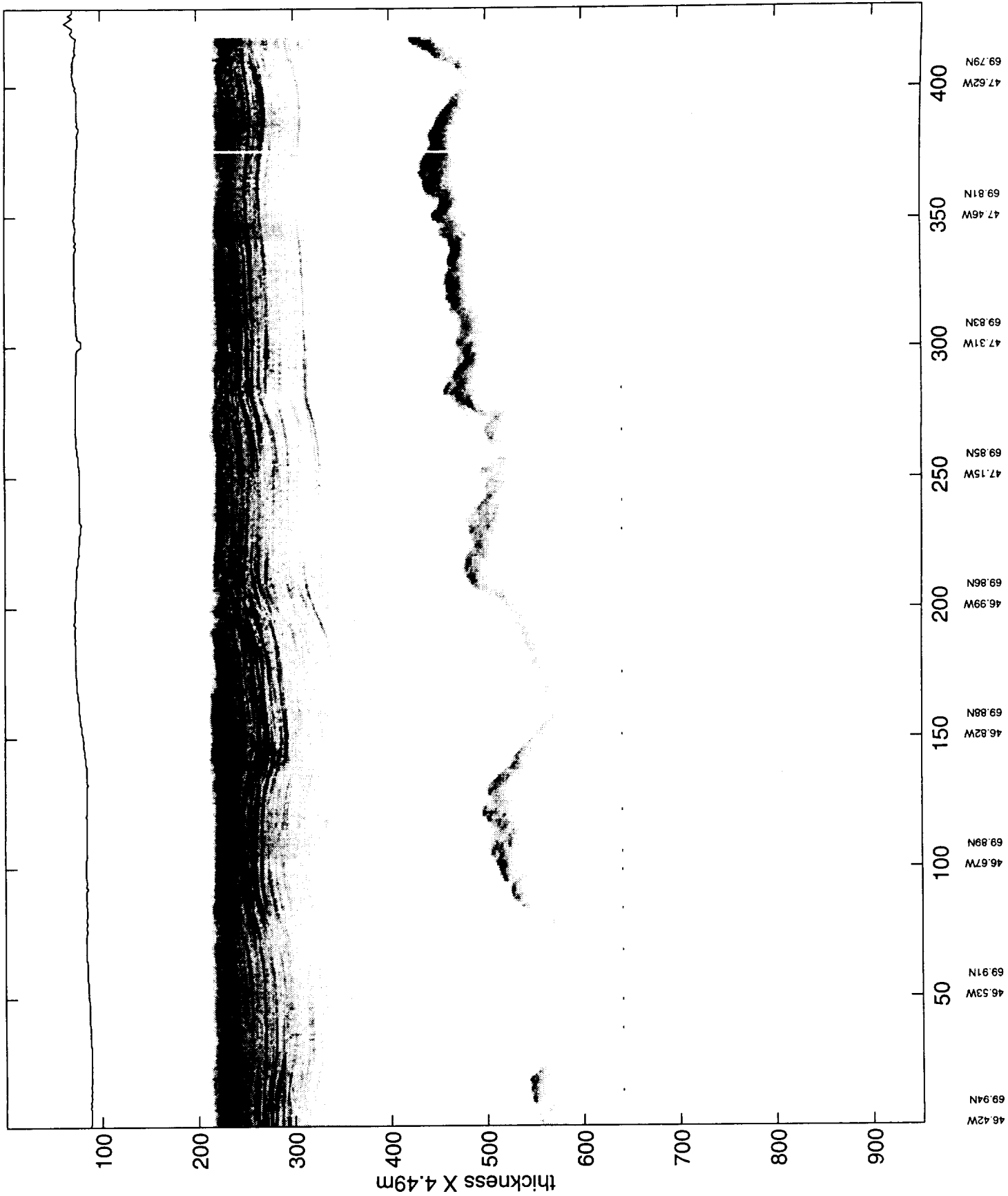
r_4x_2.1 <2> [1000-2000]



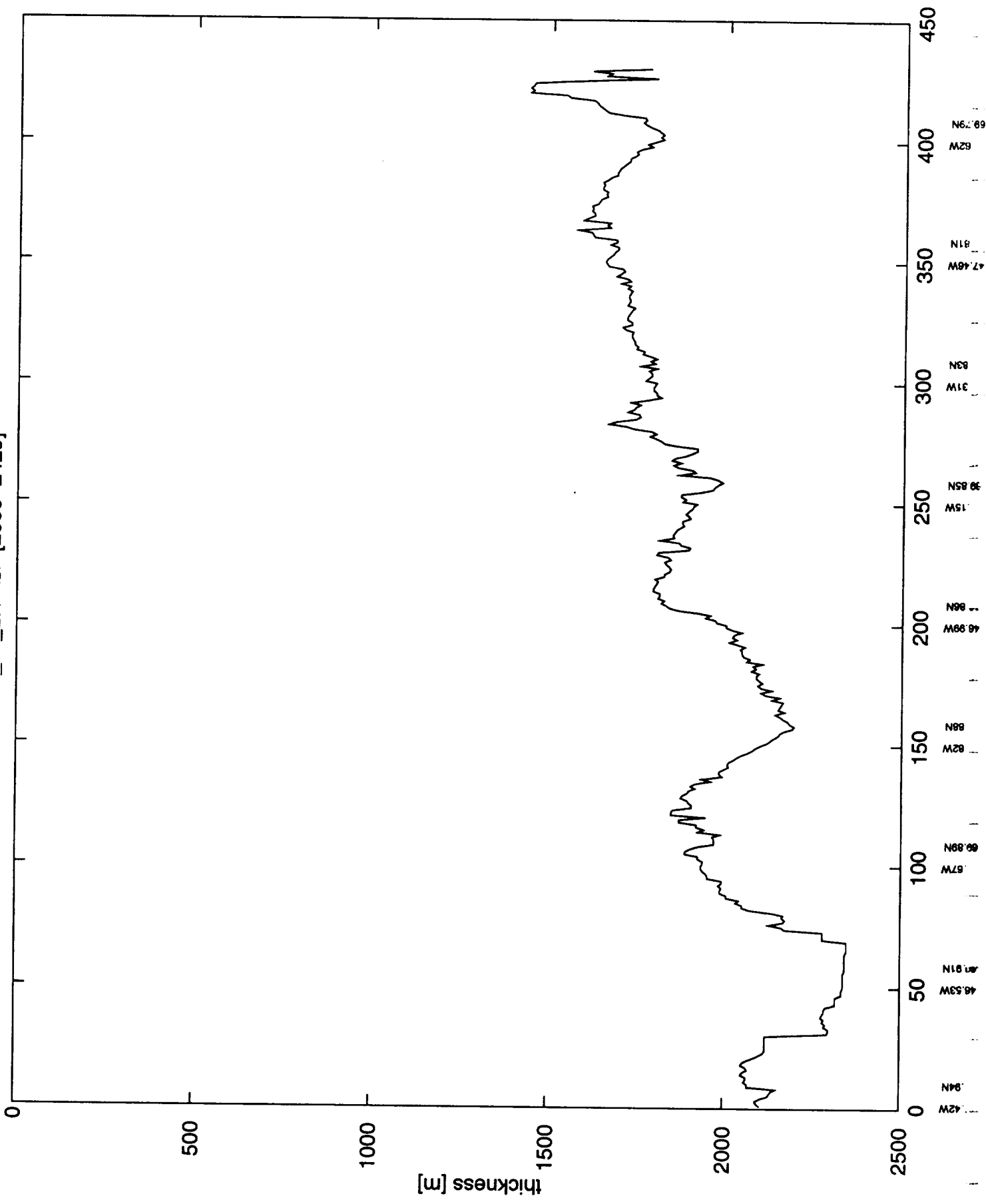
r_4x_2.1 (2) [1000-2000] thickness



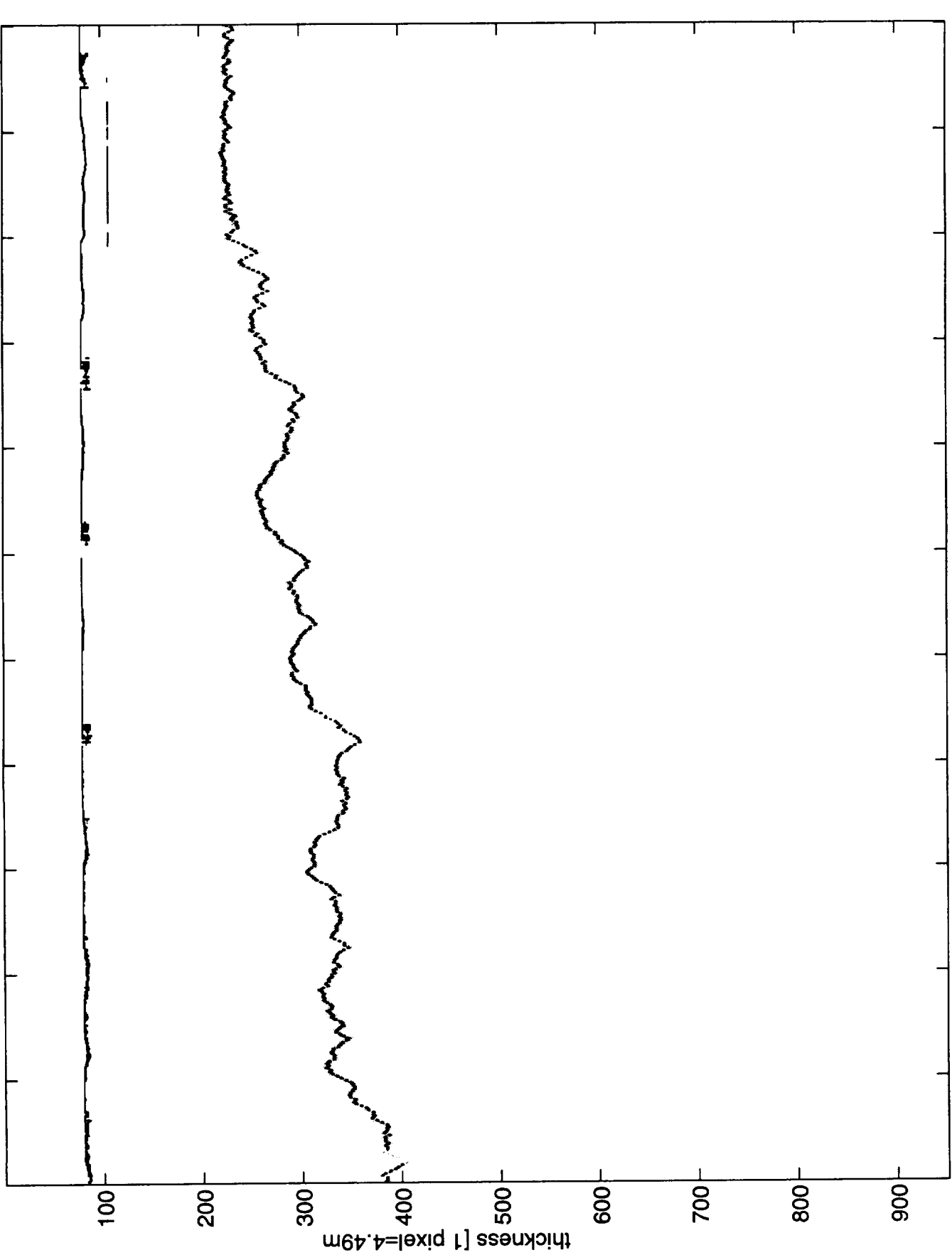
r_4x_2.1 <3> [2000-2430]



r_4x_2.1 <3> [2000-2429]



r_4x_3.1 <1> [0-550]



48.13W

69.75N

48.29W

69.75N

48.46W

69.75N

48.8W

69.74N

48.97W

69.74N

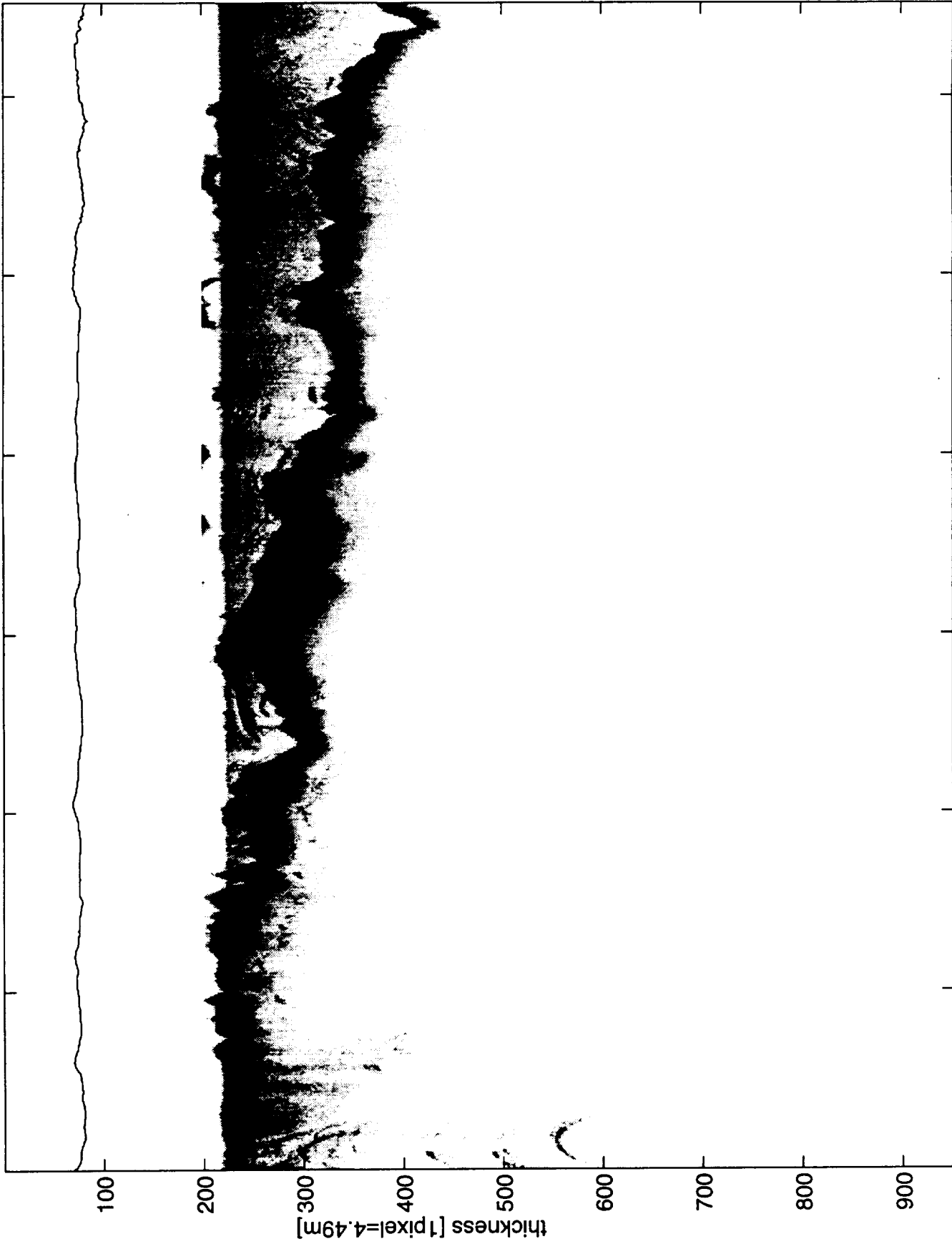
48.8W

69.73N

49.96W

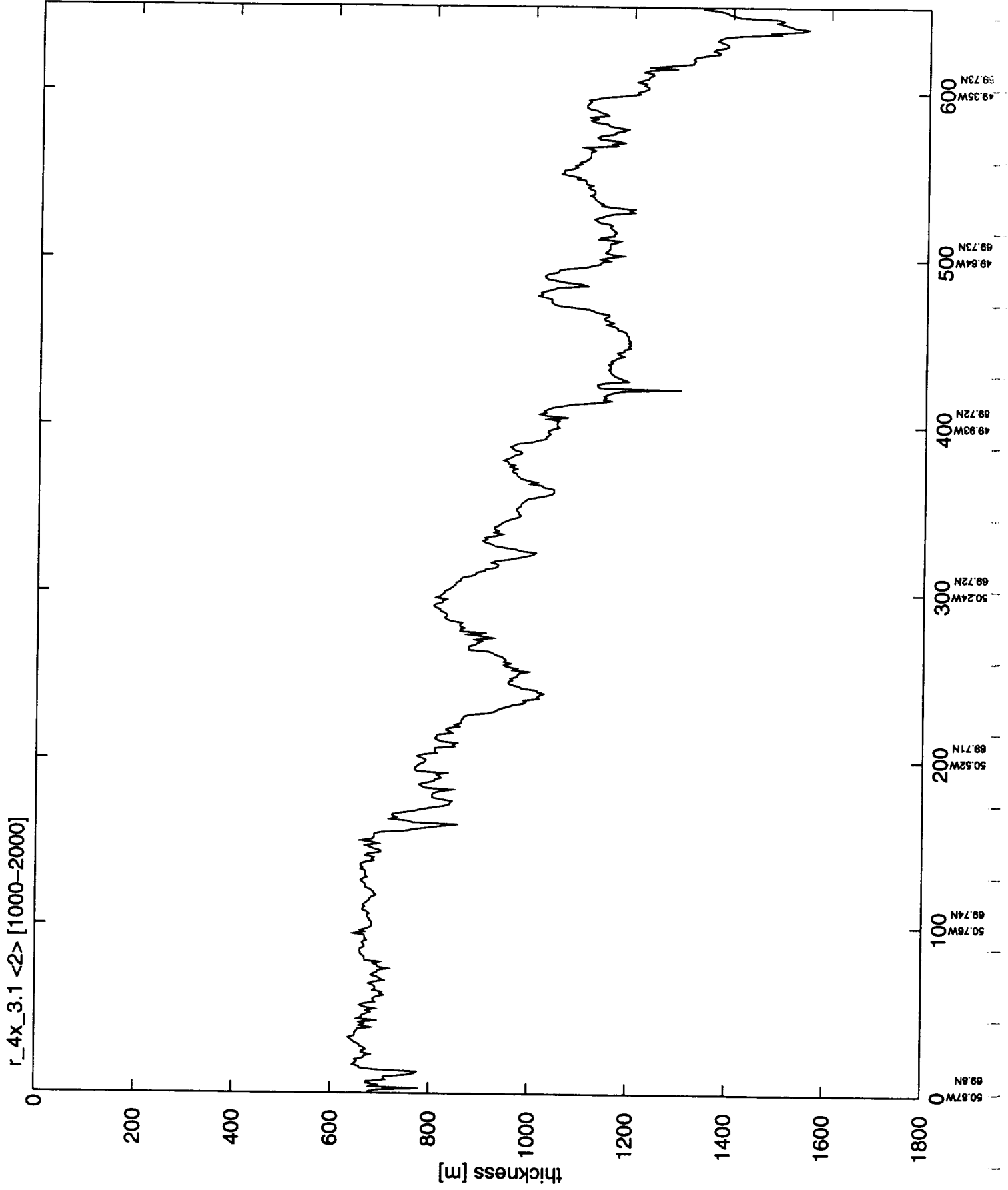
69.72N

r_4x_3.1 <2> [1350-2000]

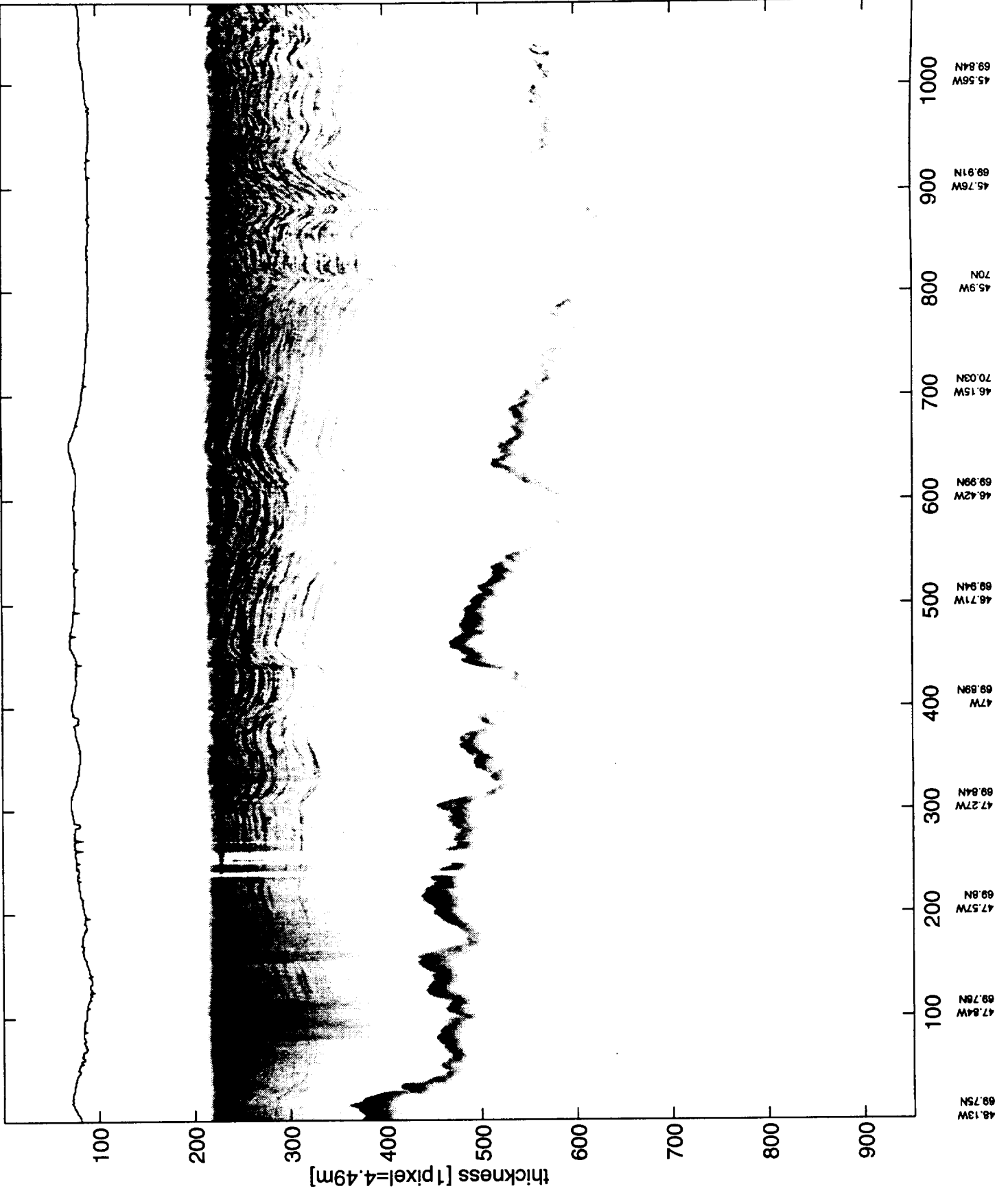


50.8679W
69.8017N
50.7586W
69.738N
50.5226W
69.7149N
50.2425W
69.7189N
49.9269W
69.7235N
49.6354W
69.7291N
49.3514W
69.7343N
49.0506W
69.7389N

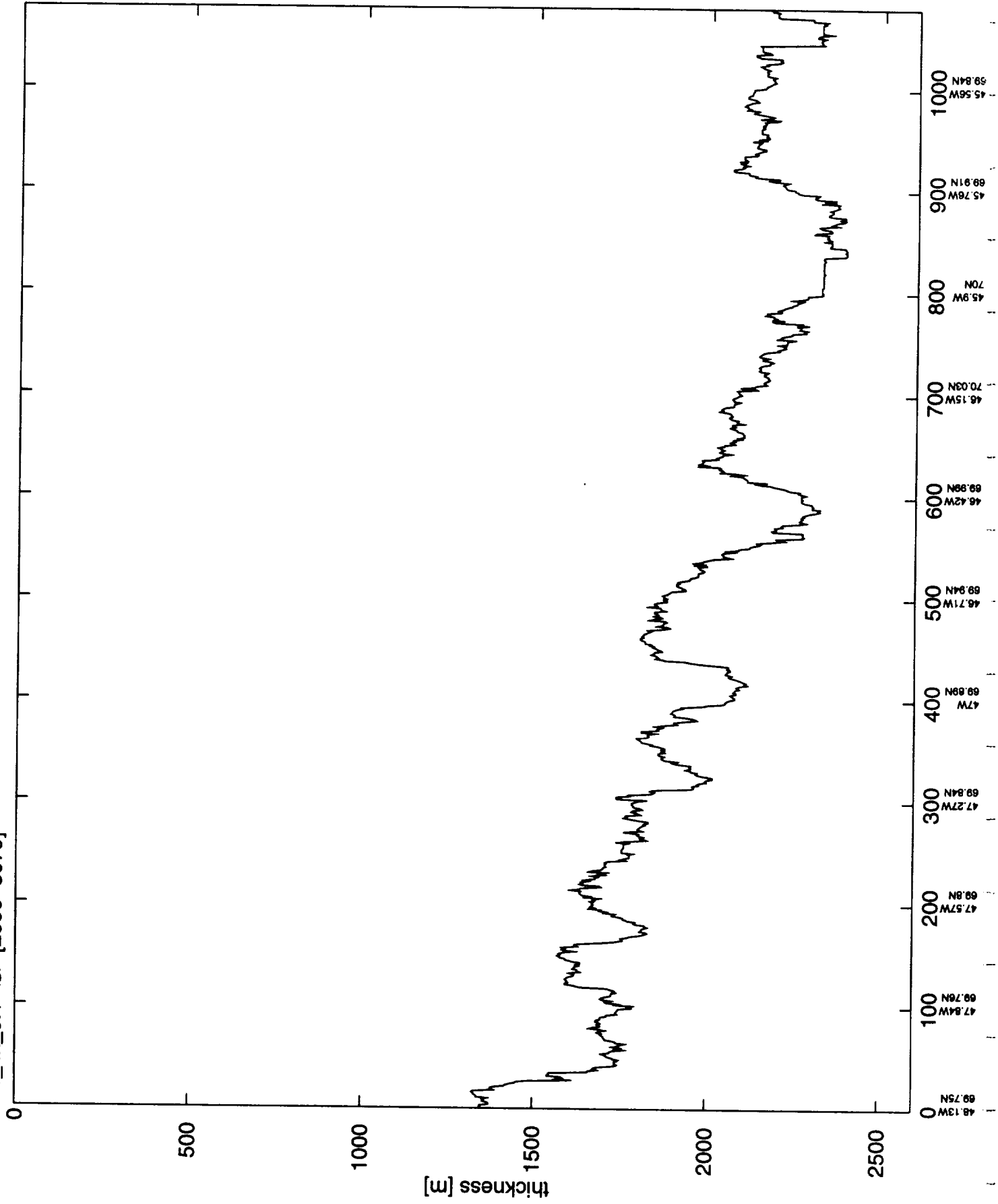
r_4x_3.1 <2> [1000-2000]



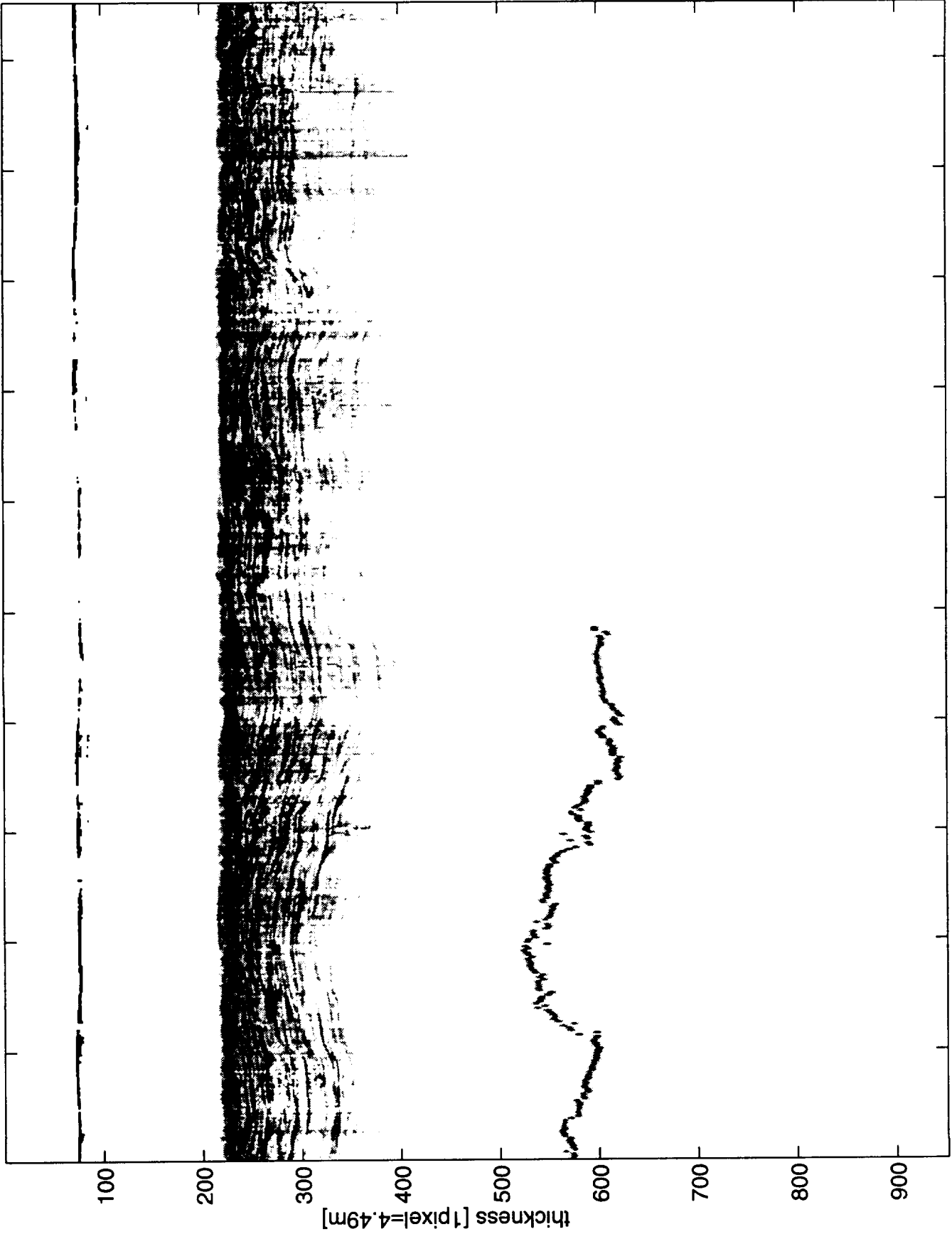
r_4x_3.1 <3> [2000-3079]



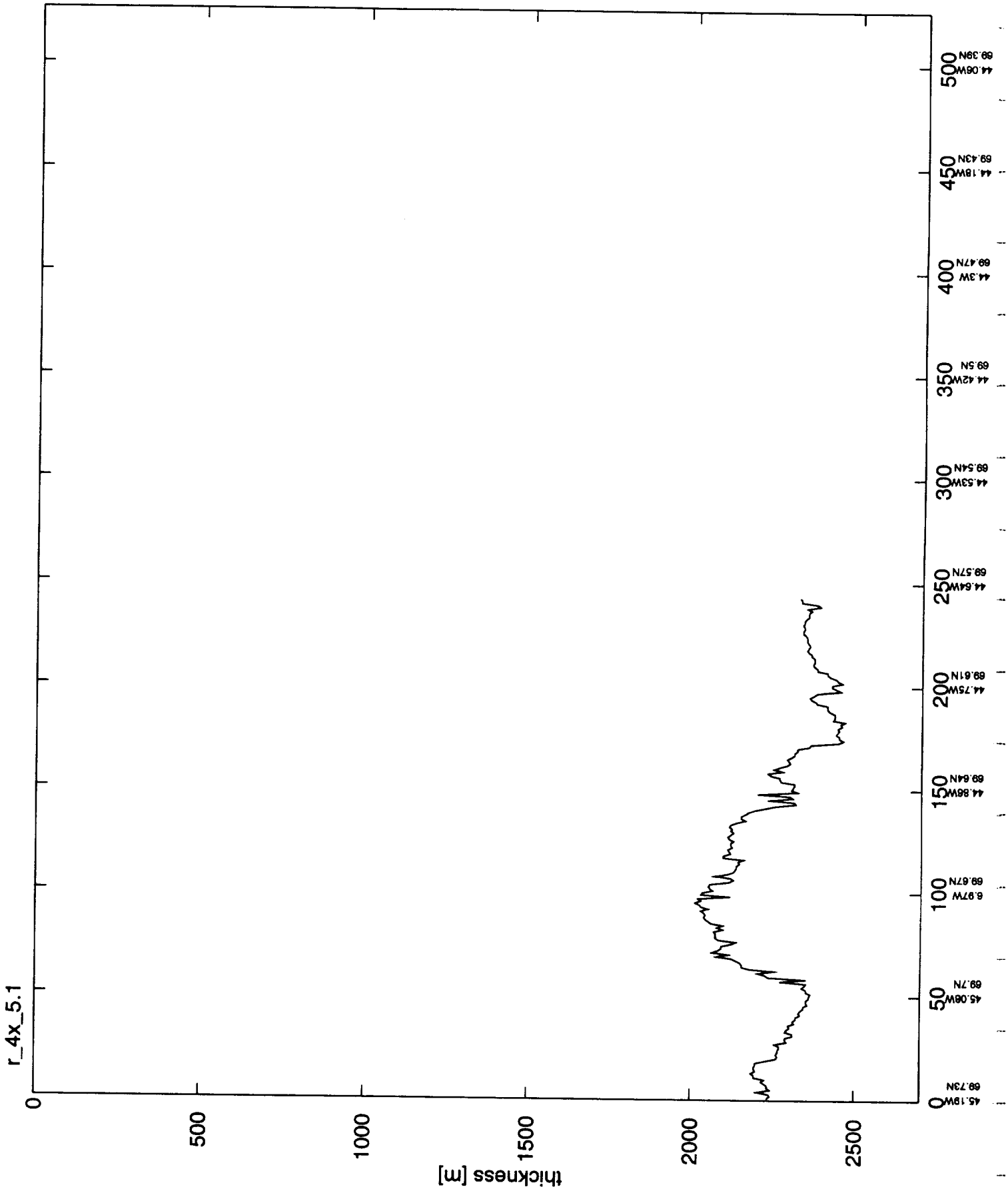
r_4x_3.1 <3> [2000-3079]



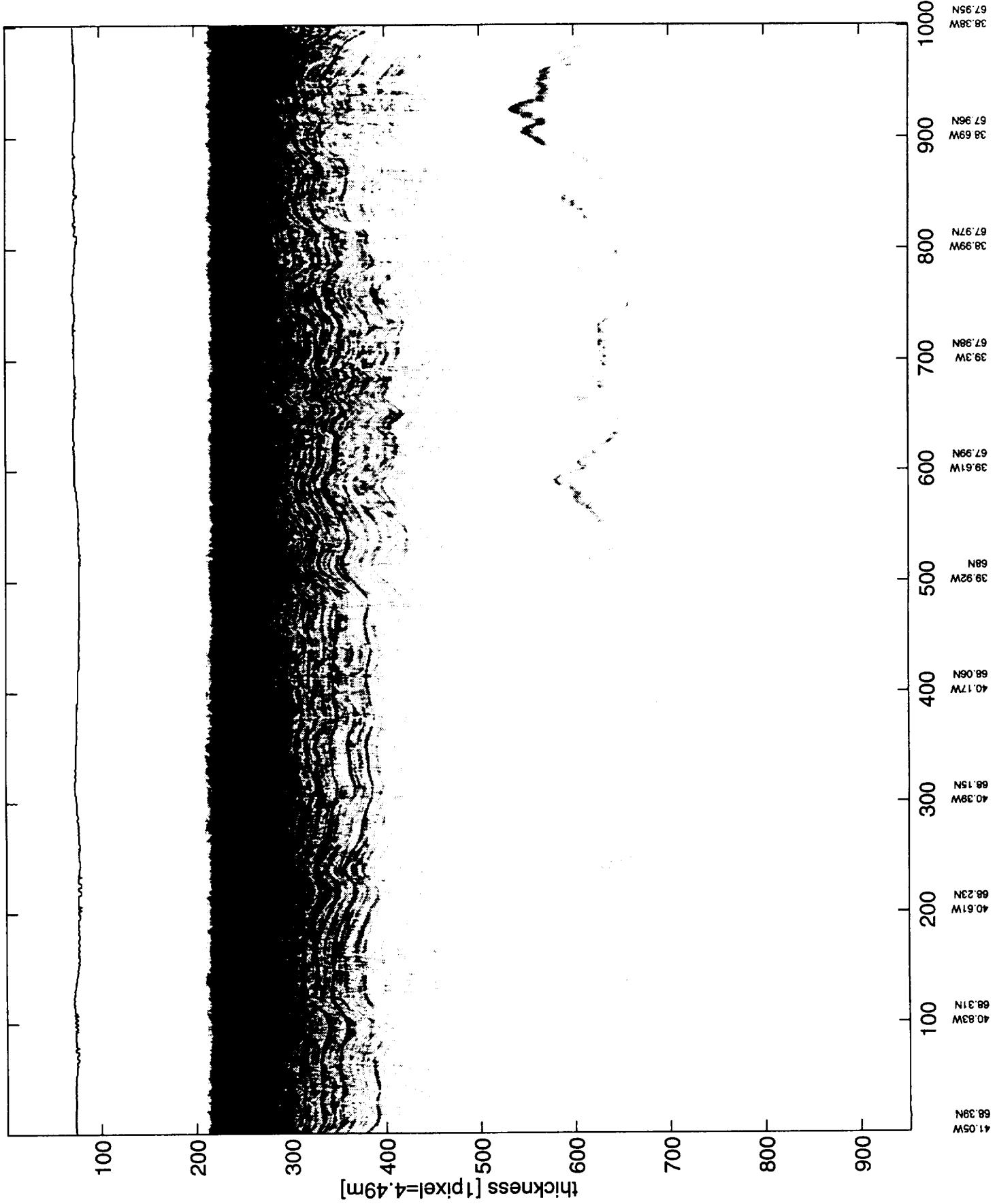
r_4x_5.1



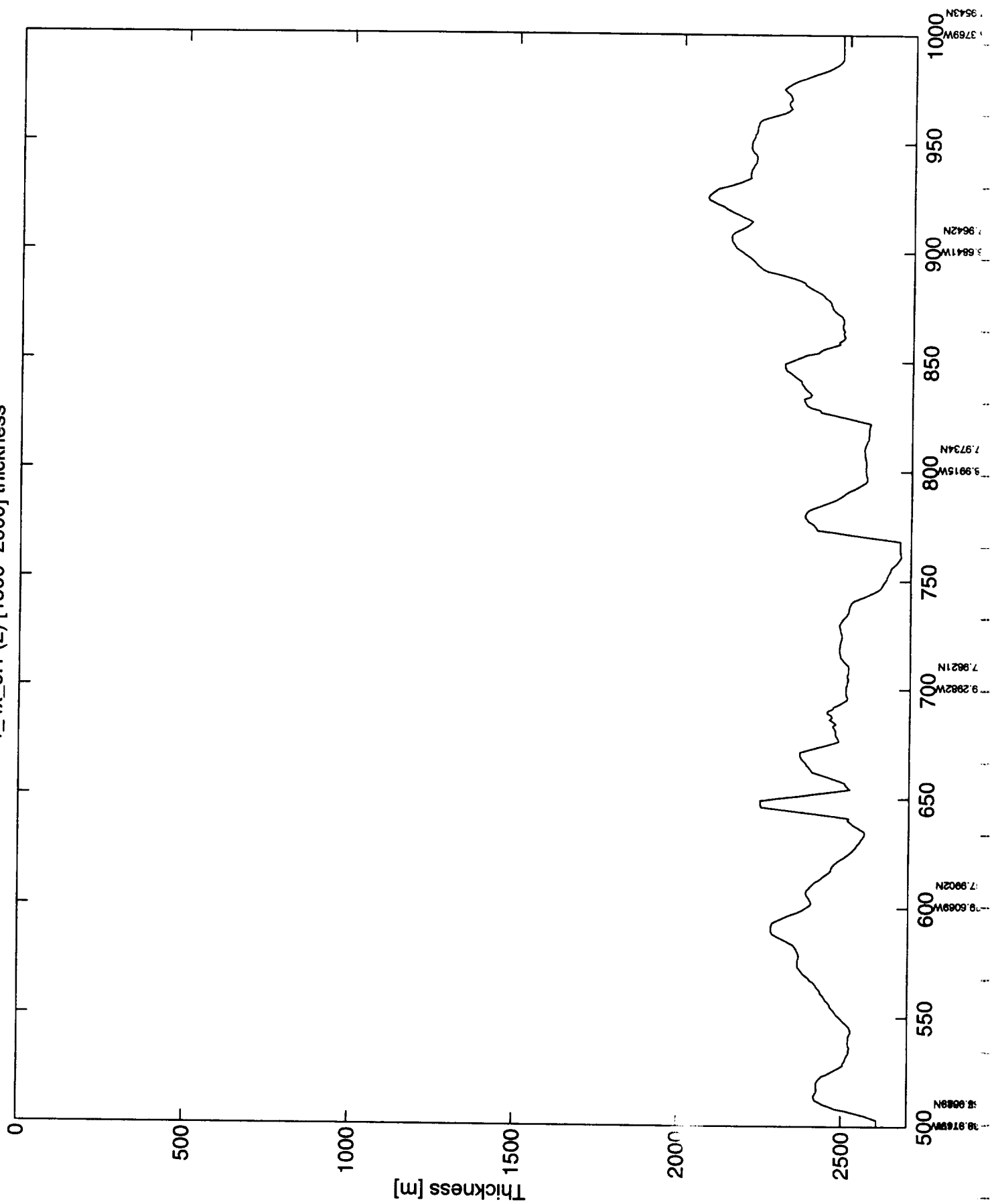
45.19W 69.73N
45.08W 69.7N
44.97W 69.67N
44.86W 69.64N
44.75W 69.61N
44.64W 69.57N
44.53W 69.54N
44.42W 69.5N
44.3W 69.47N
44.18W 69.43N
44.06W 69.39N



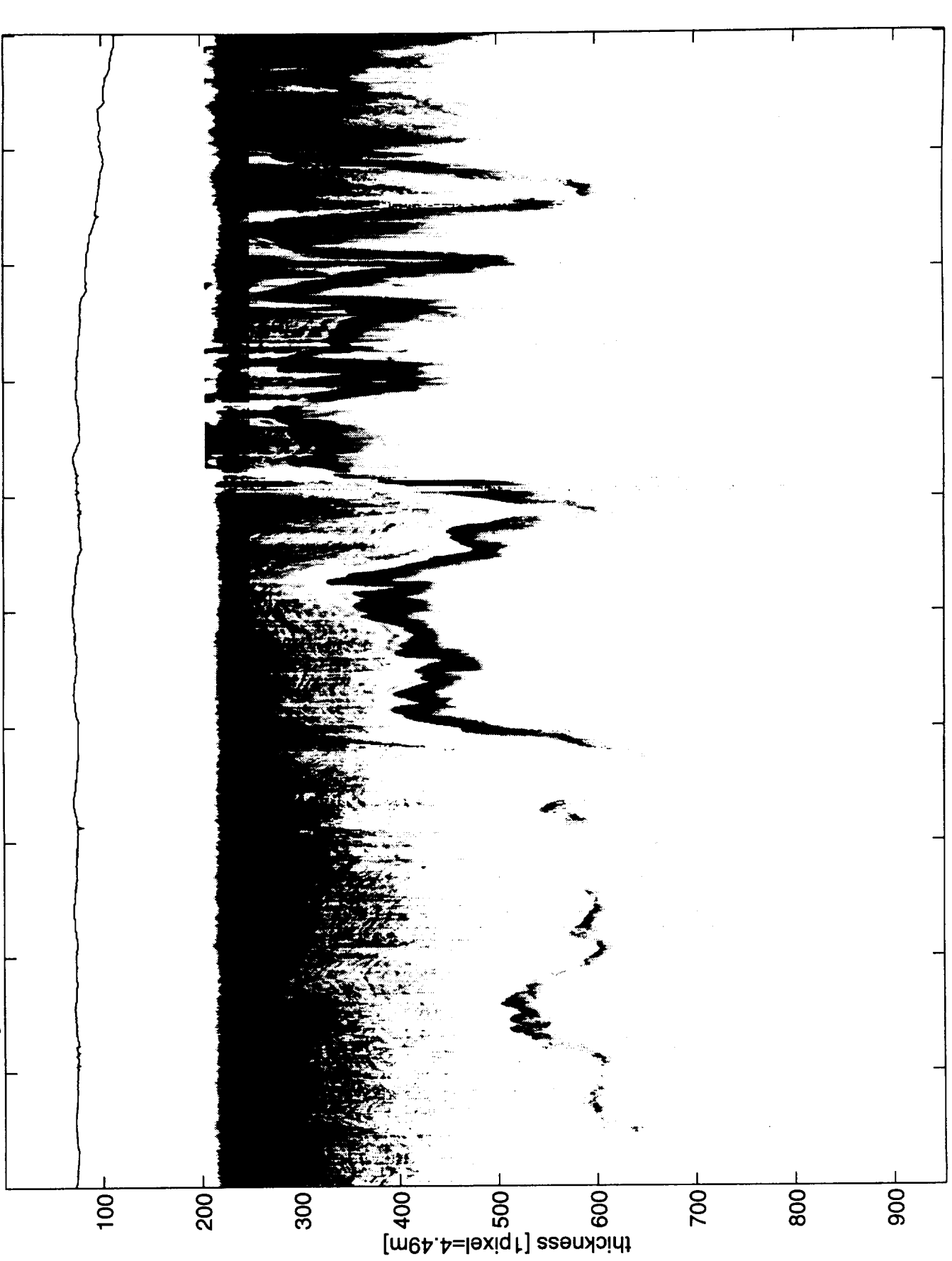
r_4x_6.1 <2> [1000-2000]



r_4x_6.1 (2) [1500-2000] thickness

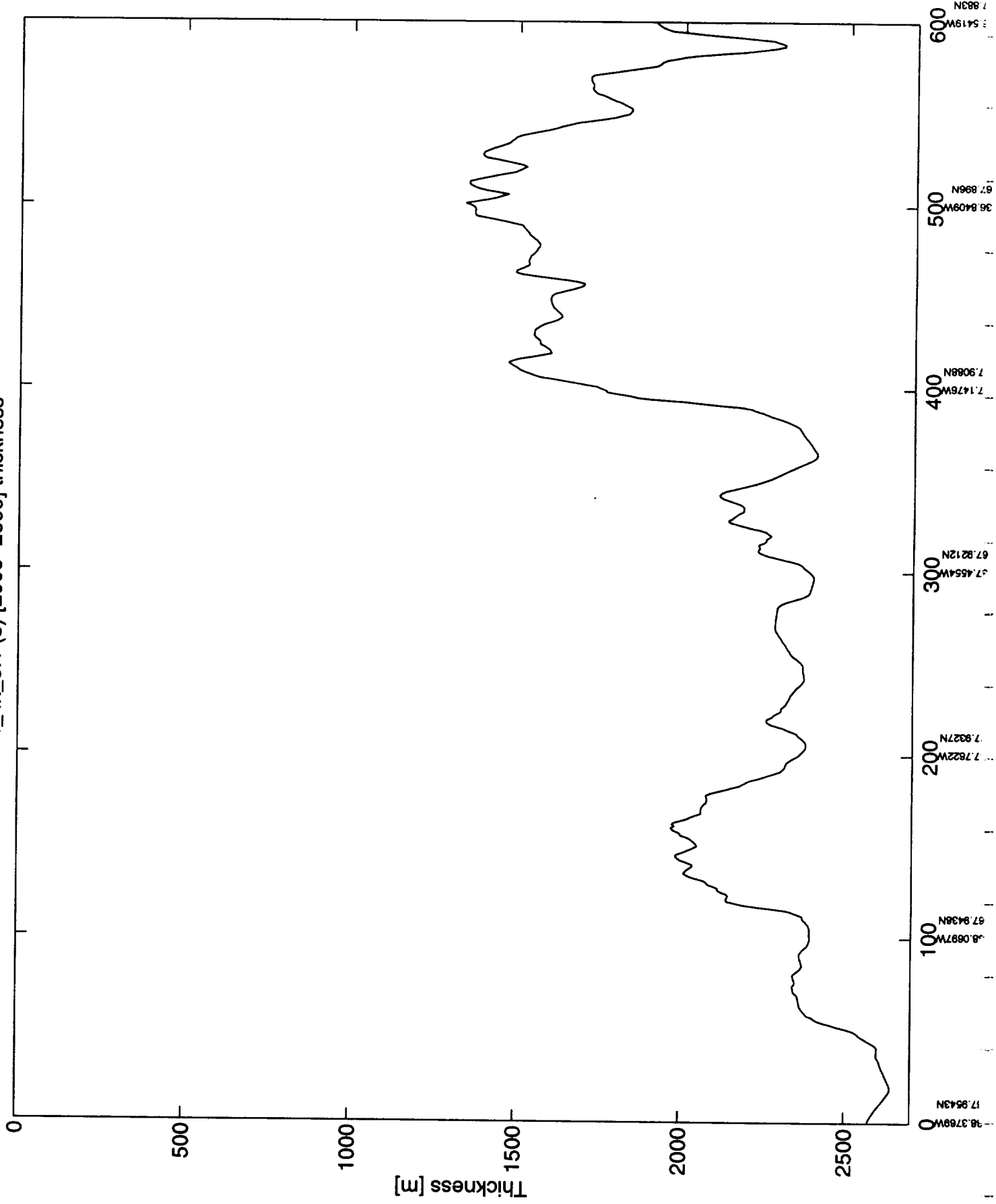


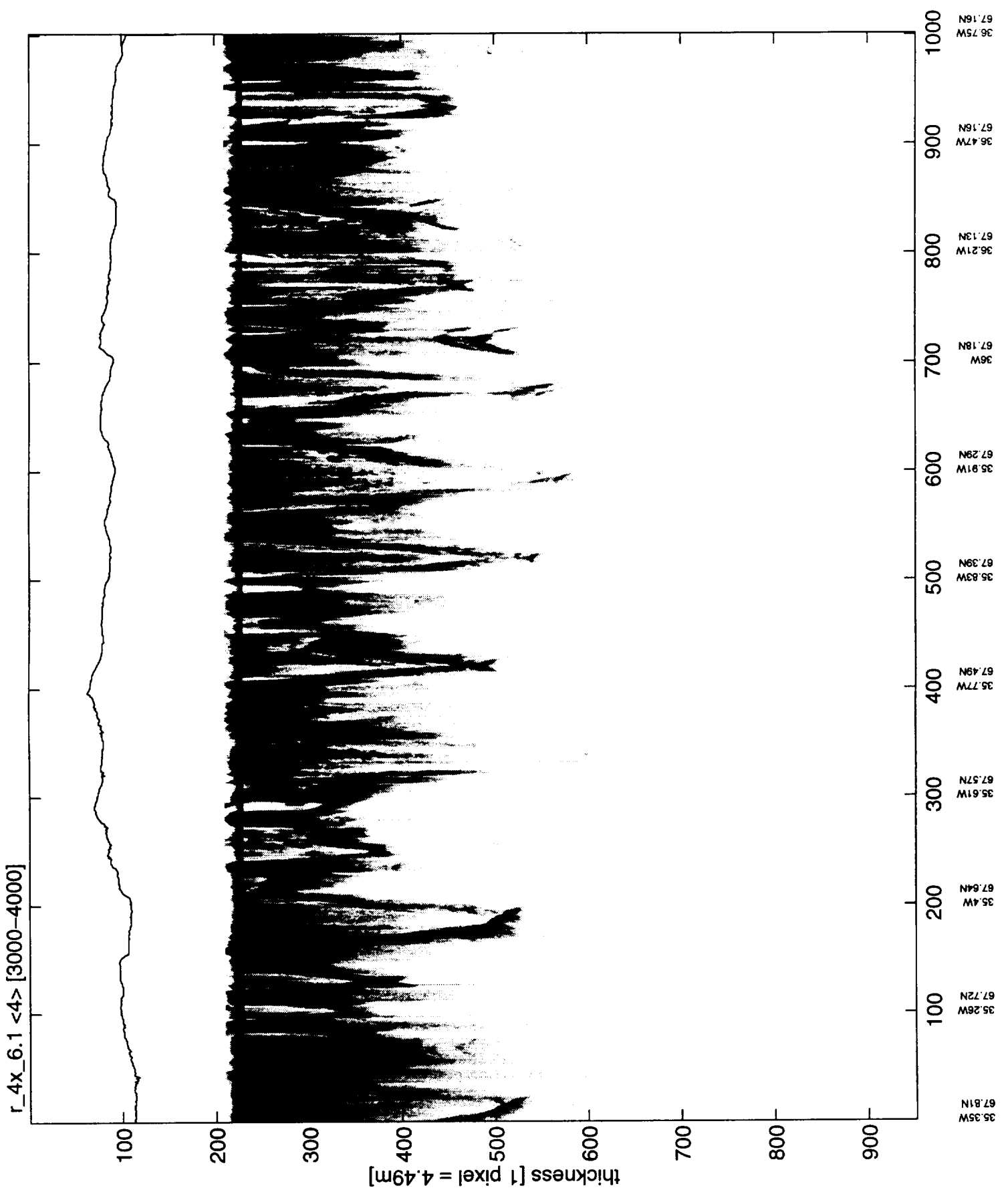
r_4x_6.1 <3> [2000-3000]



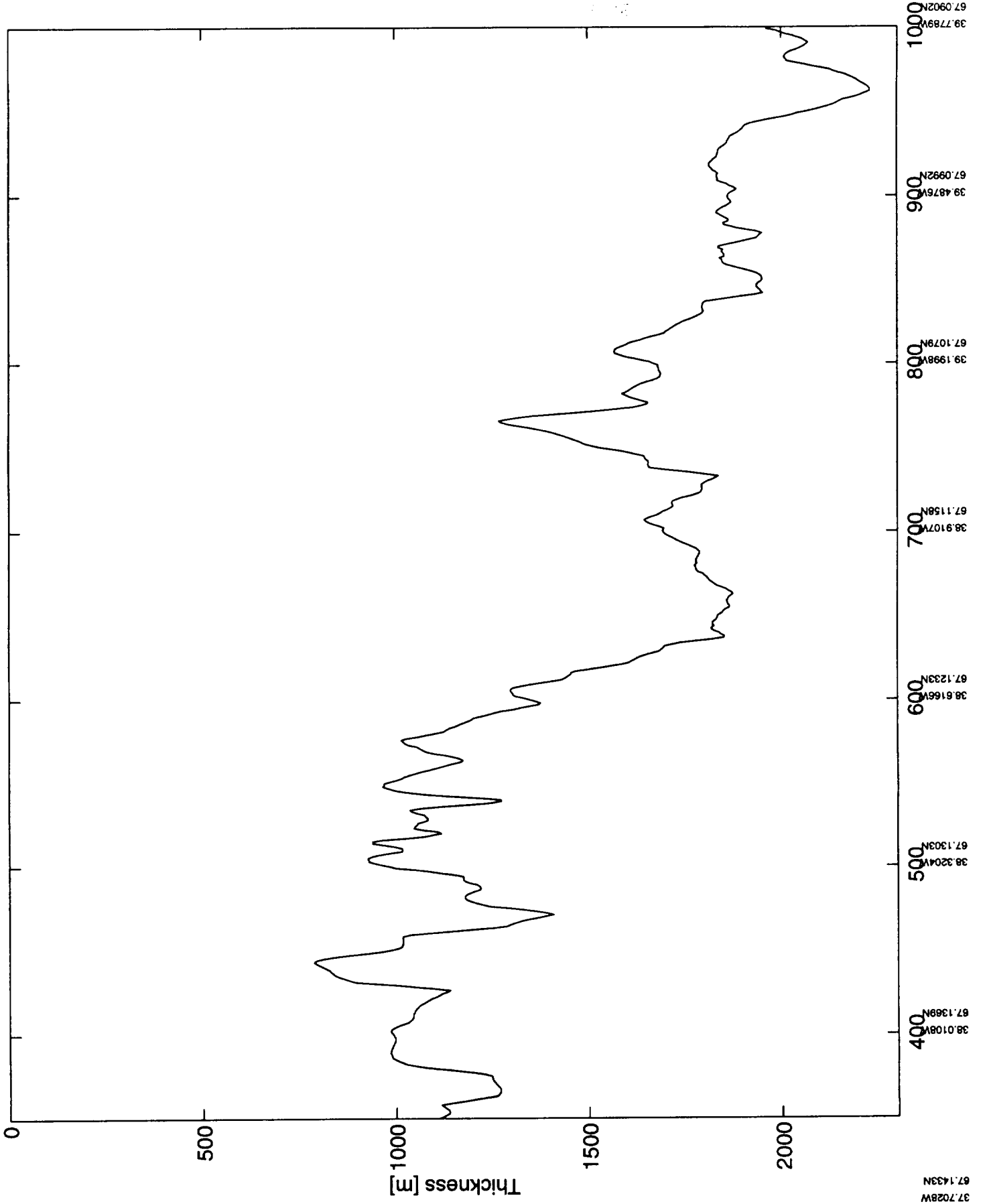
38.38W 67.95N
38.07W 67.94N
37.77W 67.93N
37.46W 67.92N
37.15W 67.91N
36.84W 67.9N
36.54W 67.88N
36.24W 67.87N
35.94W 67.86N
35.64W 67.84N
35.35W 67.81N

r_4x_6.1 (3) [2000-2600] thickness



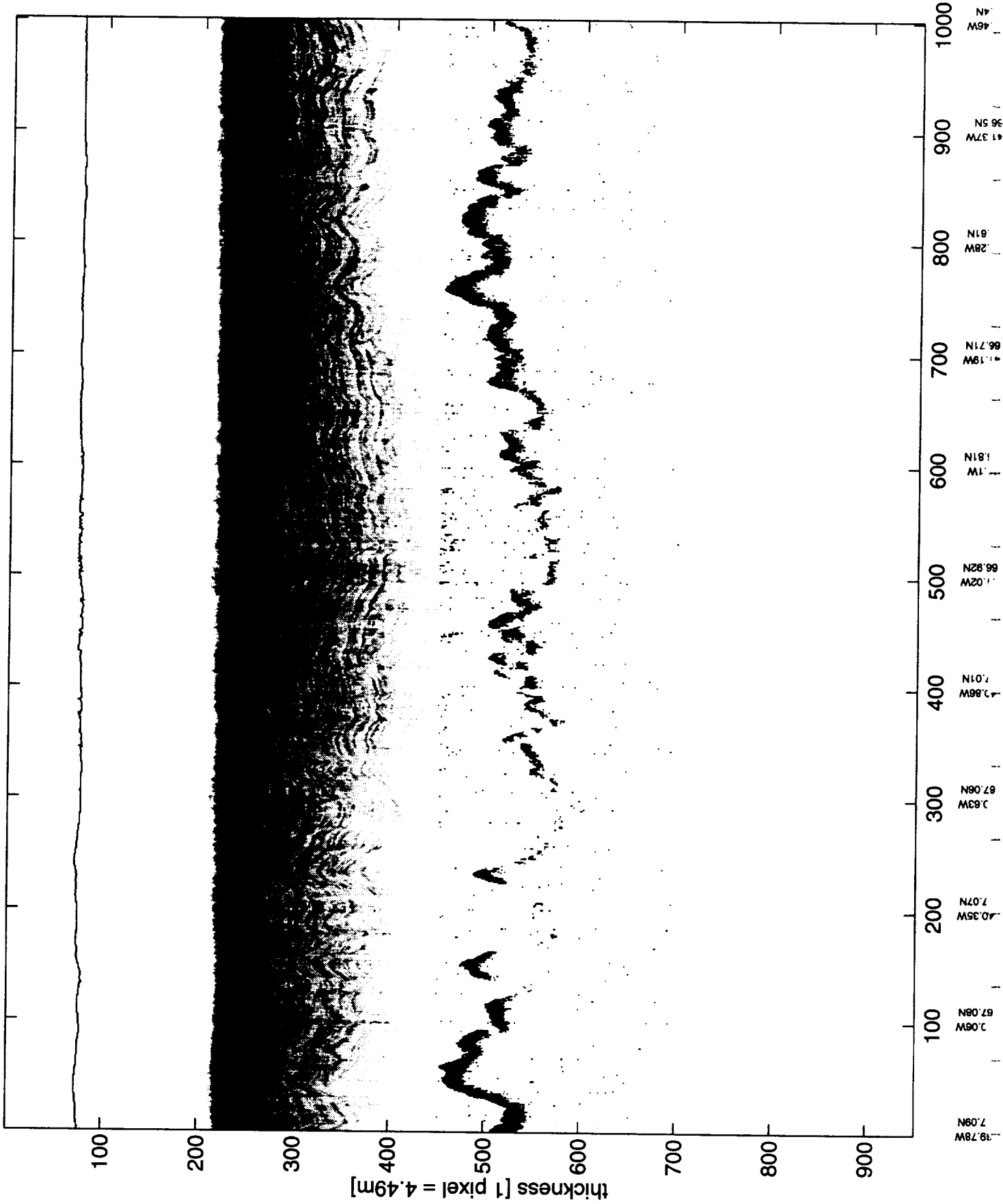


r_4x_6.1 (5) [4350-5000] thickness

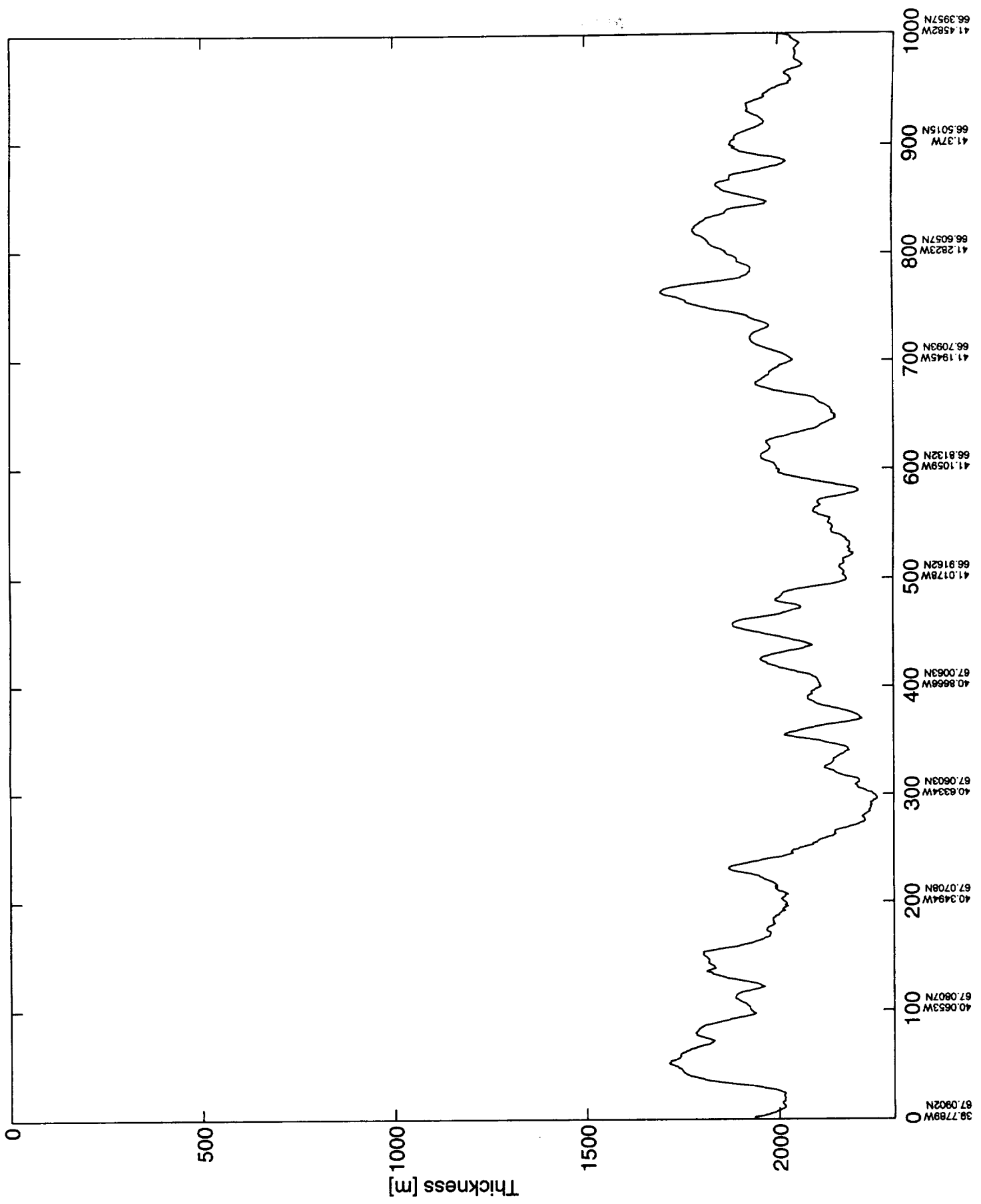


37.7028W
67.1433N

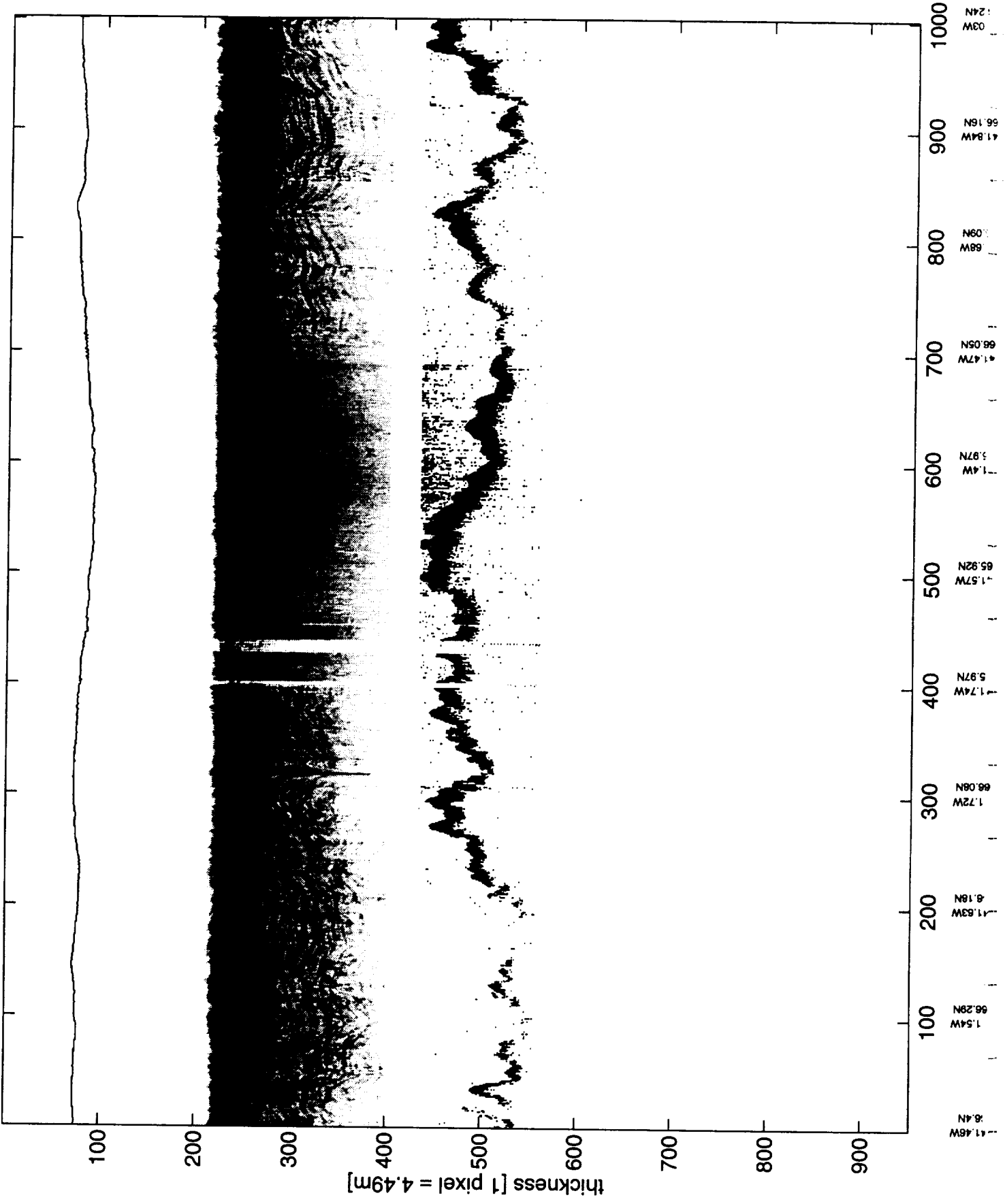
r_4x_6.1 <6> [5000-6000]



r_4x_6.1 (6) [5000-6000] thickness

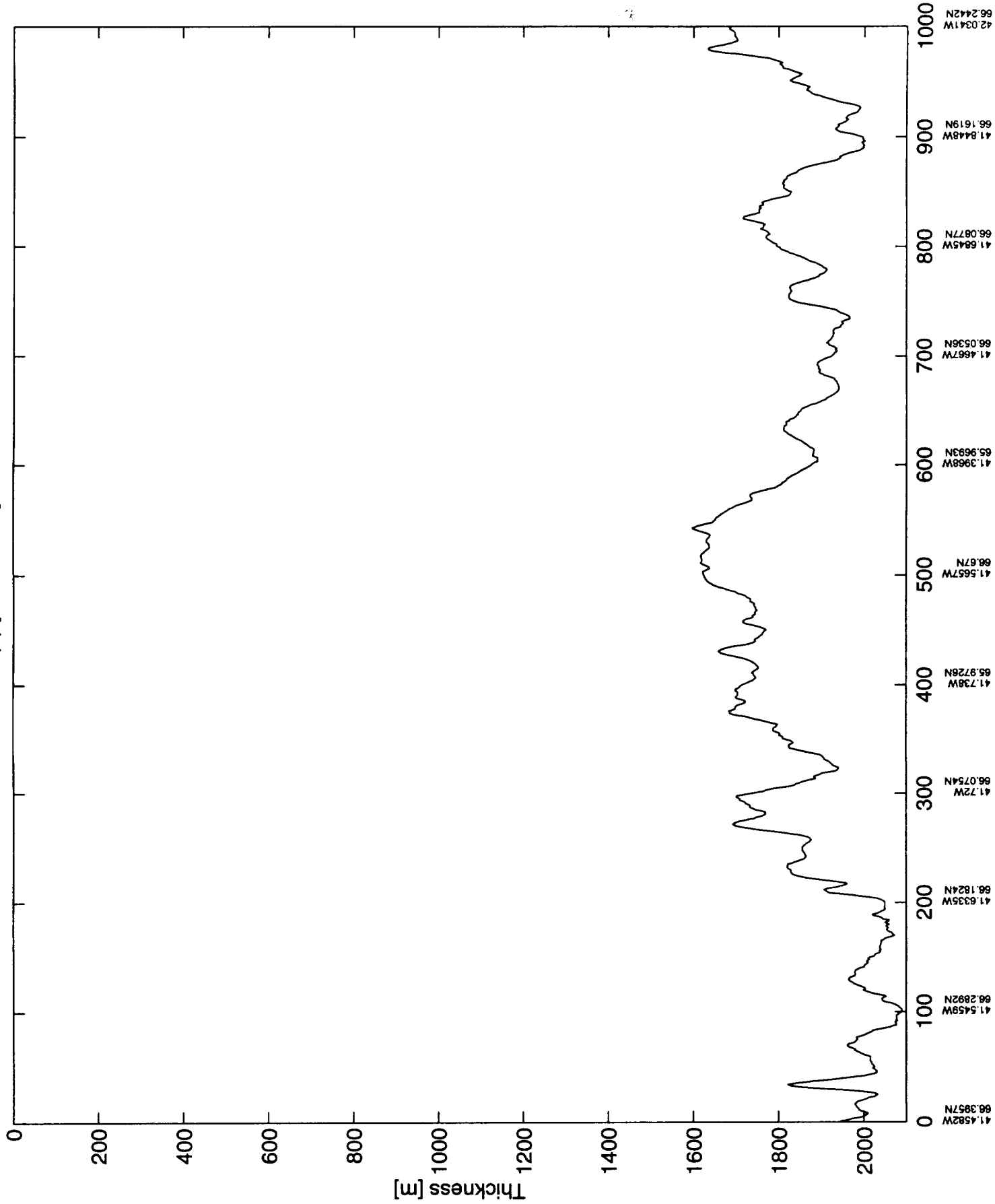


r_4x_6.1 <7> [6000-7000]



41.46W
8.4N
1.54W
66.29N
41.63W
6.18N
1.72W
66.08N
1.74W
5.97N
1.57W
65.92N
1.4W
5.97N
4.47W
66.05N
68W
68N
41.84W
66.16N
03W
24N

r_4x_6.1 (7) [6000-7000] thickness

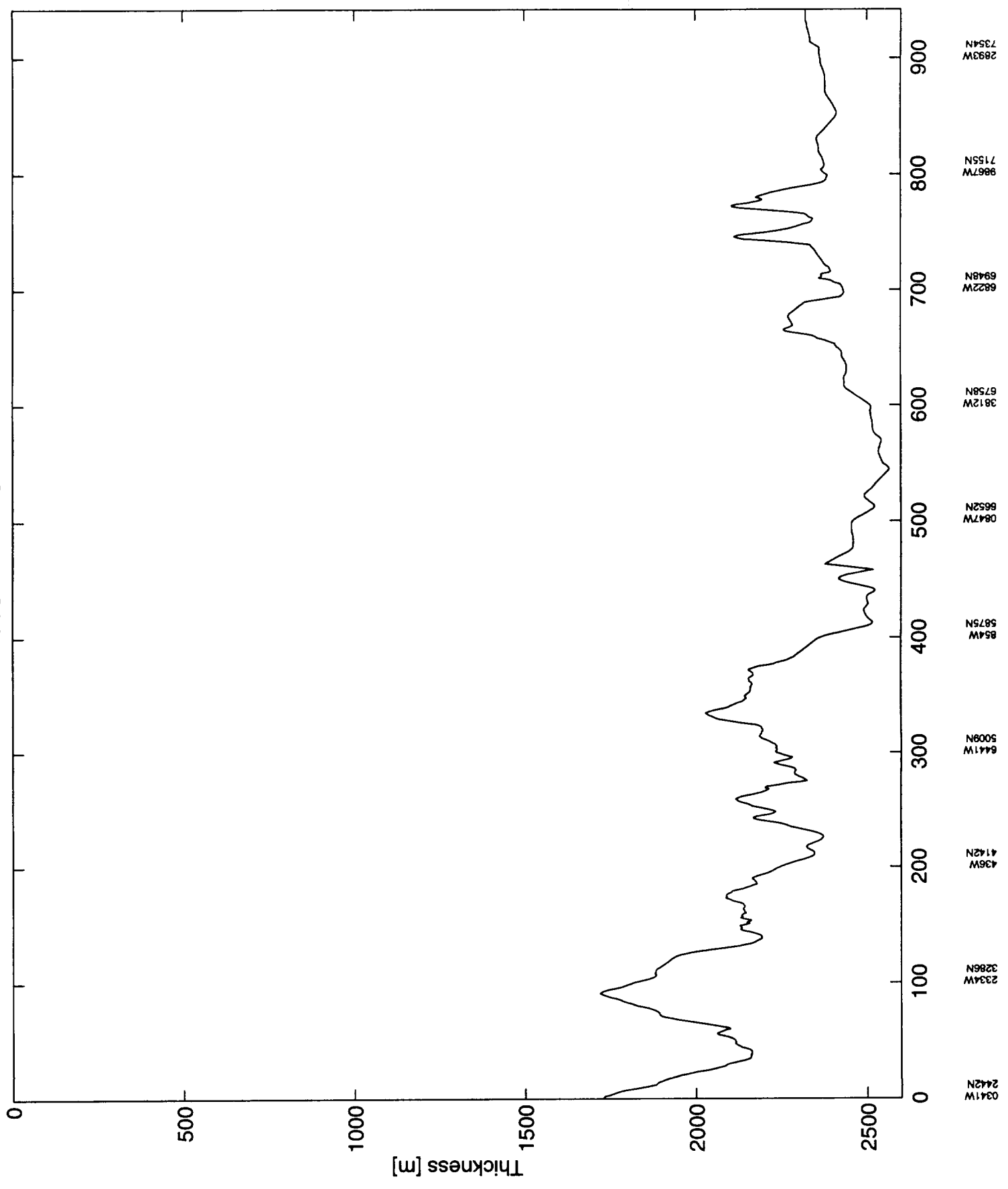


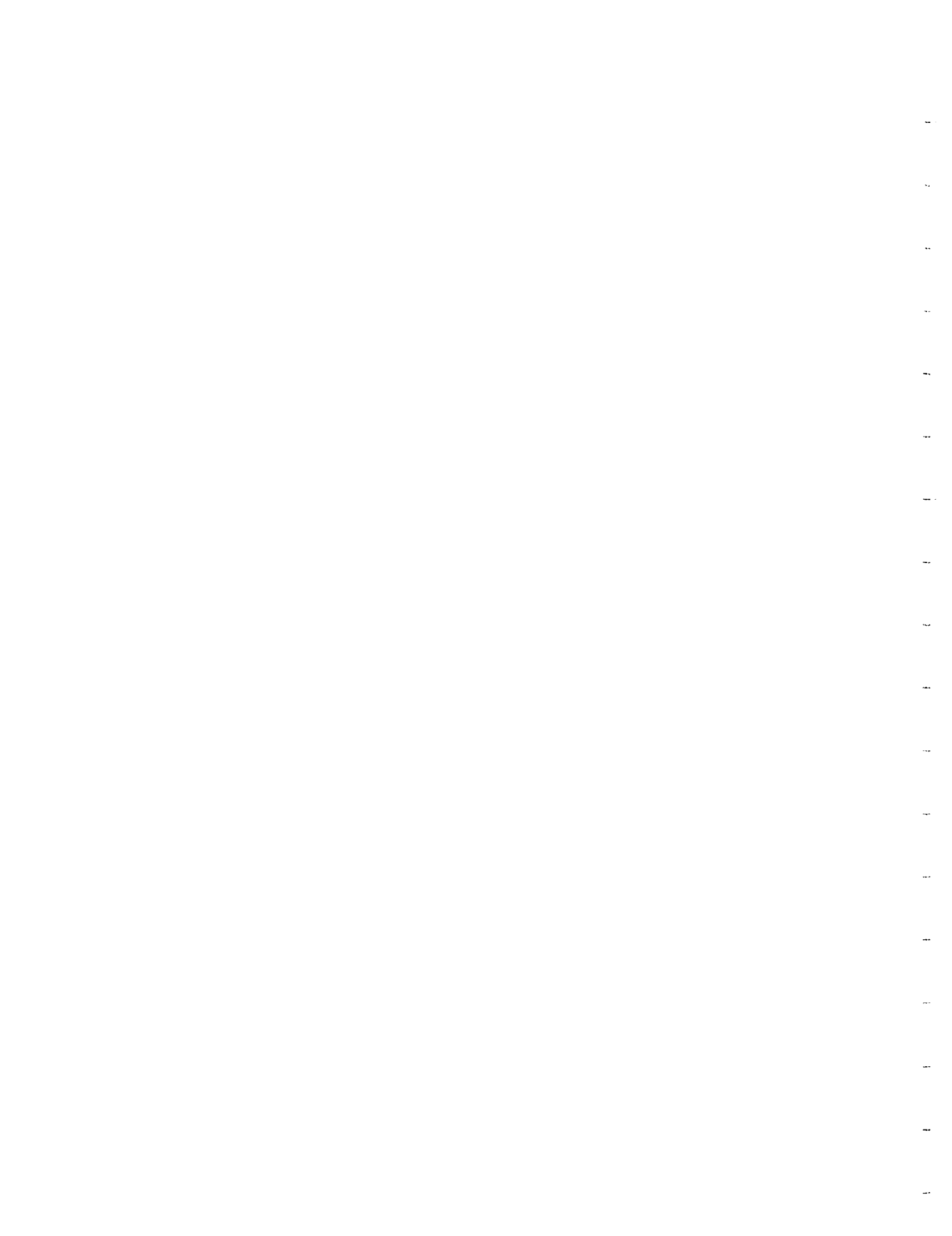
r_4x_6.1 <8> [7000-7942]



6.24N
4.23W
66.33N
2.43W
6.41N
42.64W
6.5N
2.85W
66.58N
4.08W
6.66N
3.68W
3.68N
3.72N
43.98W
3.72N
1.29W
66.74N

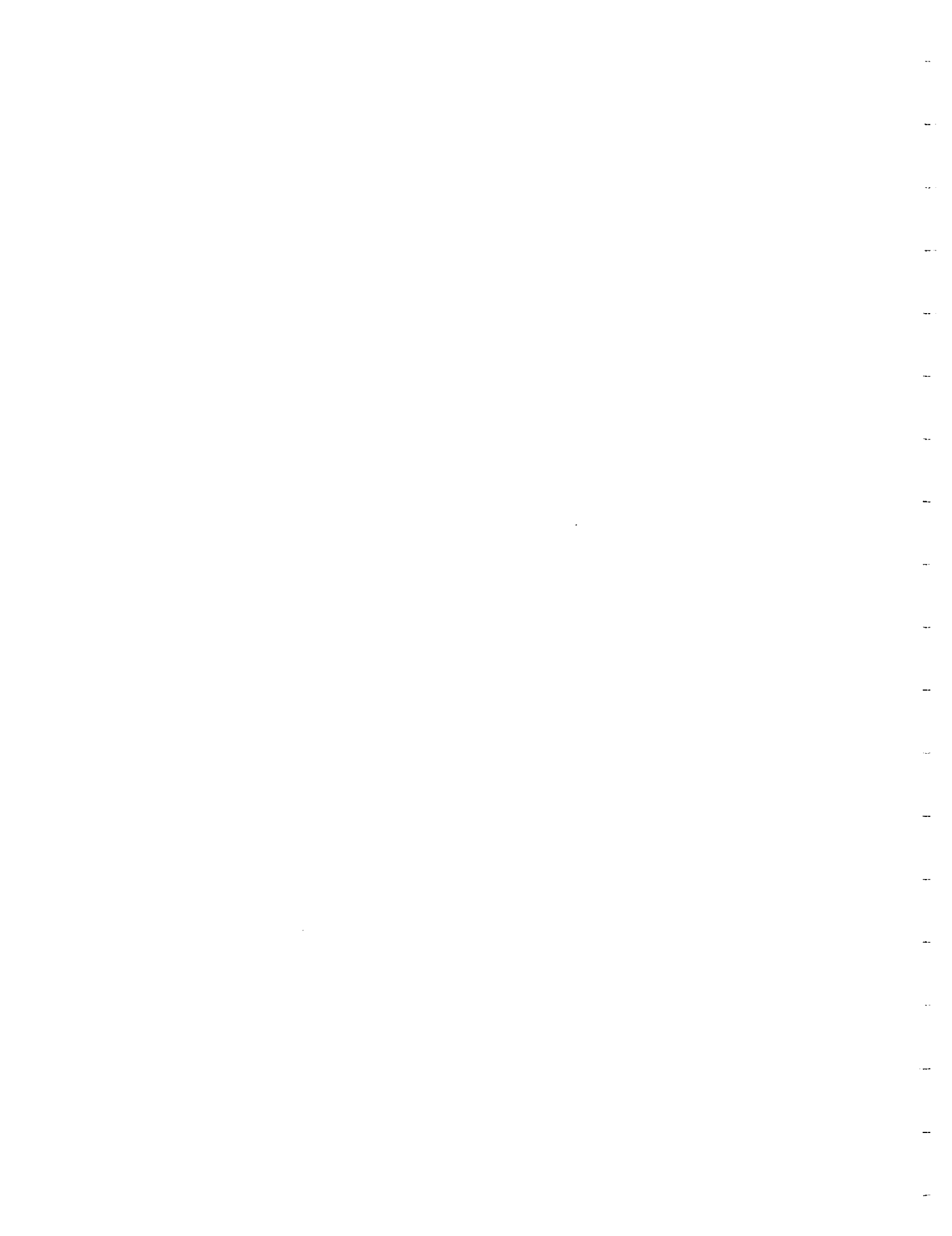
r_4x_6.1 (8) [7000-7942] thickness

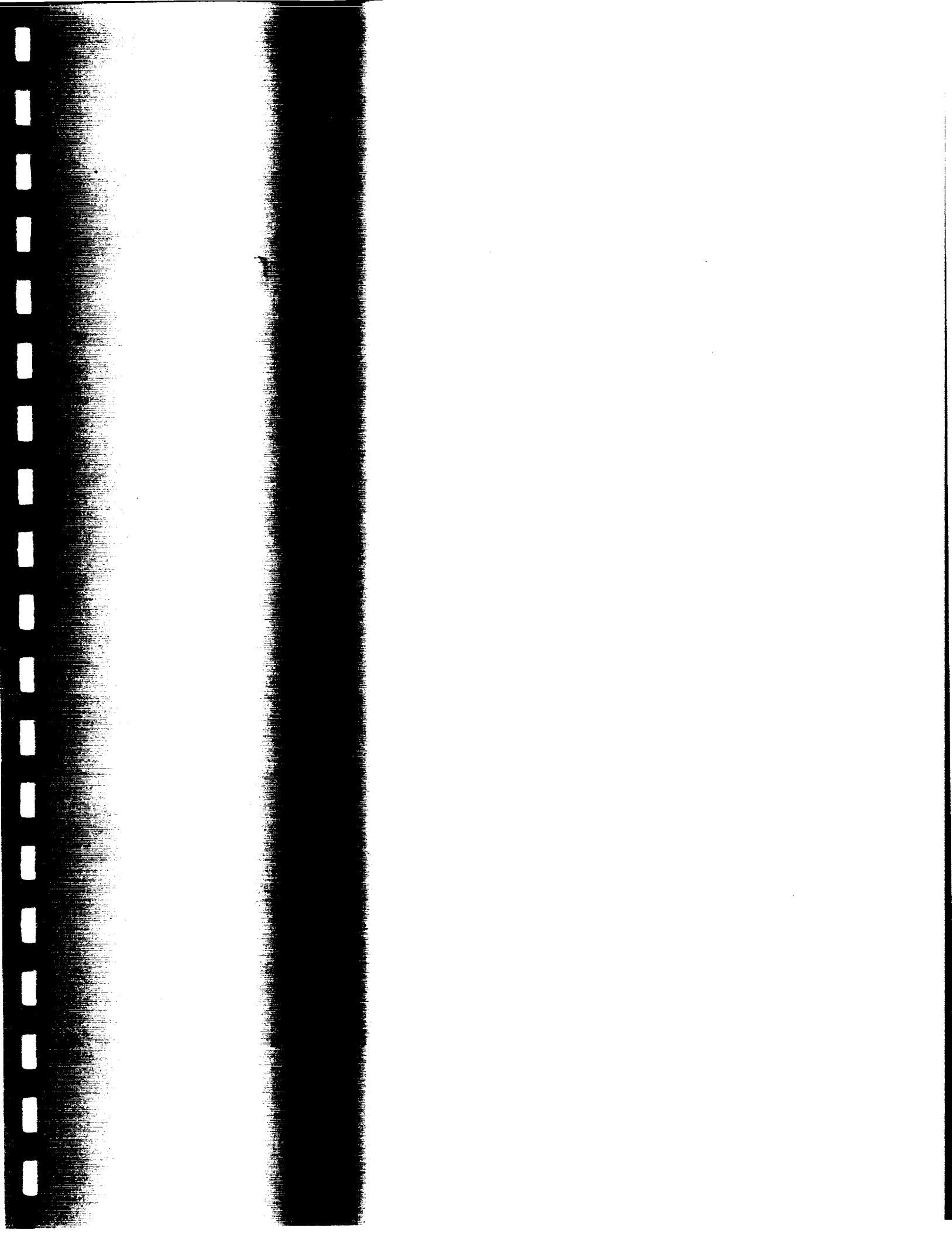


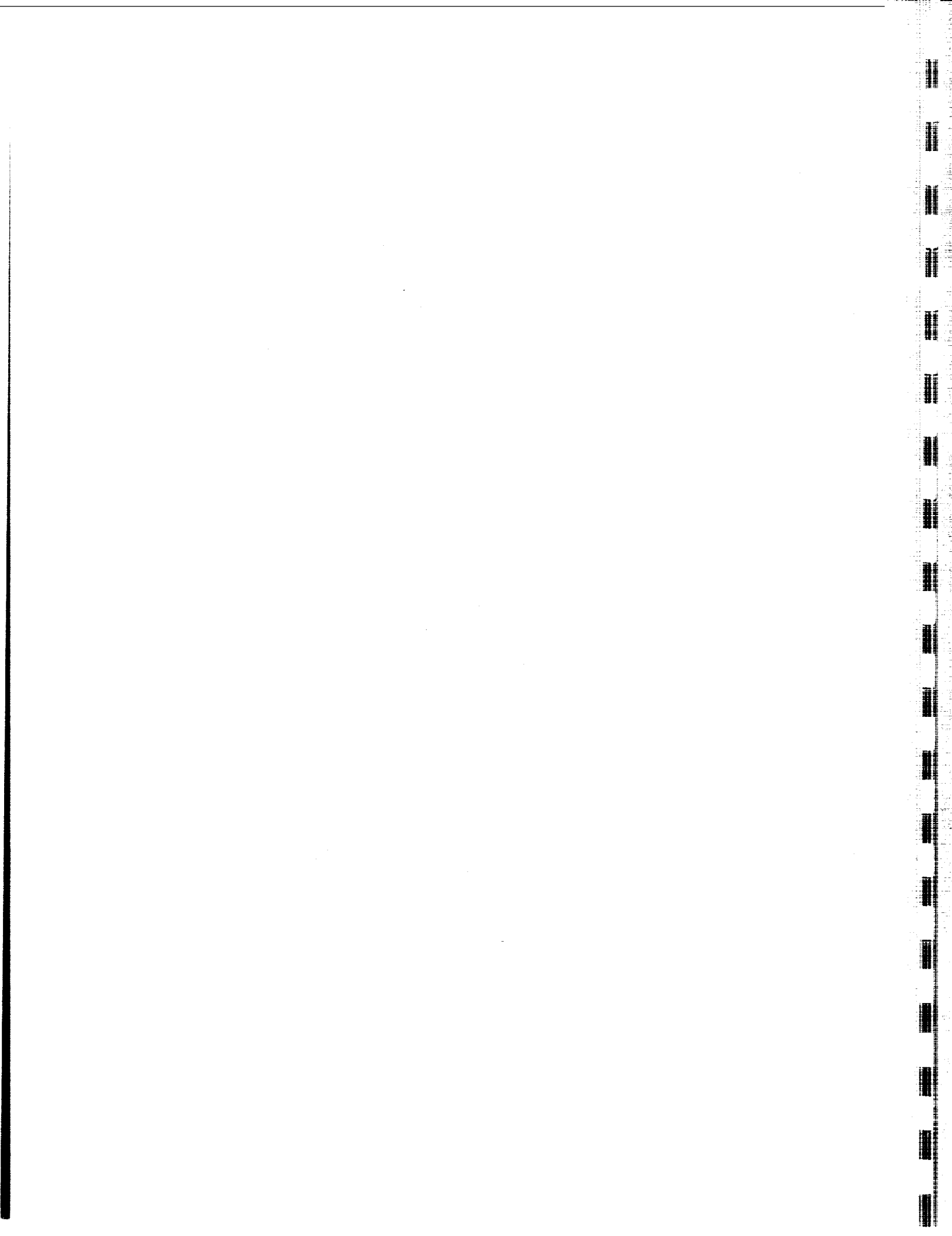


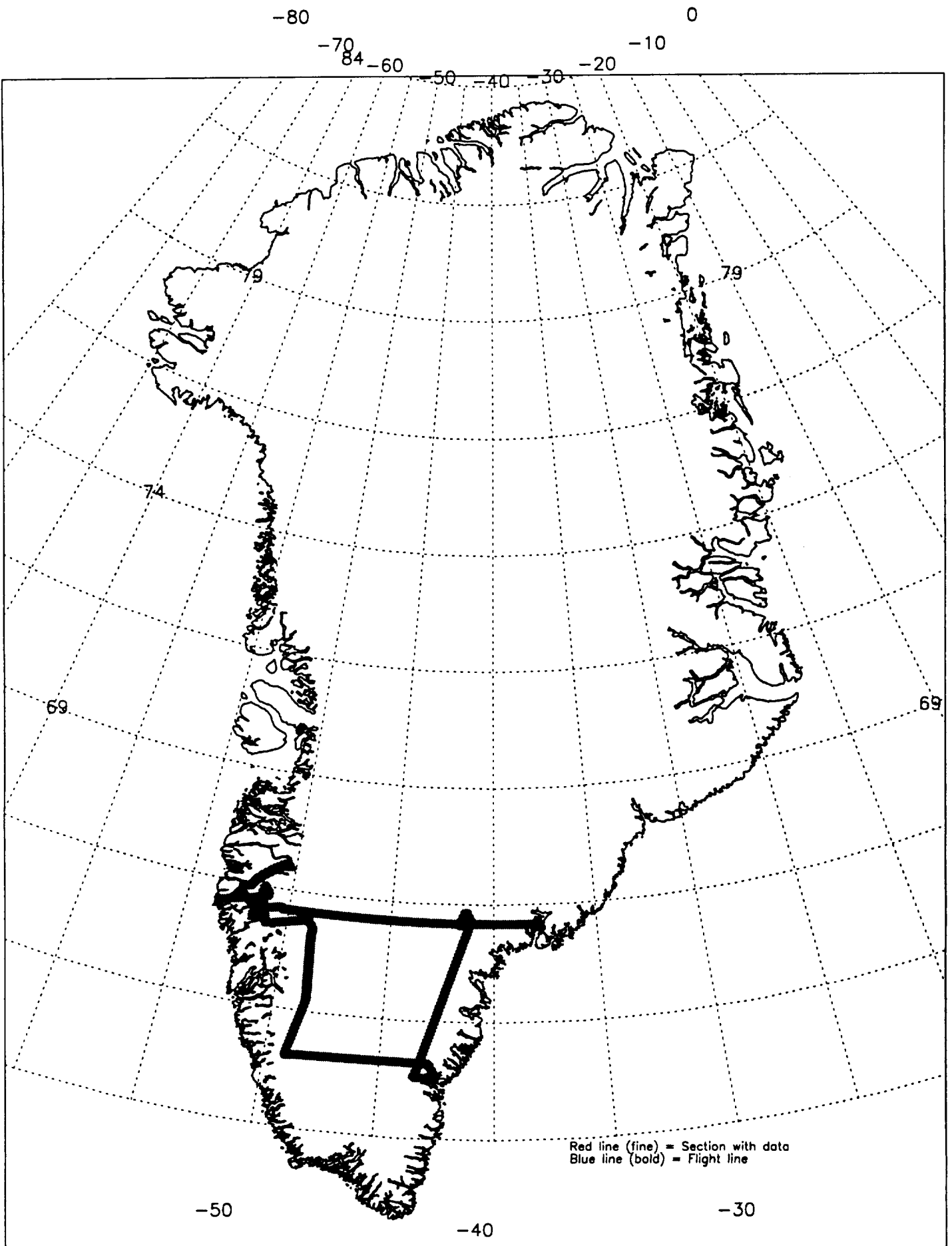
Appendix H

July 7, 1993

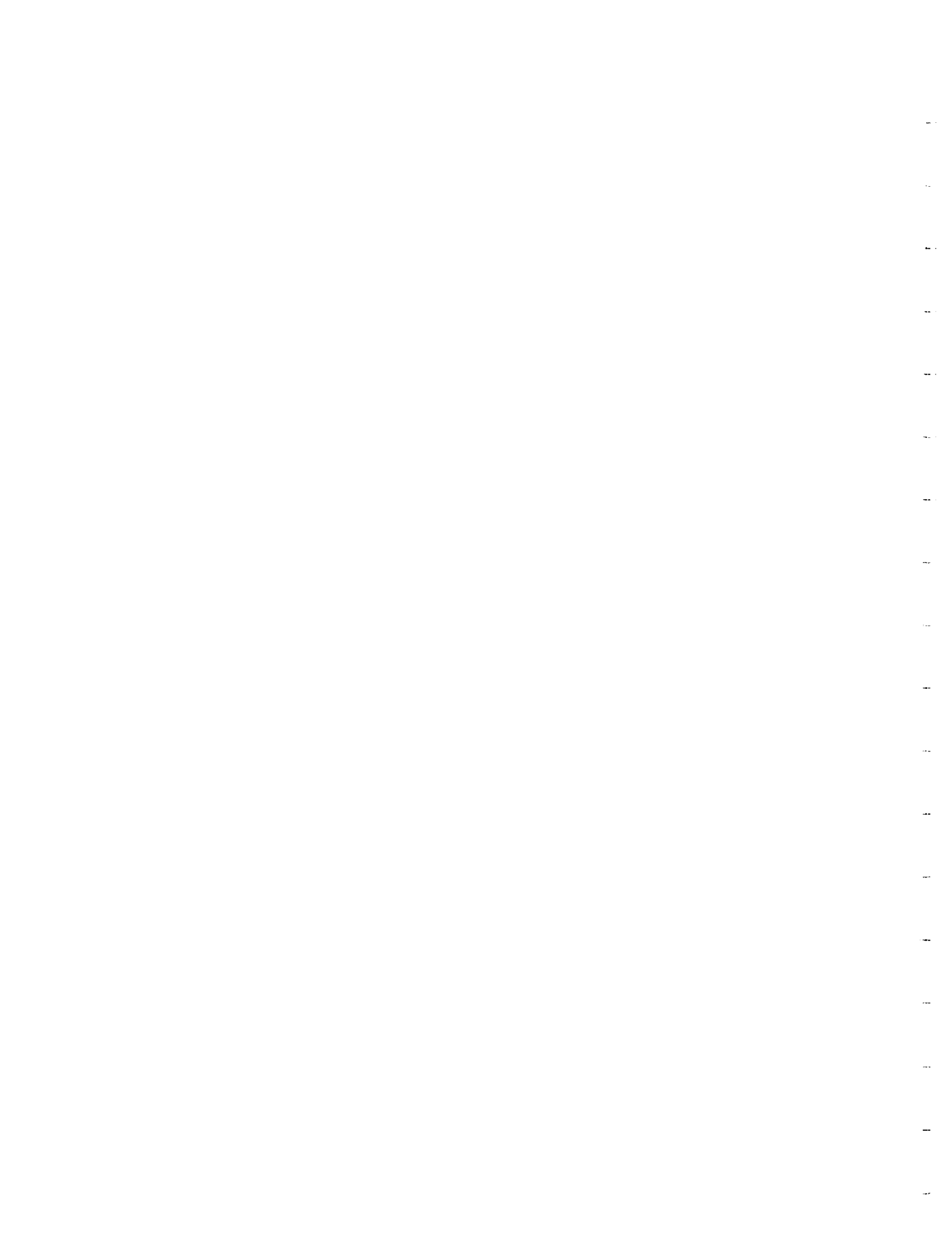




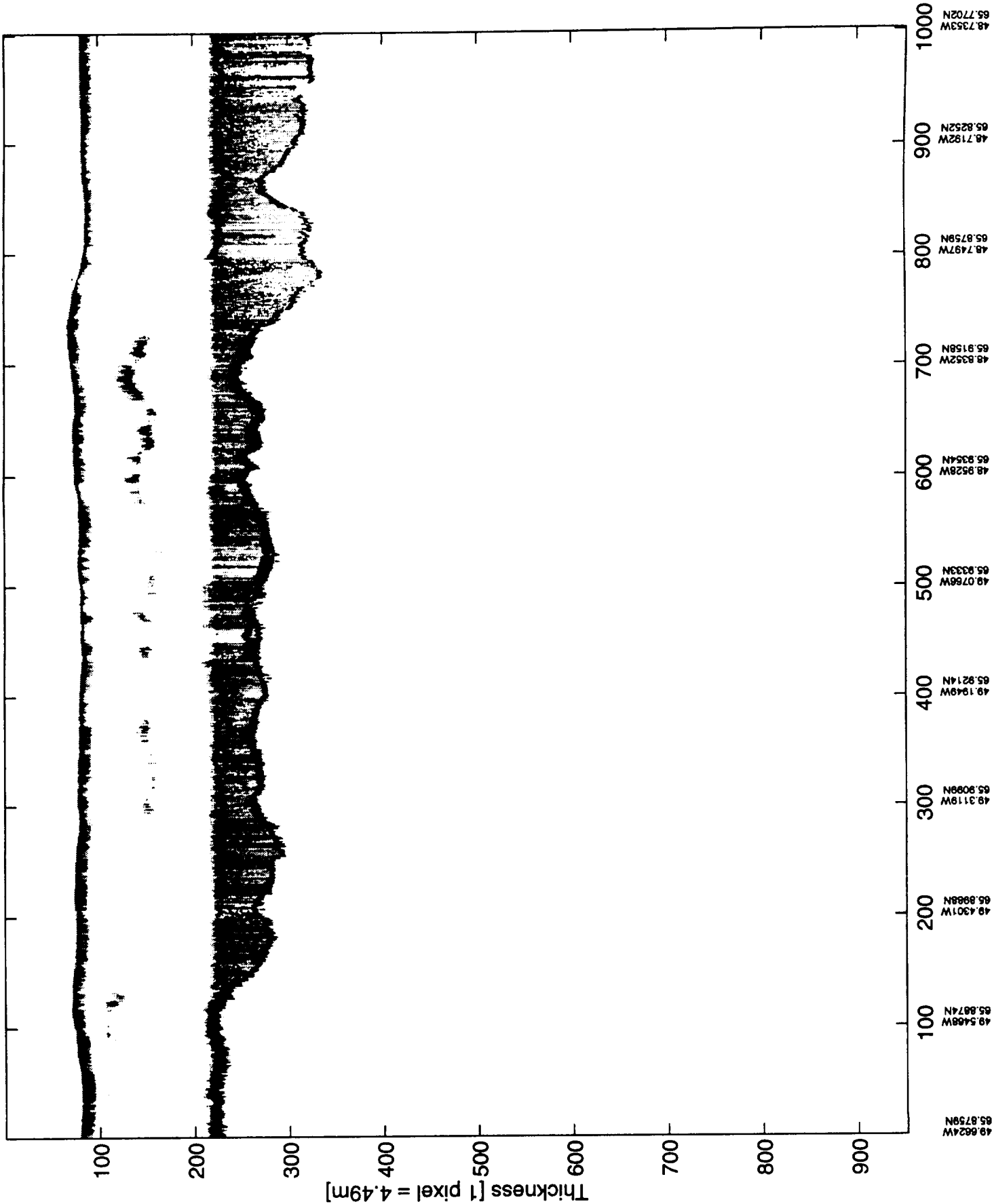




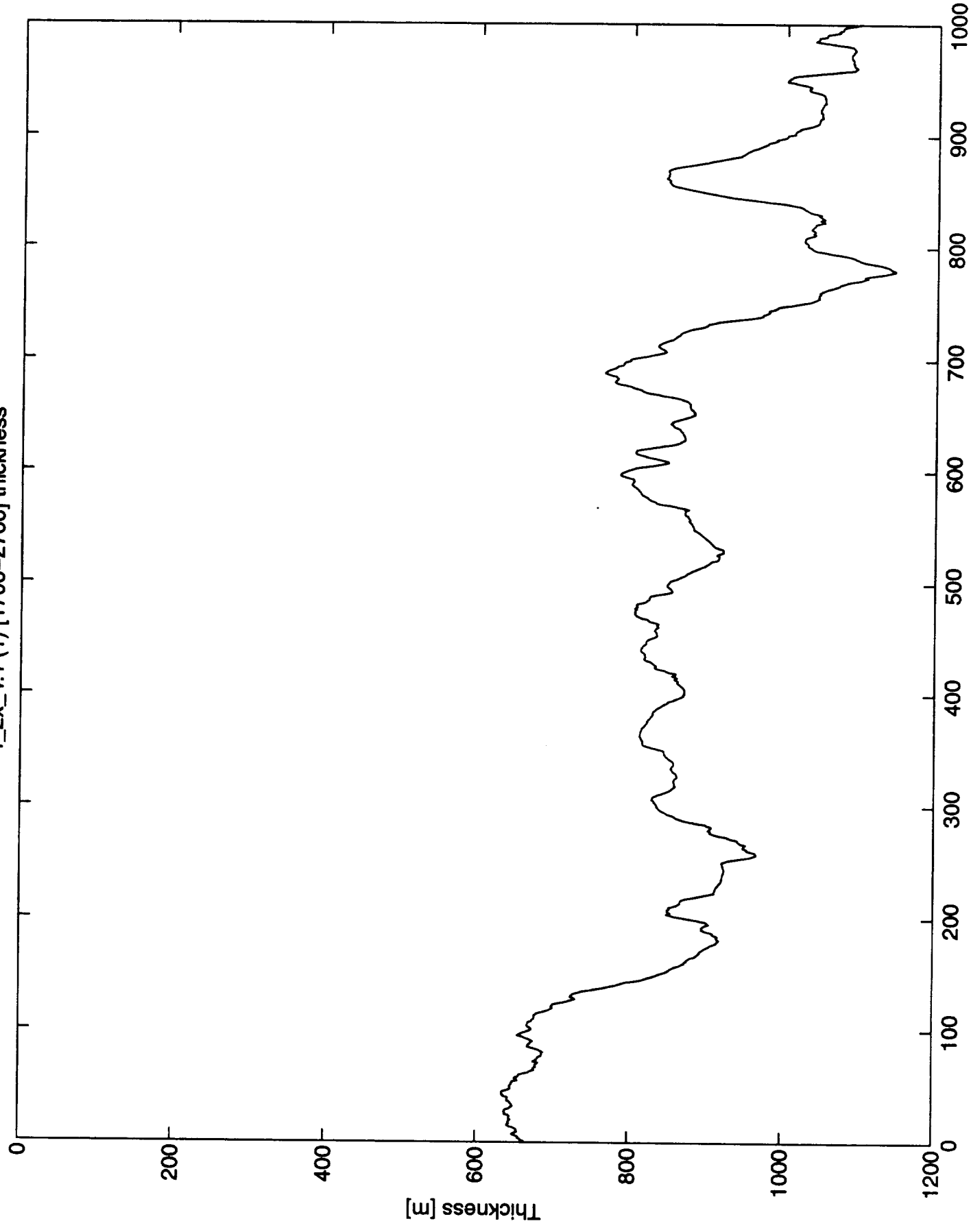
July 7, 1993 (r_2x)



r_2x_4.1 (1) [1700 2700]

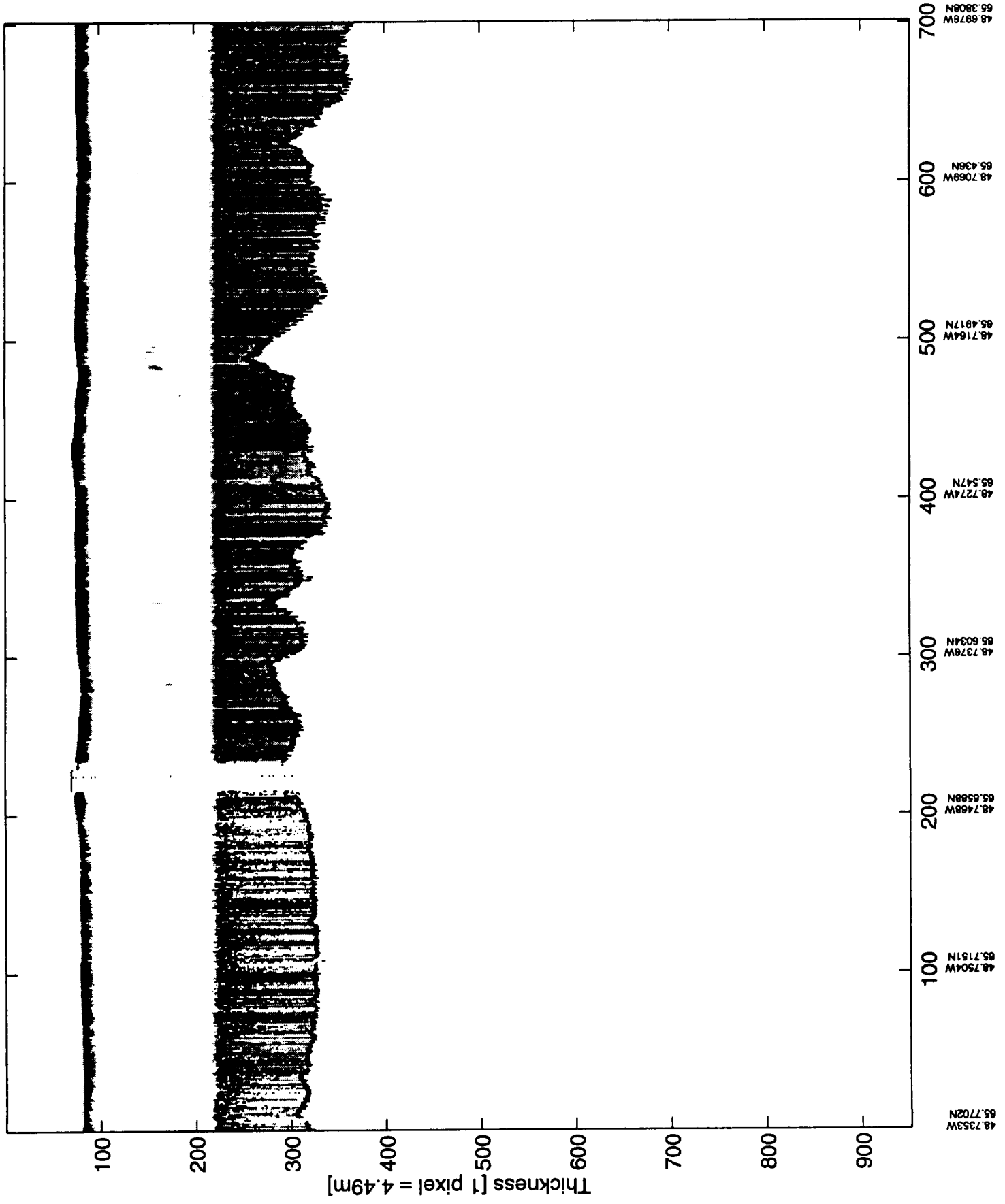


r_2x_4.1 (1) [1700-2700] thickness

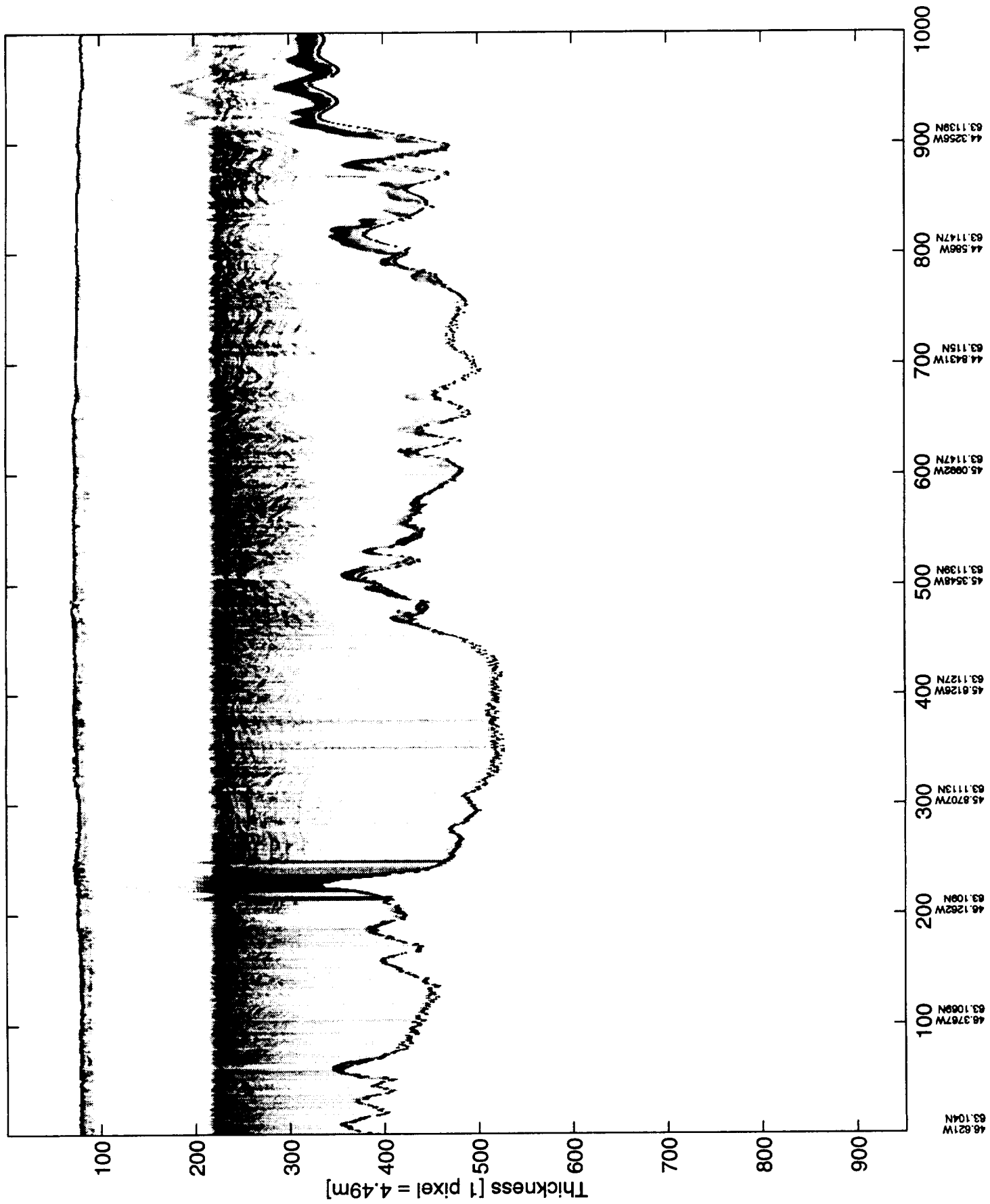


7.49V
A /
874N
3C 12 /
1101 /
089N
94 /
2 /
762V
333N
95 /
352W
158N
45
75
192W
252N
35

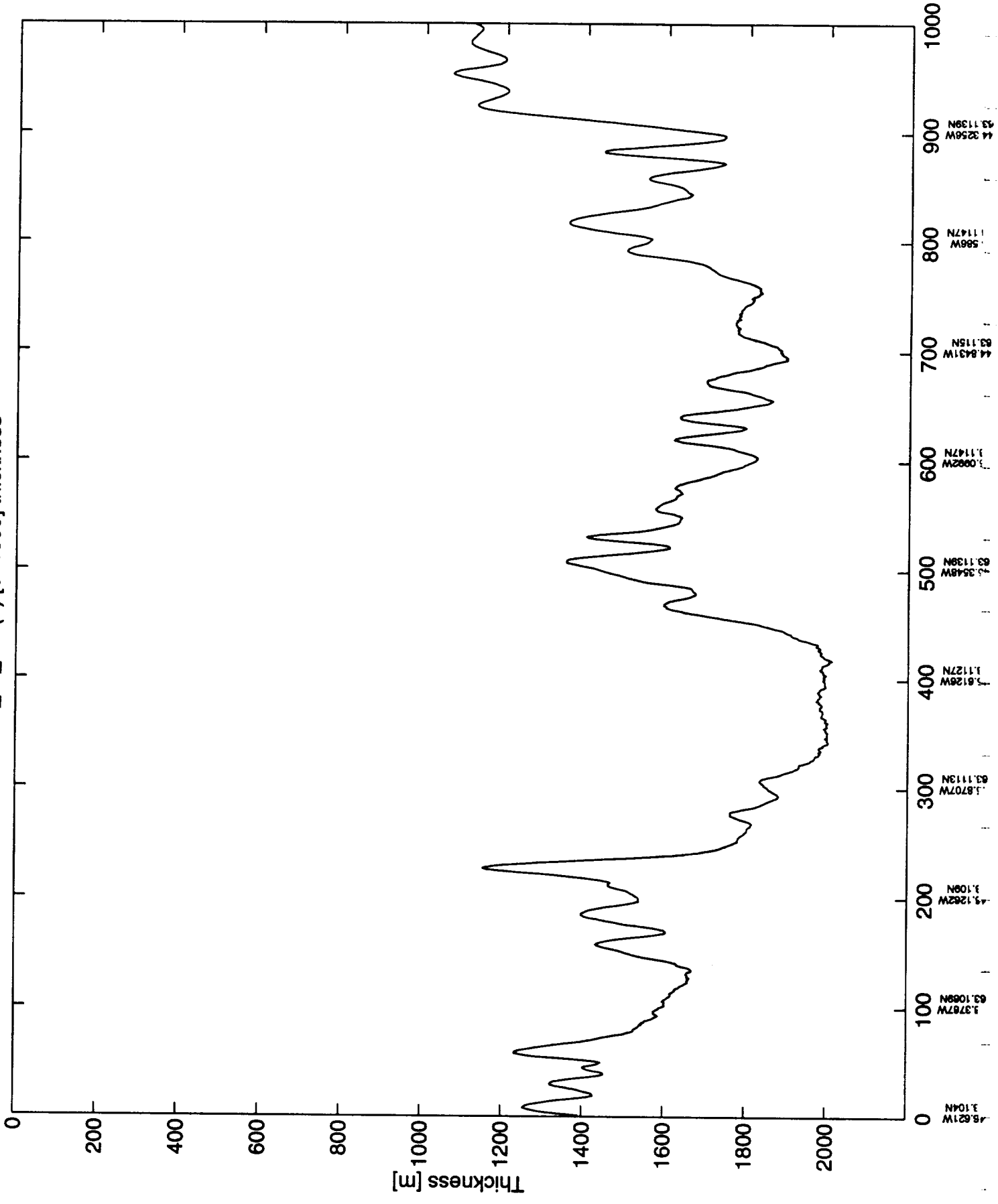
r_2x_4.1 (2) [2700 3400]



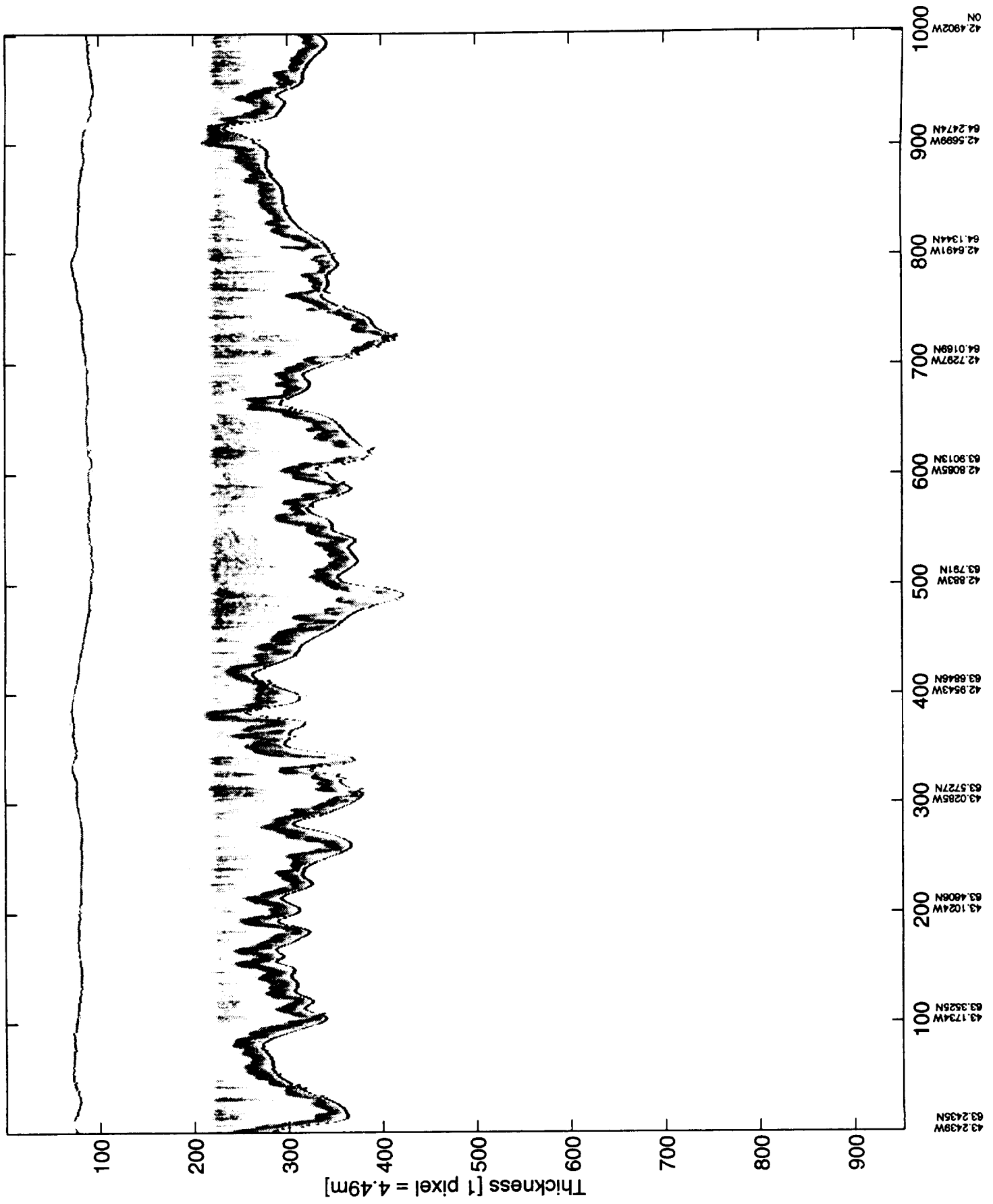
r_2x_6.1 (1) [0-1000]



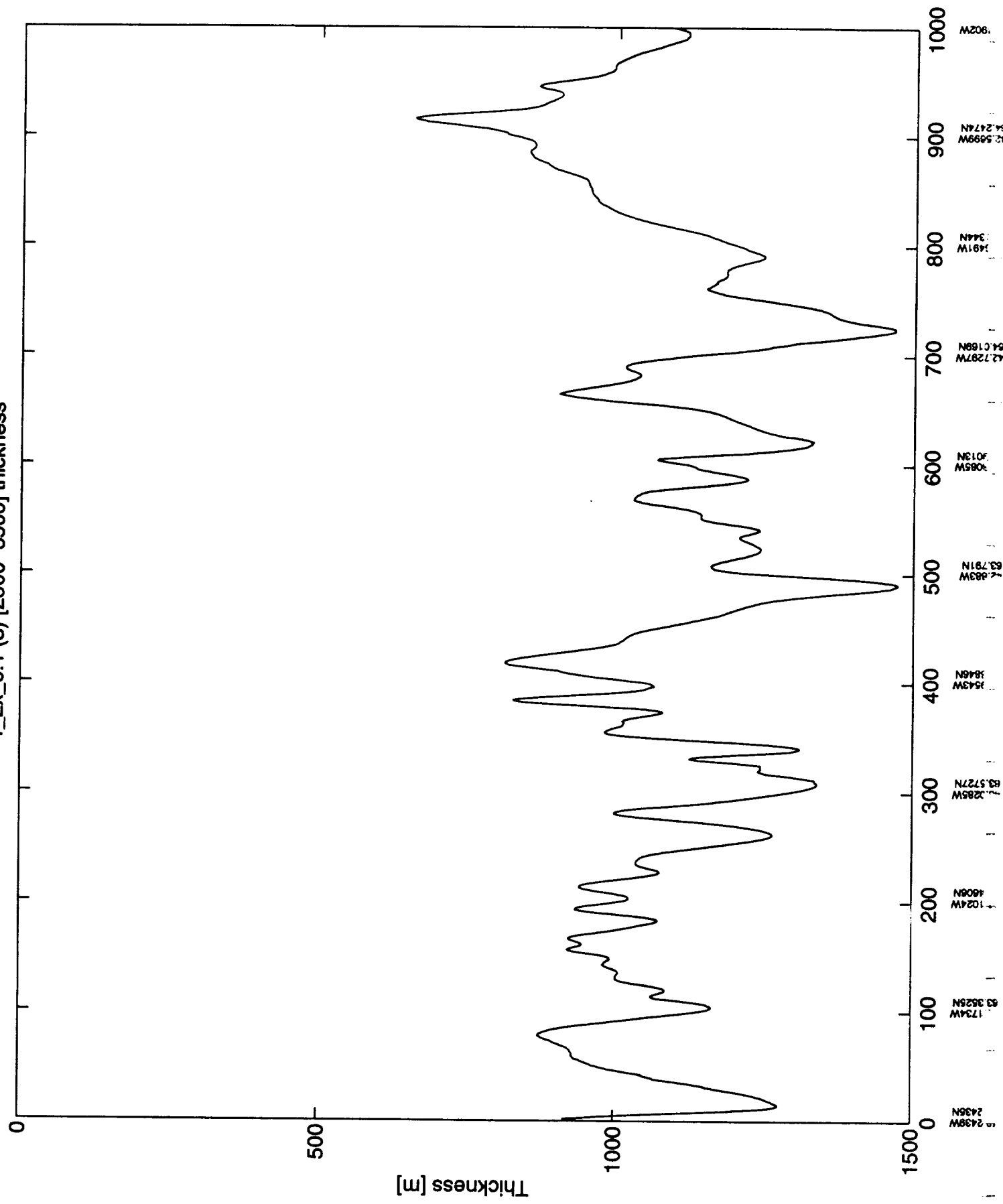
r_2x_6.1 (1) [0-1000] thickness



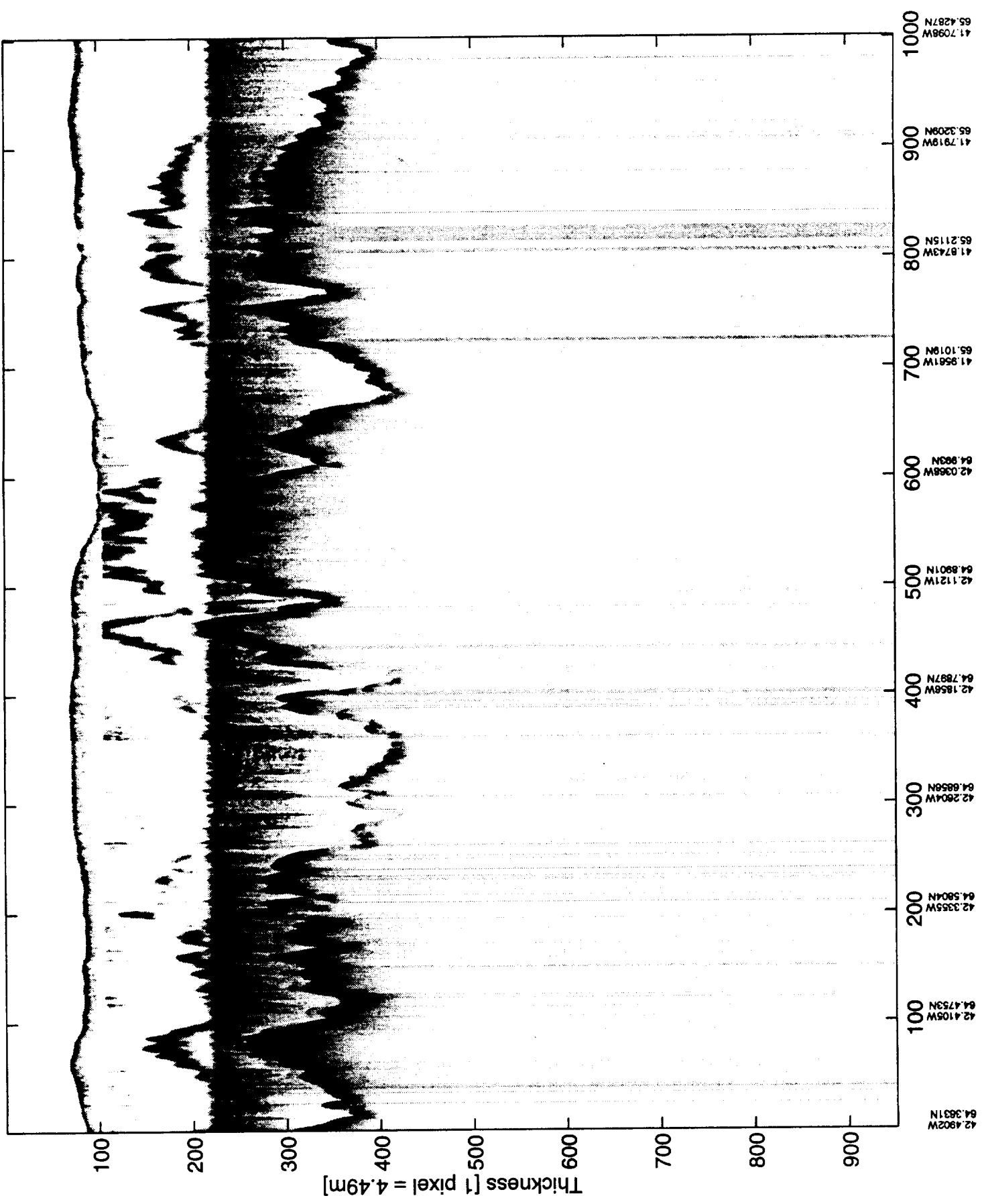
r_2x_6.1 (3) [2500 3500]



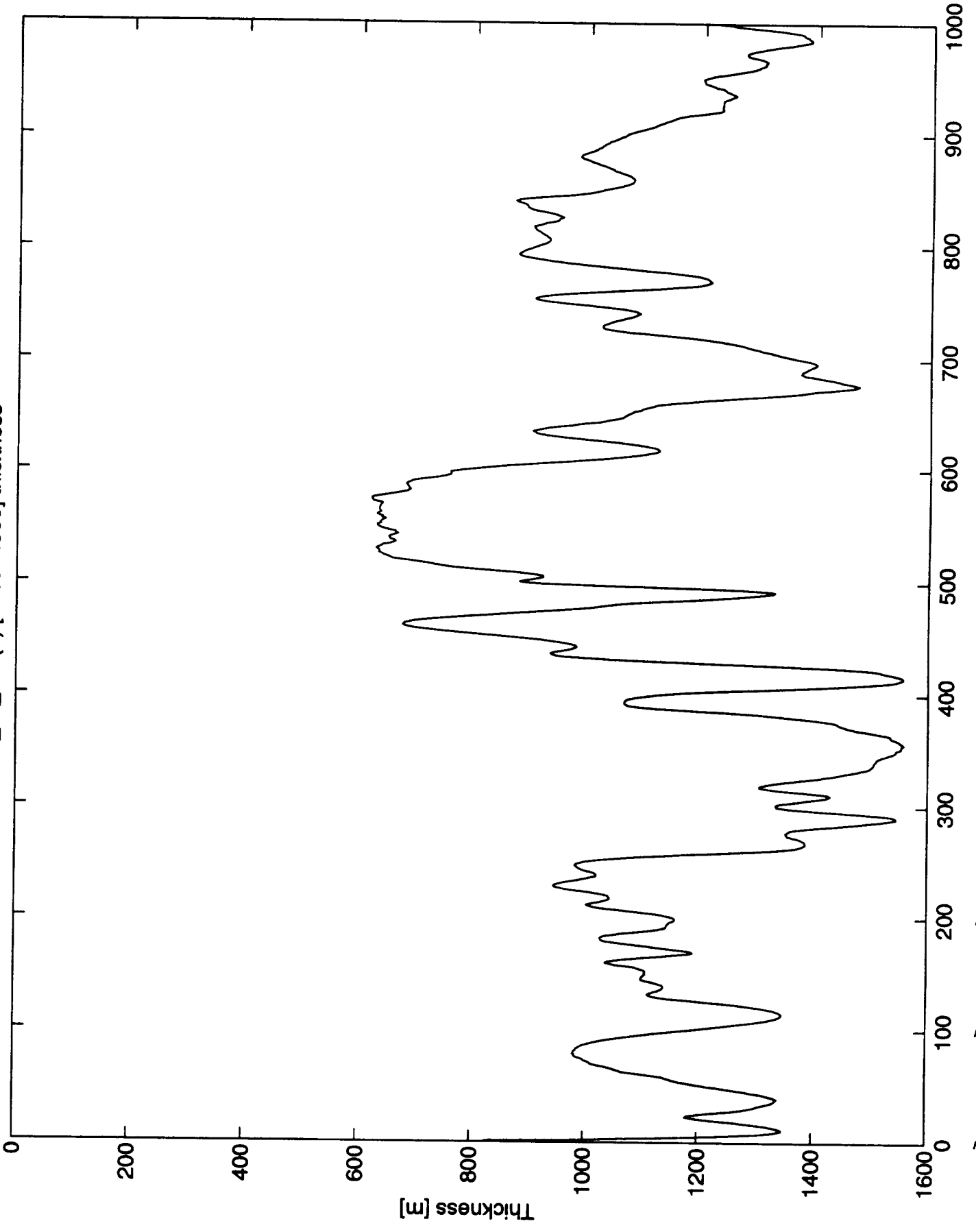
r_2x_6.1 (3) [2500-3500] thickness



r_2x_6.1 (4) [3500 4500]

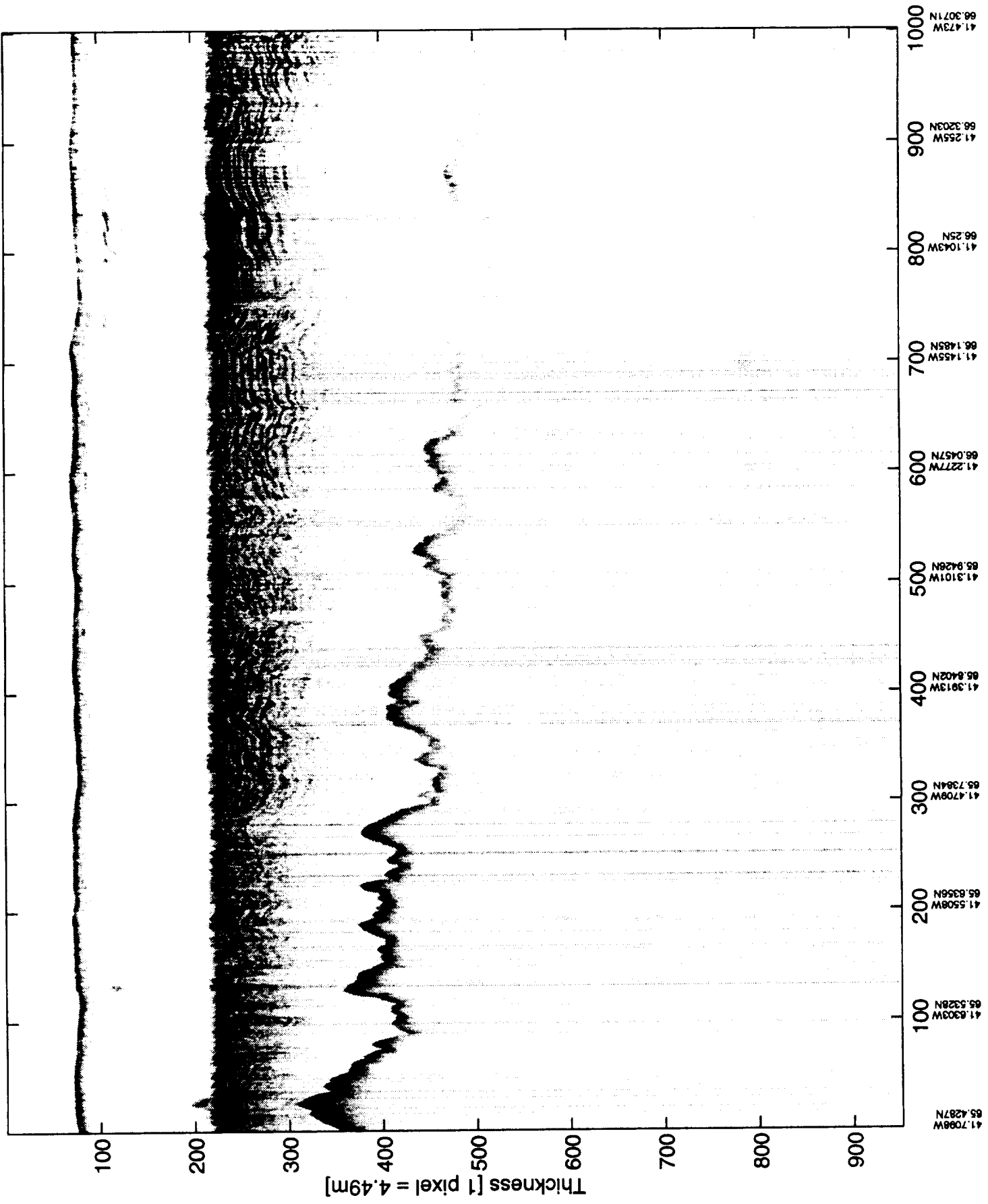


r_2x_6.1 (4) [3500-4500] thickness

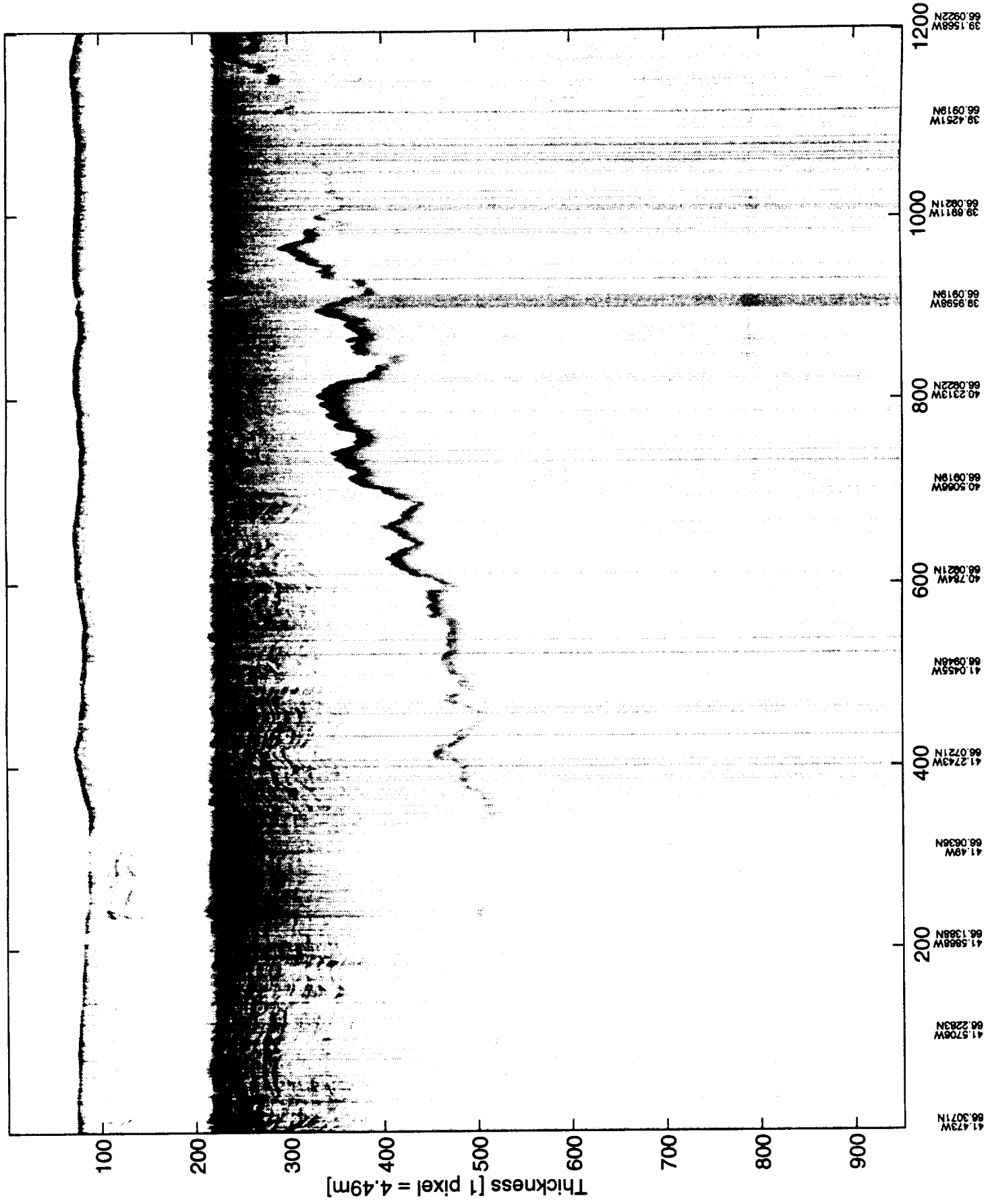


42 02W 04 11N
42 47SW 04 47SN
42 48SW 04 48SN
42 49SW 04 49SN
42 50SW 04 50SN
42 51SW 04 51SN
42 52SW 04 52SN
42 53SW 04 53SN
42 54SW 04 54SN
42 55SW 04 55SN
42 56SW 04 56SN
42 57SW 04 57SN
42 58SW 04 58SN
42 59SW 04 59SN
42 60SW 04 60SN
42 61SW 04 61SN
42 62SW 04 62SN
42 63SW 04 63SN
42 64SW 04 64SN
42 65SW 04 65SN
42 66SW 04 66SN
42 67SW 04 67SN
42 68SW 04 68SN
42 69SW 04 69SN
42 70SW 04 70SN
42 71SW 04 71SN
42 72SW 04 72SN
42 73SW 04 73SN
42 74SW 04 74SN
42 75SW 04 75SN
42 76SW 04 76SN
42 77SW 04 77SN
42 78SW 04 78SN
42 79SW 04 79SN
42 80SW 04 80SN
42 81SW 04 81SN
42 82SW 04 82SN
42 83SW 04 83SN
42 84SW 04 84SN
42 85SW 04 85SN
42 86SW 04 86SN
42 87SW 04 87SN
42 88SW 04 88SN
42 89SW 04 89SN
42 90SW 04 90SN
42 91SW 04 91SN
42 92SW 04 92SN
42 93SW 04 93SN
42 94SW 04 94SN
42 95SW 04 95SN
42 96SW 04 96SN
42 97SW 04 97SN
42 98SW 04 98SN
42 99SW 04 99SN
42 00SW 04 00SN

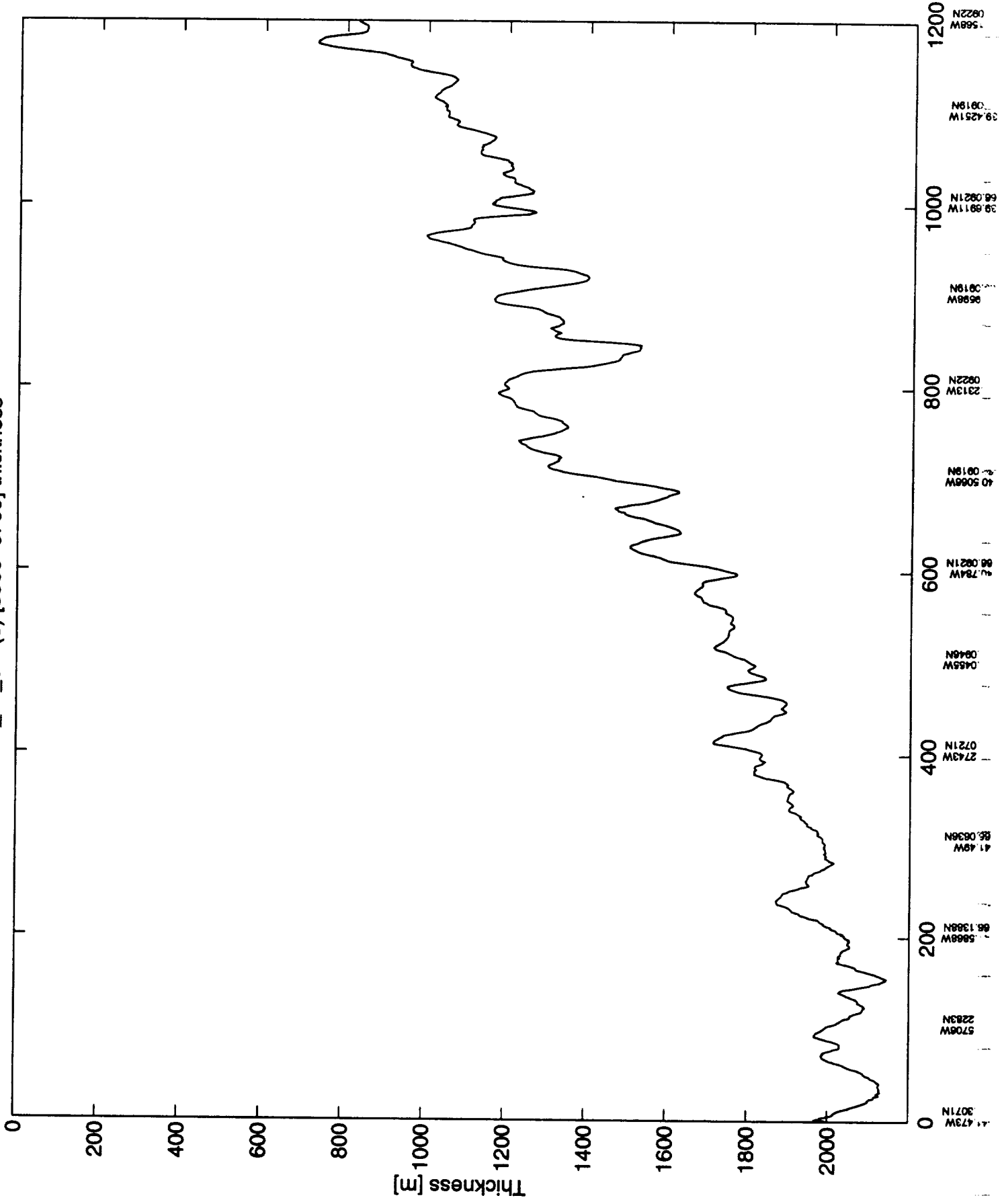
r_2x_6.1 (5) [4500 5500]



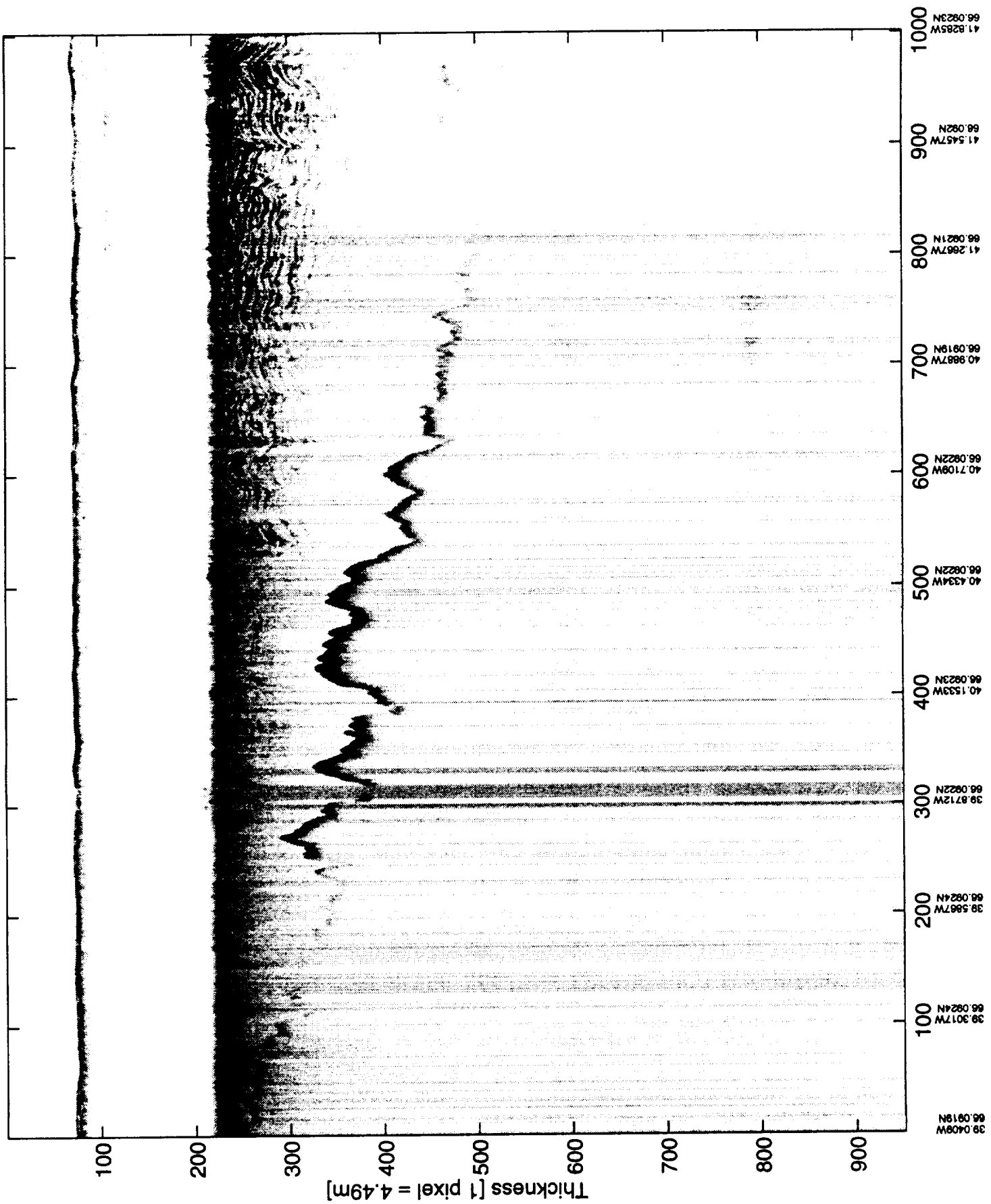
r_2x_6.1 (6) [5500 6700]



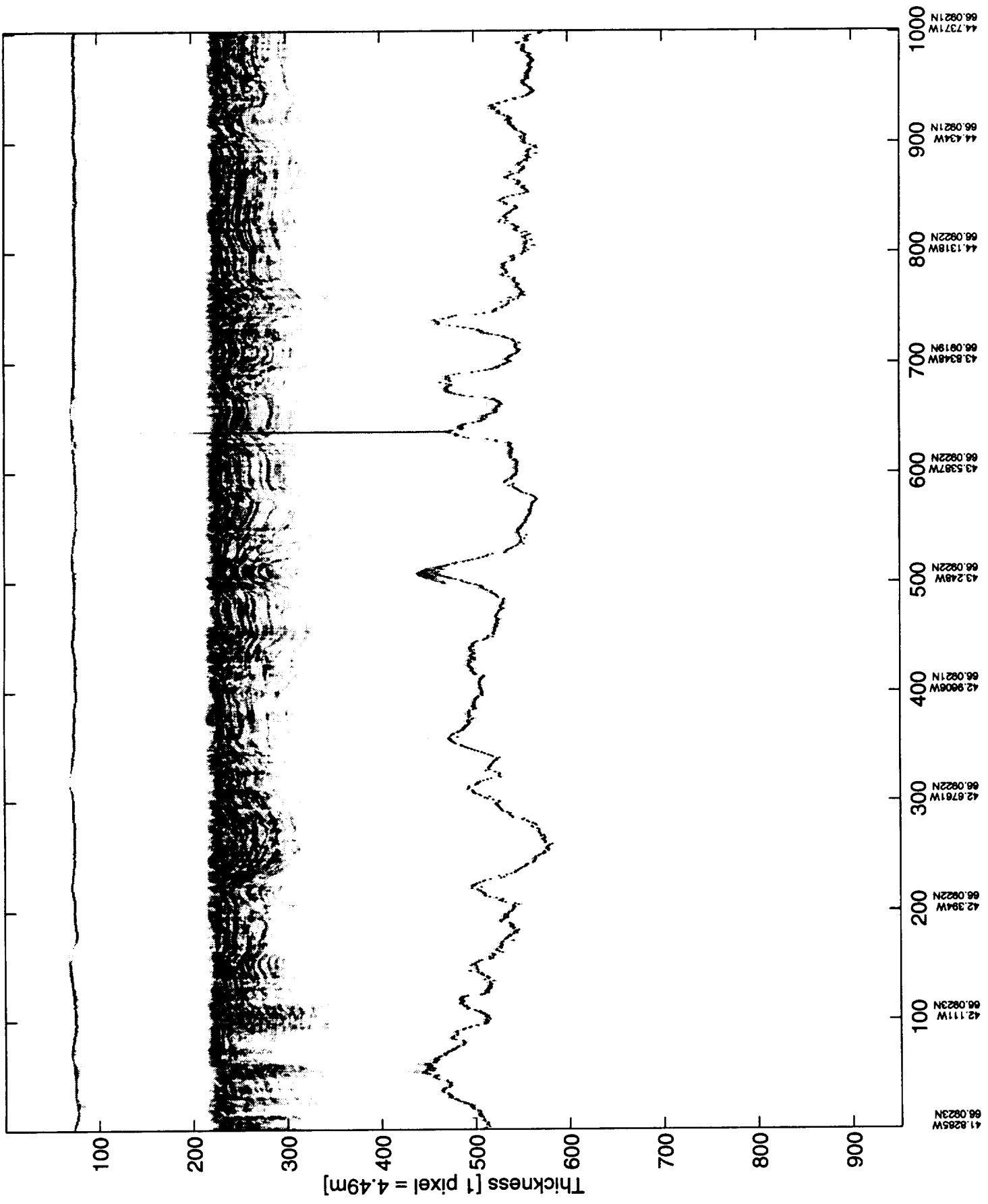
r_2x_6.1 (6) [5500-6700] thickness



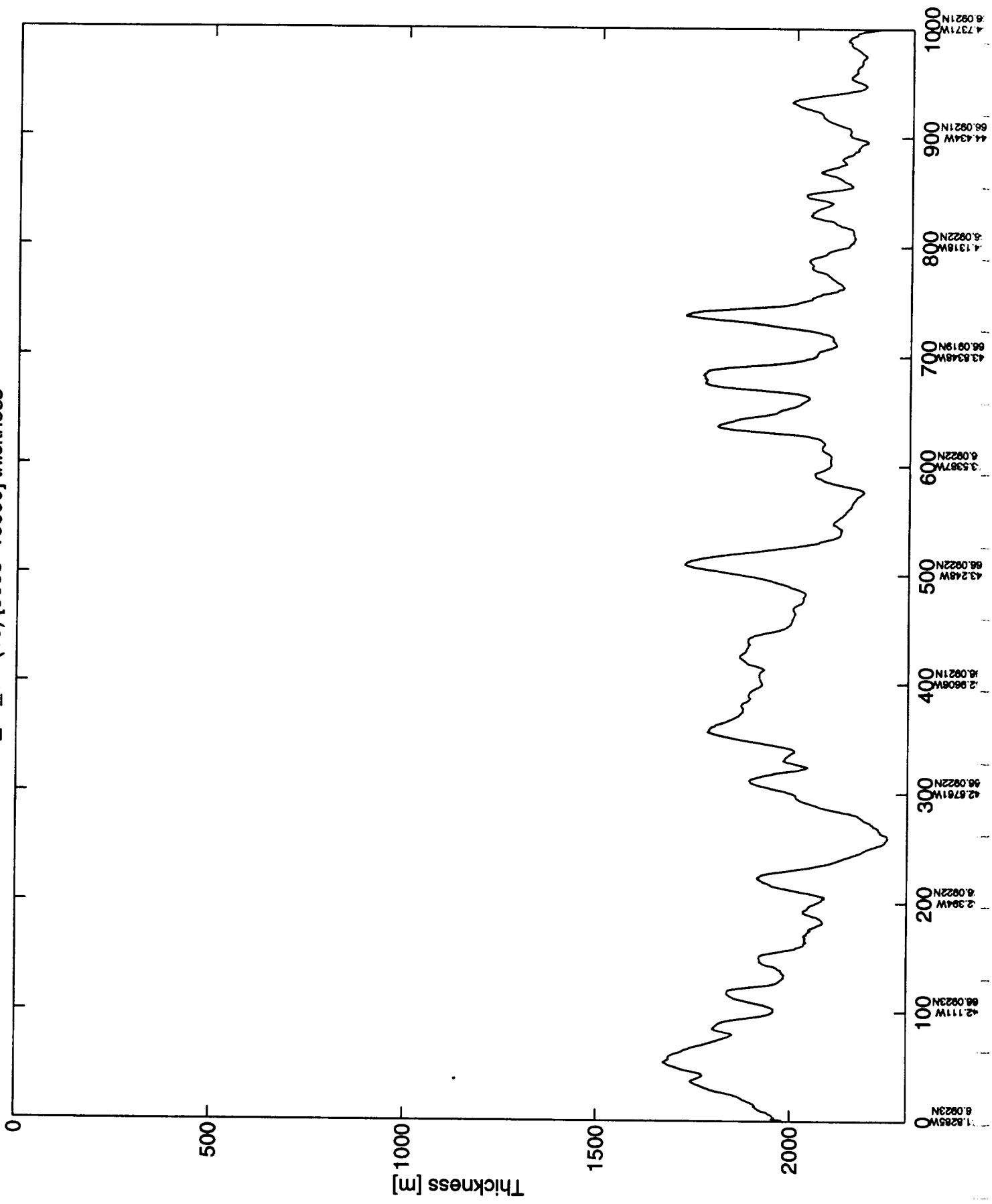
r_2x_6.1 (9) [8000 9000]



r_2x_6.1 (10) [9000 10000]

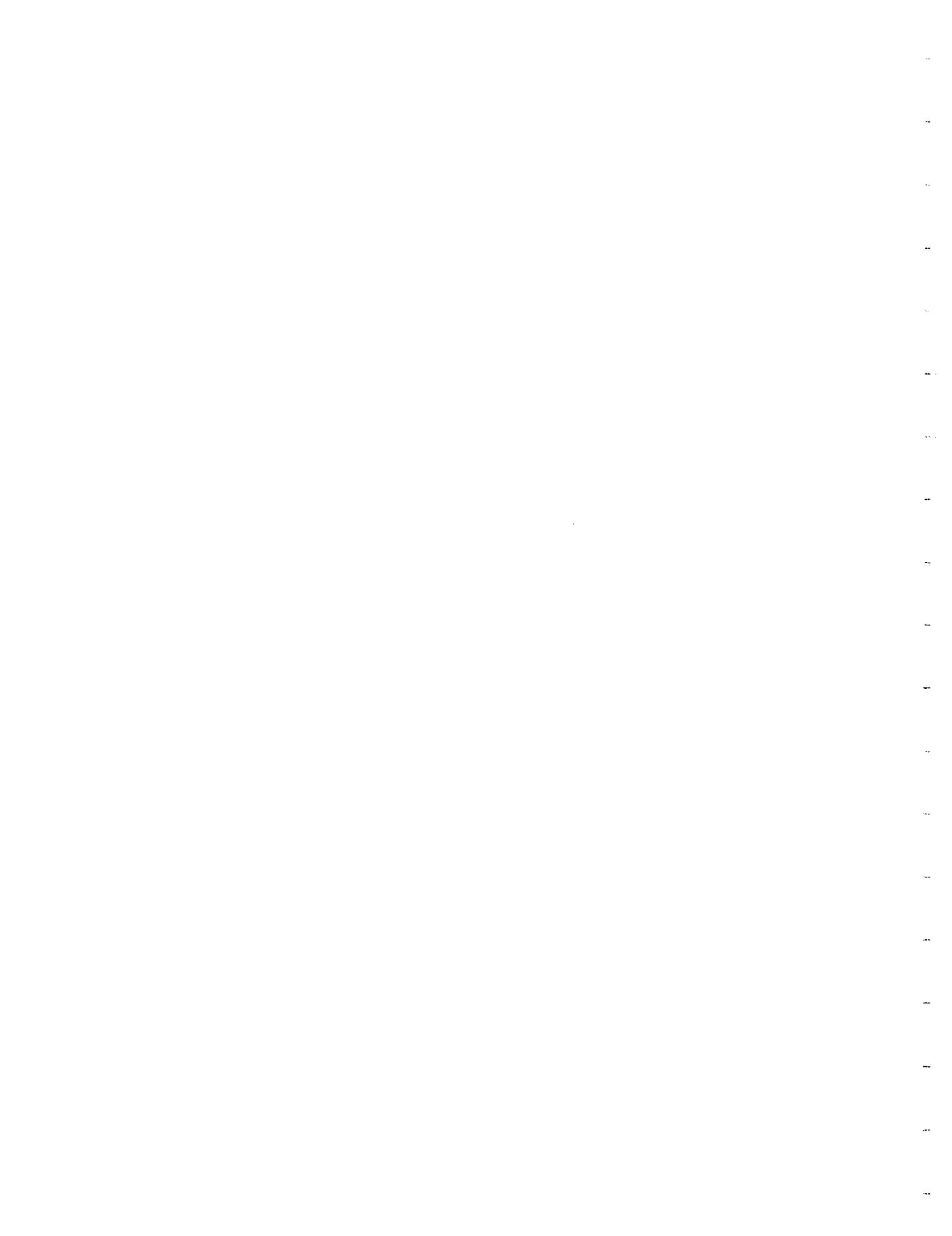


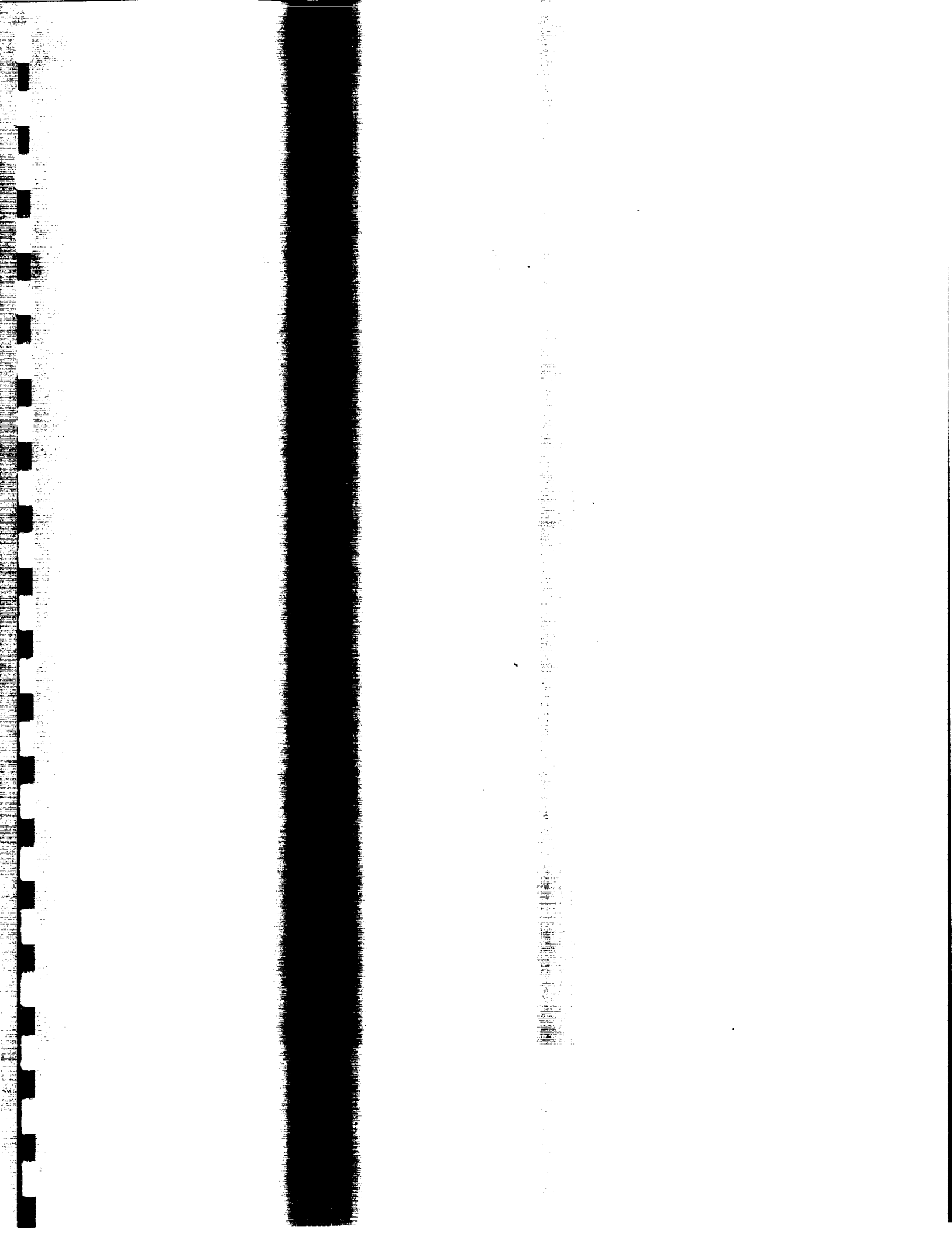
r_2x_6.1 (10) [9000-10000] thickness

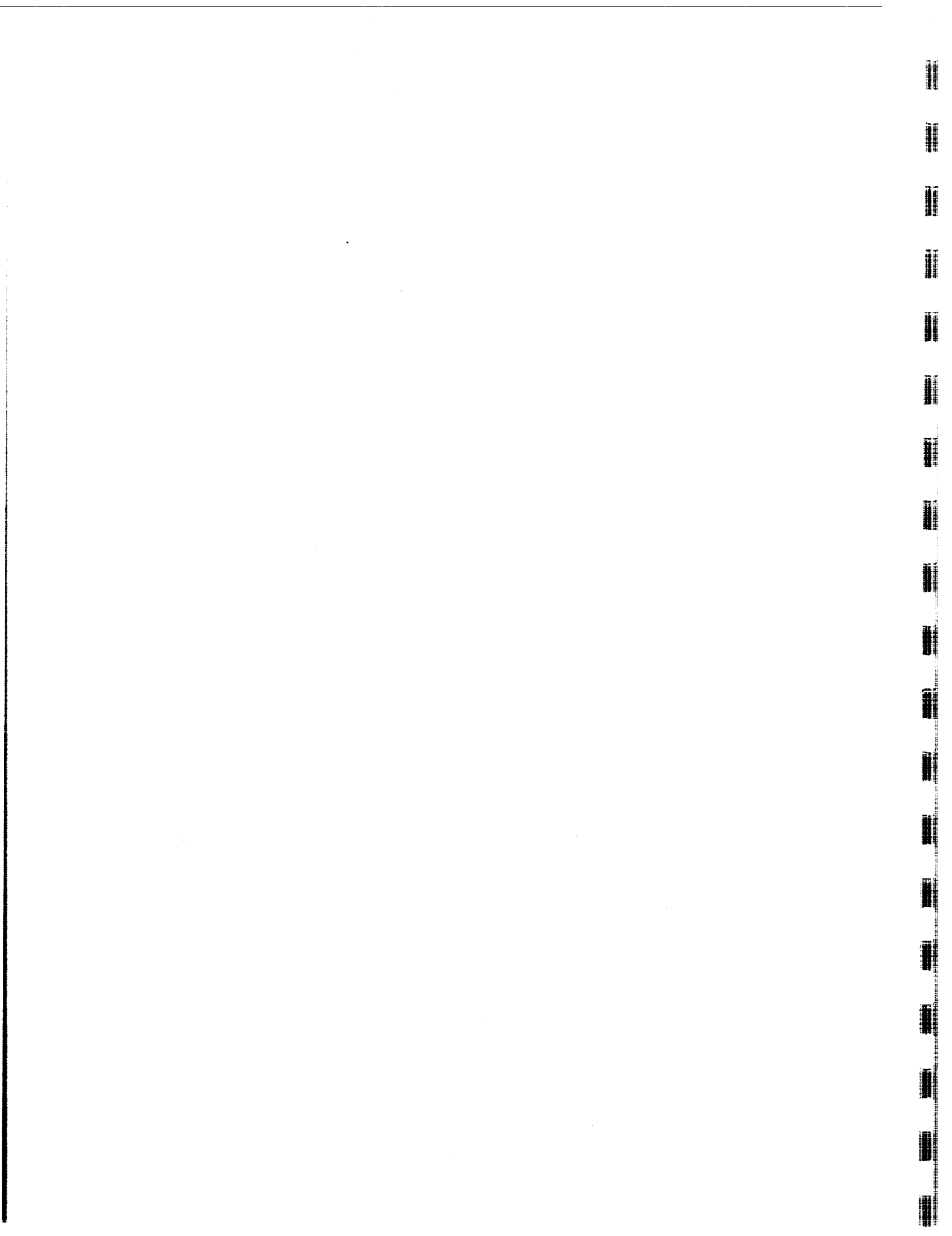


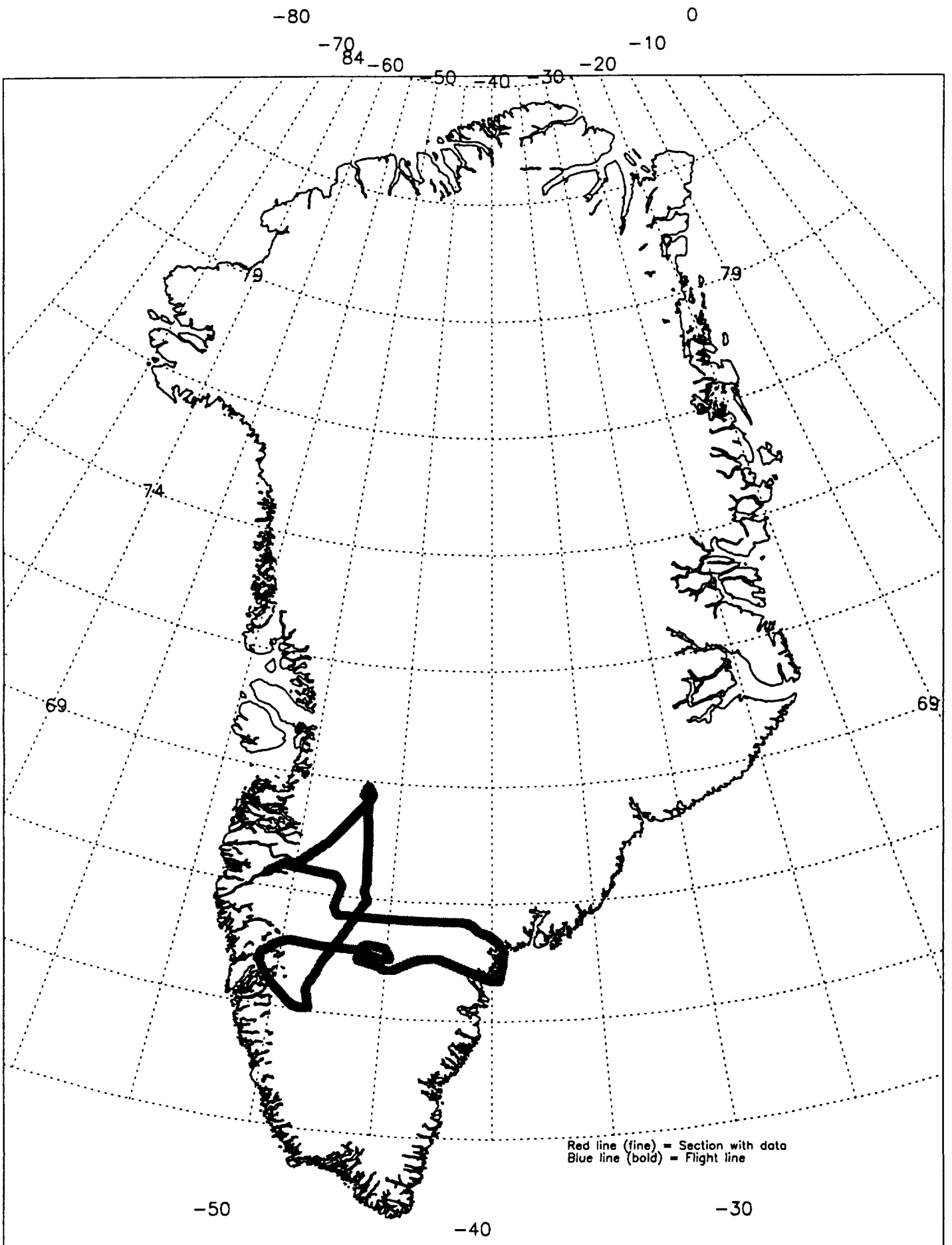
Appendix I

July 8, 1993

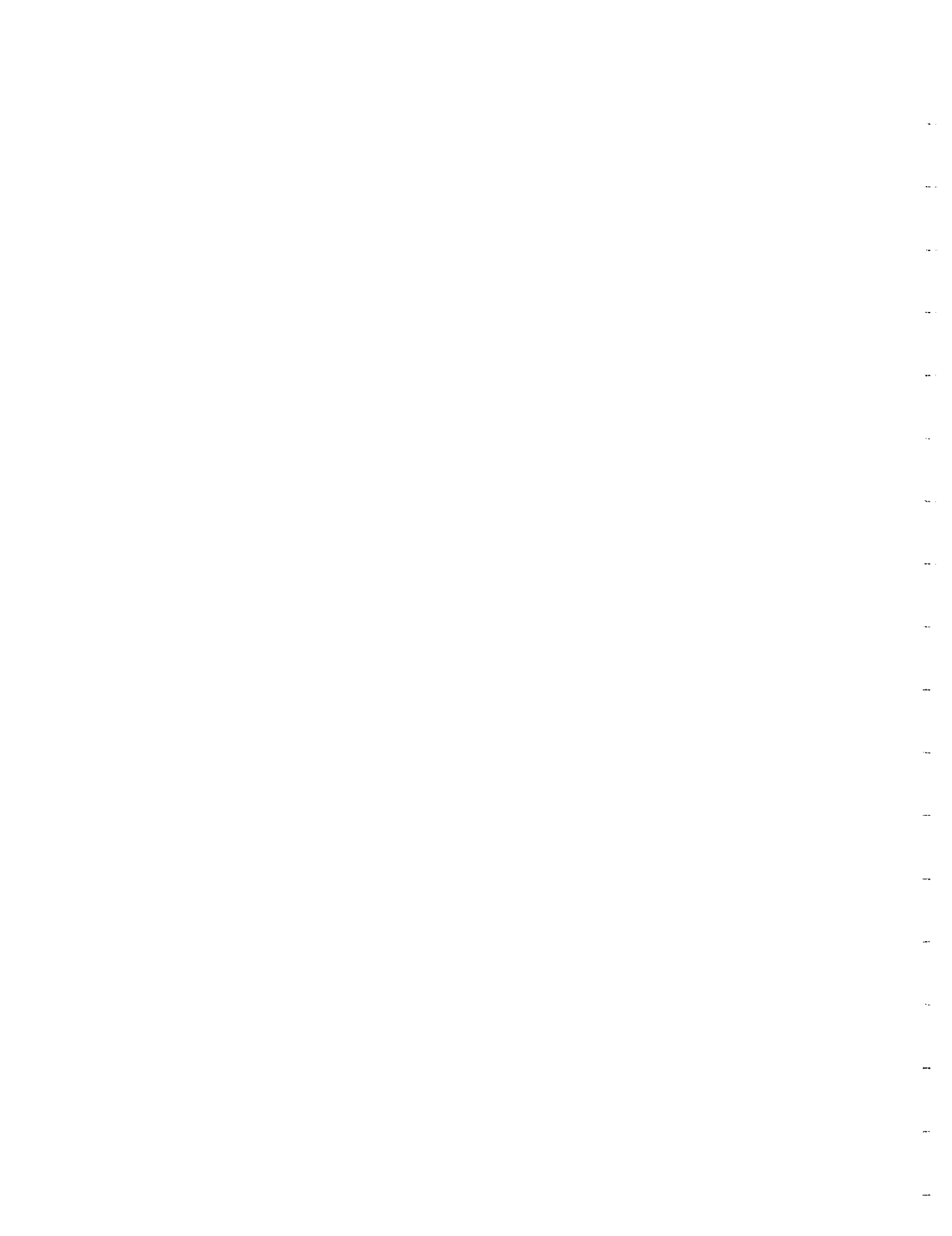




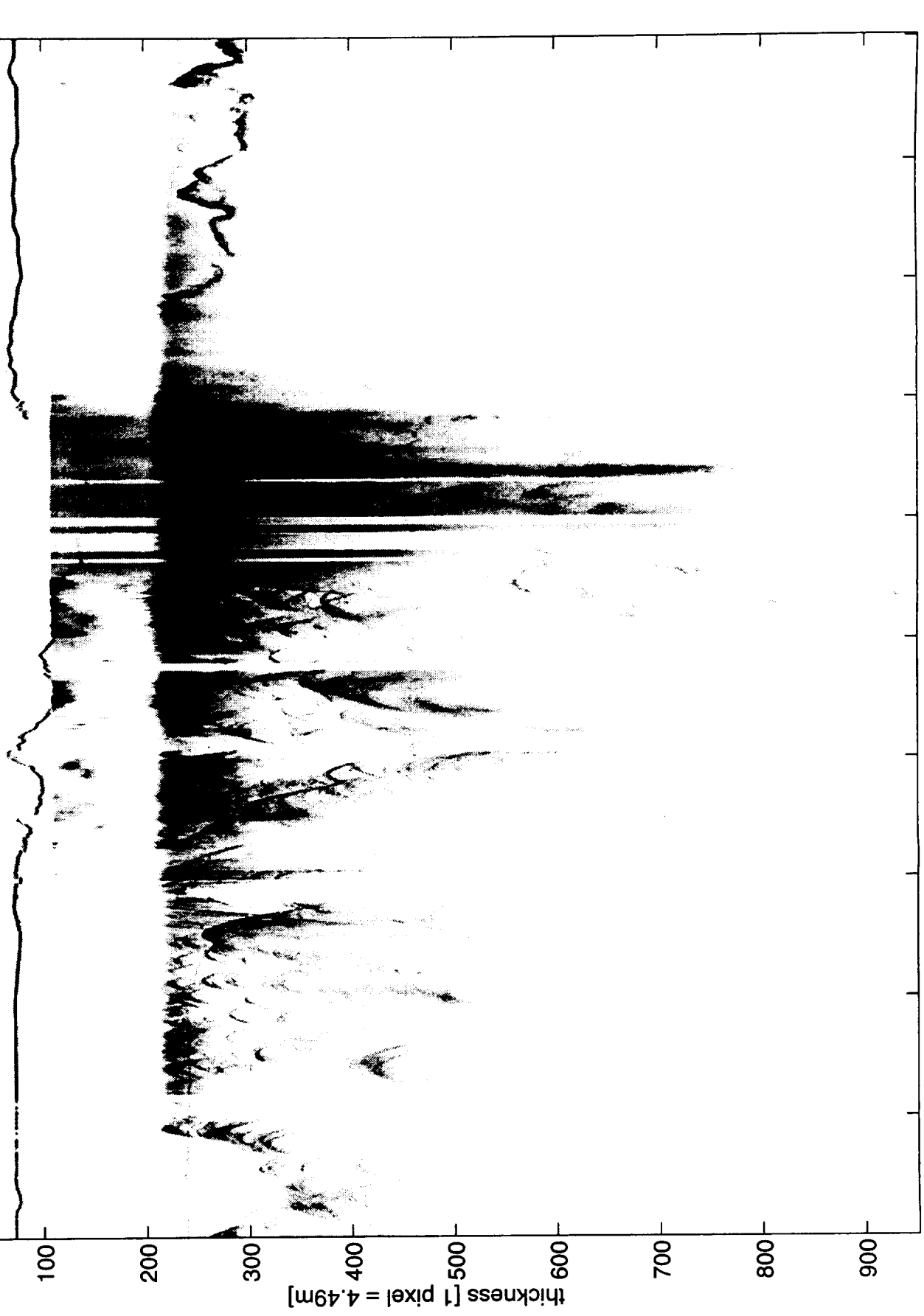




July 8, 1993 (r_9x)

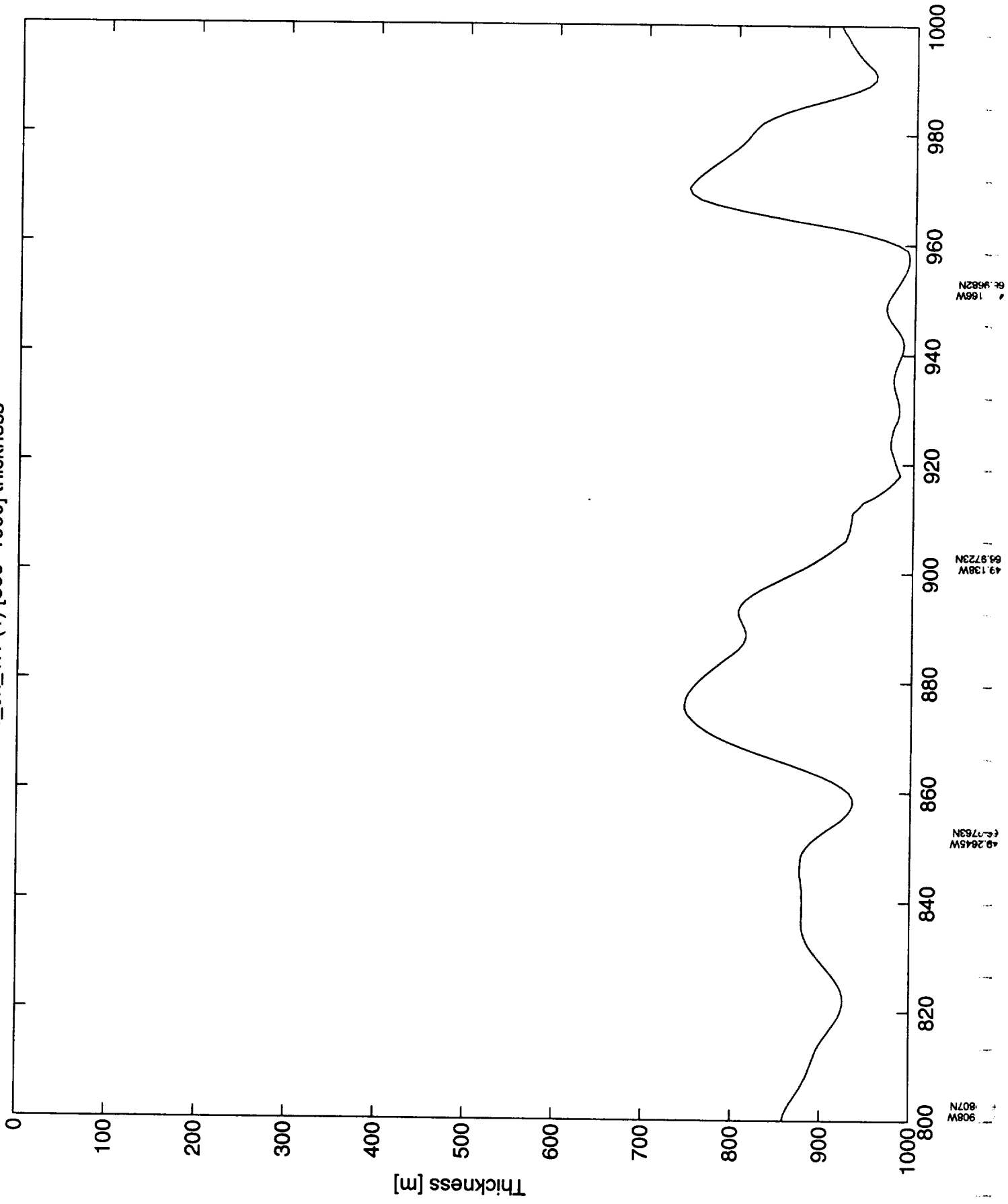


r_9x_1.1 <1> [0-1000]

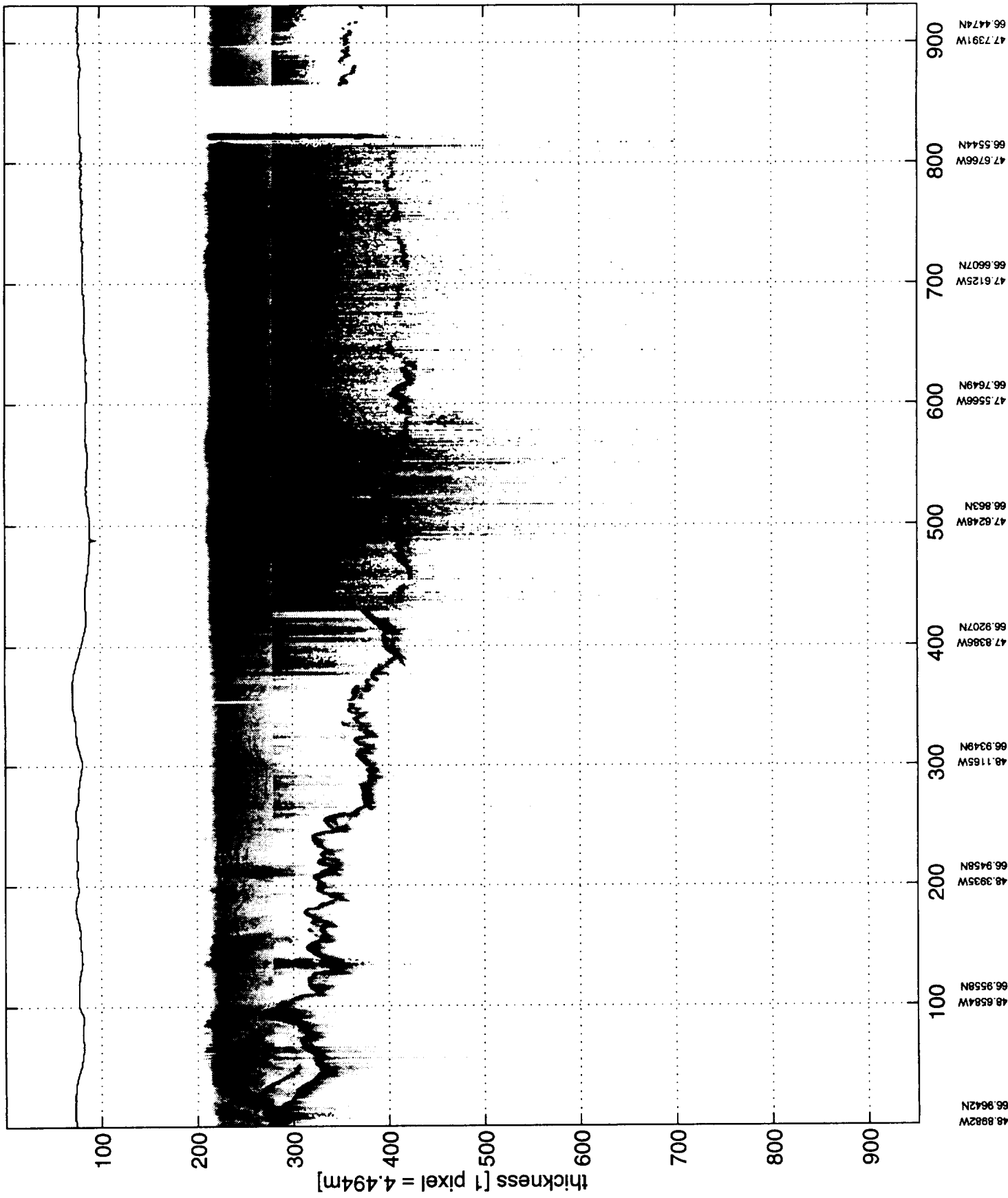


66.857N
51.2855W
66.9156N
50.8655W
66.9716N
50.6746W
67.02N
50.4397W
67.0305N
50.1885W
67.0136N
49.9338W
66.9973N
49.664W
66.9888N
49.3965W
66.9808N
49.1435W
66.9725N
48.9008W
66.9643N

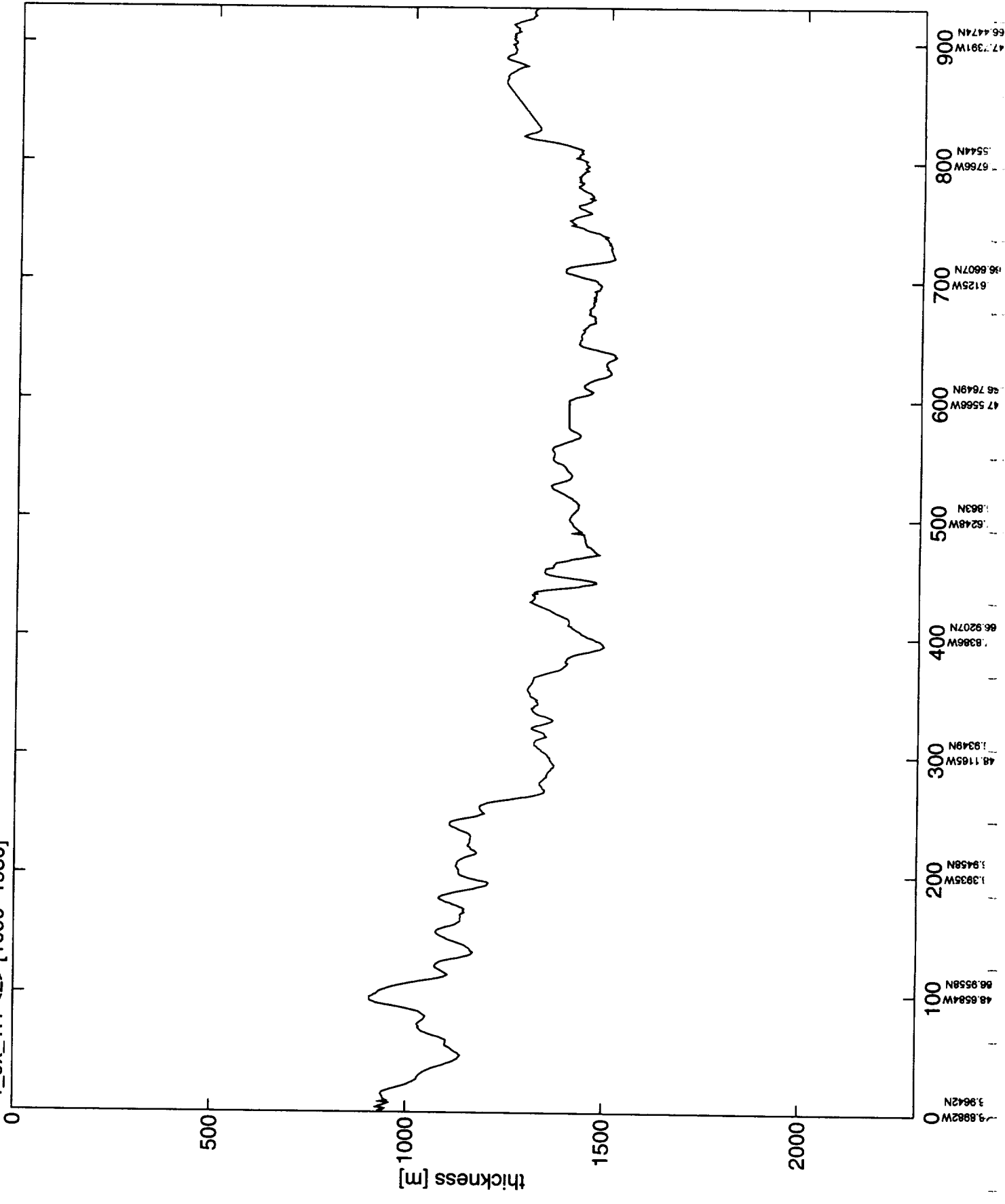
r_9x_1.1 (1) [800-1000] thickness



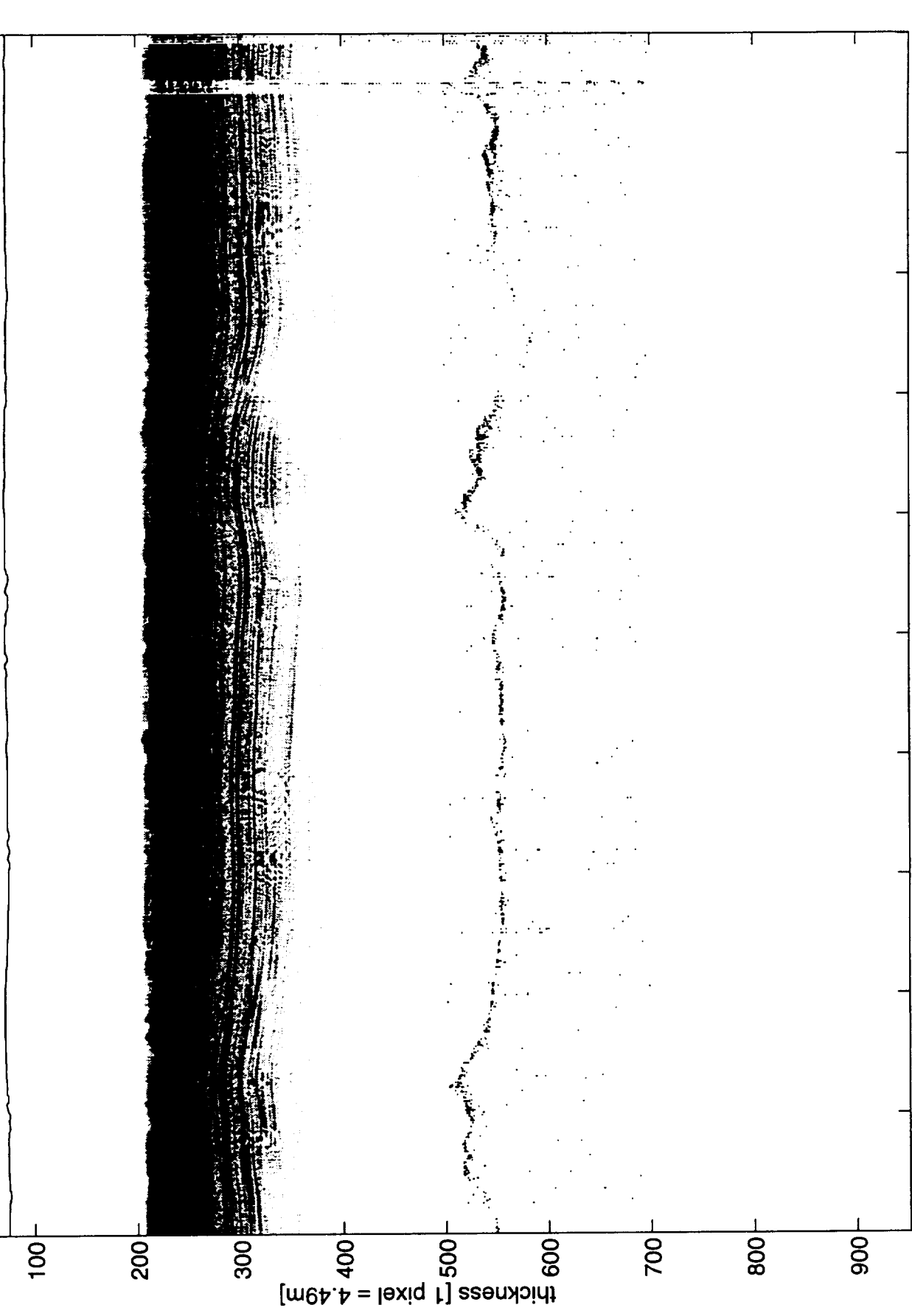
r_9x_1.1 <2> [1000-1930]



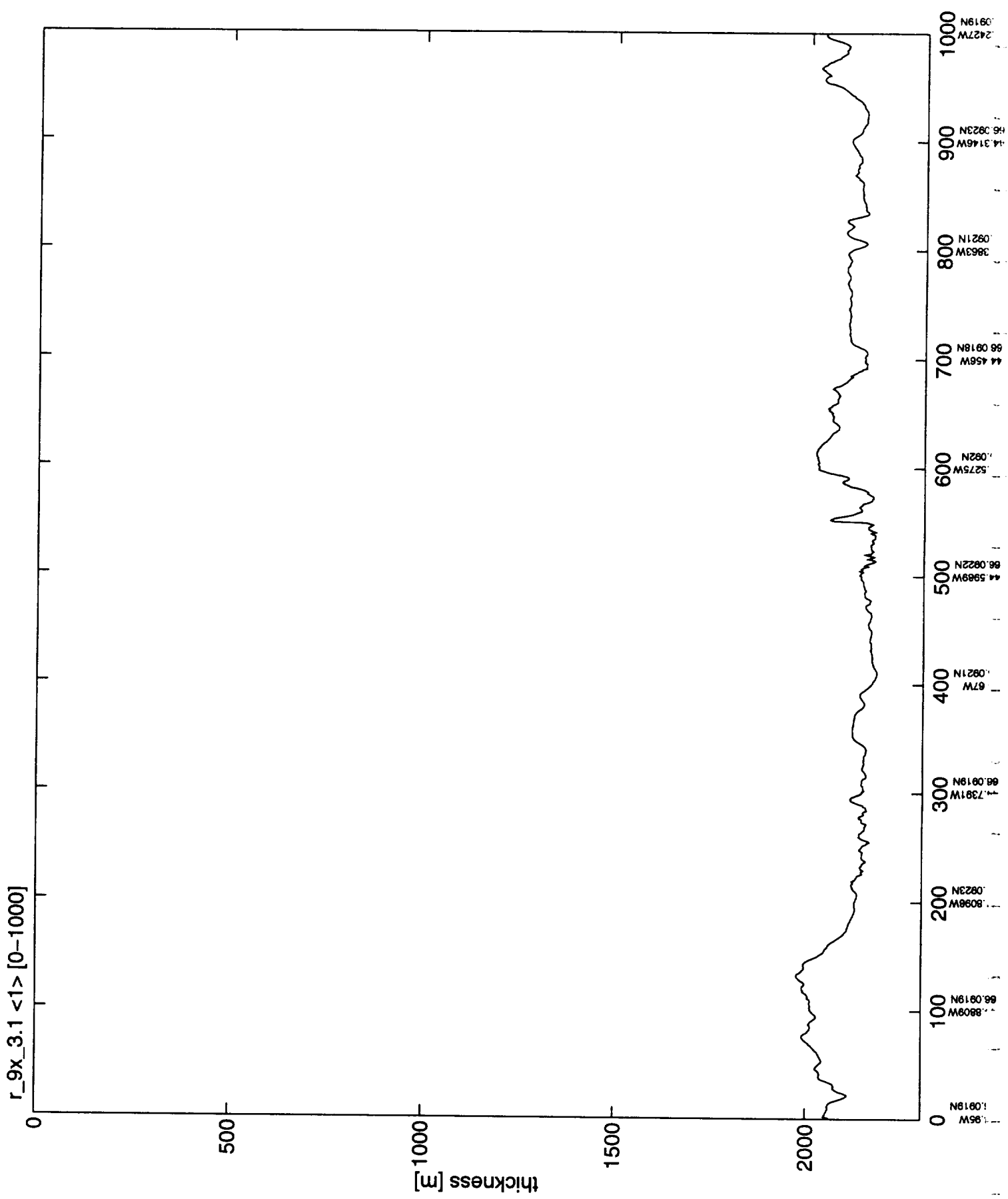
r_9x_1.1 <2> [1000-1930]



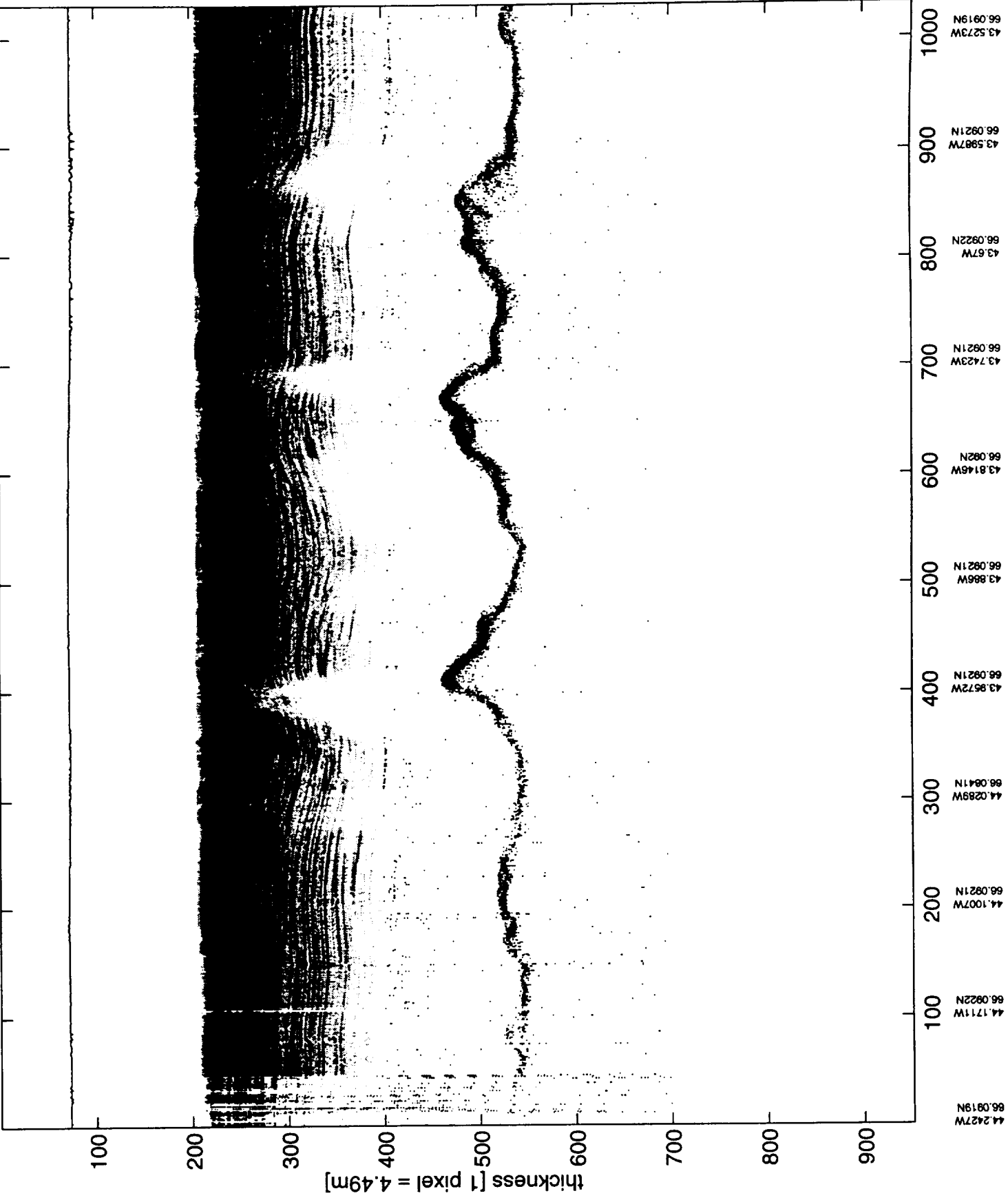
r_9x_3.1 <1> [0-1000]



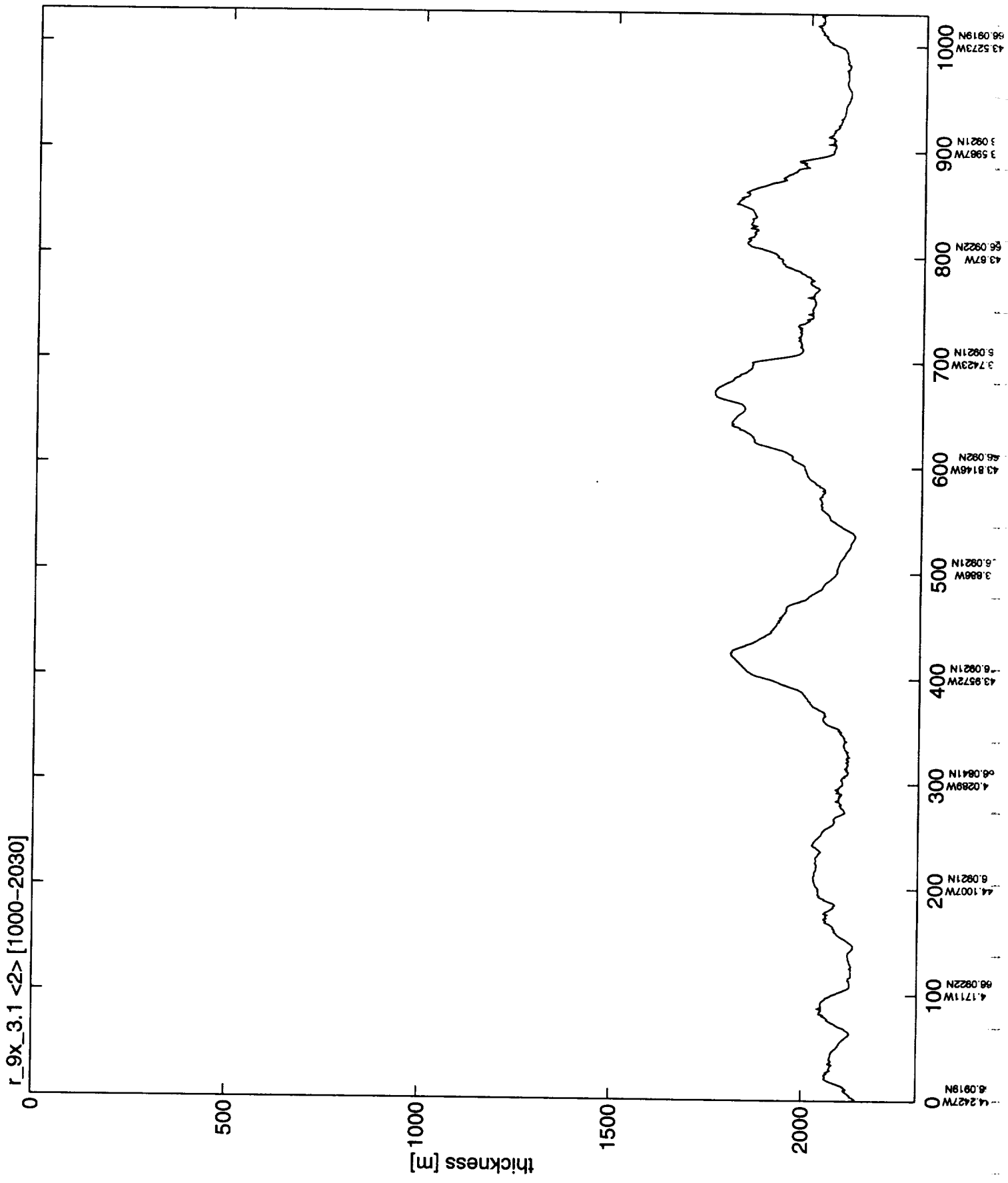
44.85W 66.0919N
44.8809W 66.0919N
44.8098W 66.0923N
44.7391W 66.0919N
44.67W 66.0921N
44.5989W 66.0922N
44.5275W 66.092N
44.456W 66.0918N
44.3863W 66.0921N
44.3146W 66.0923N
44.2427W 66.0919N



r_9x_3.1 <2> [1000-2030]

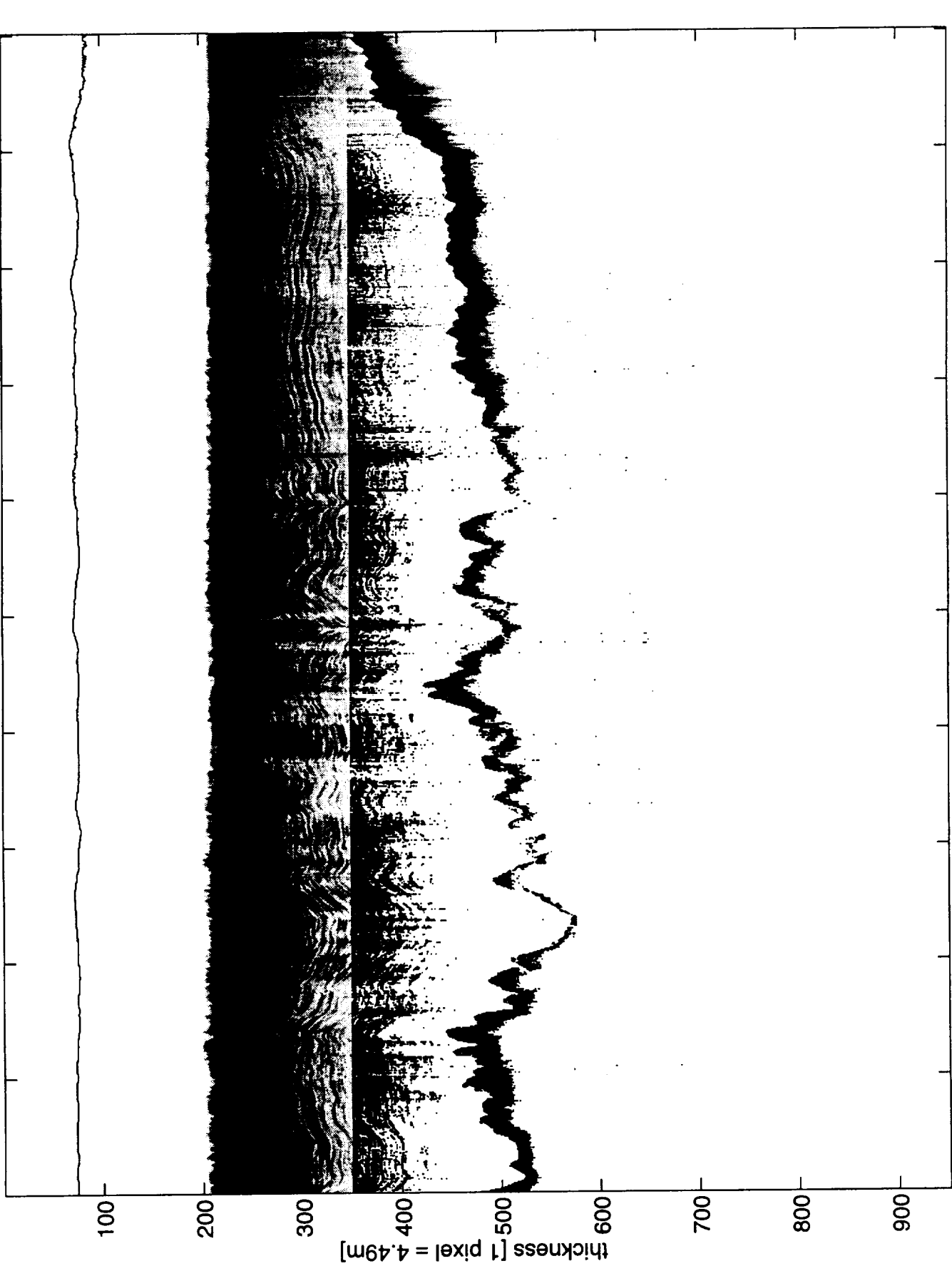


r_9x_3.1 <2> [1000-2030]

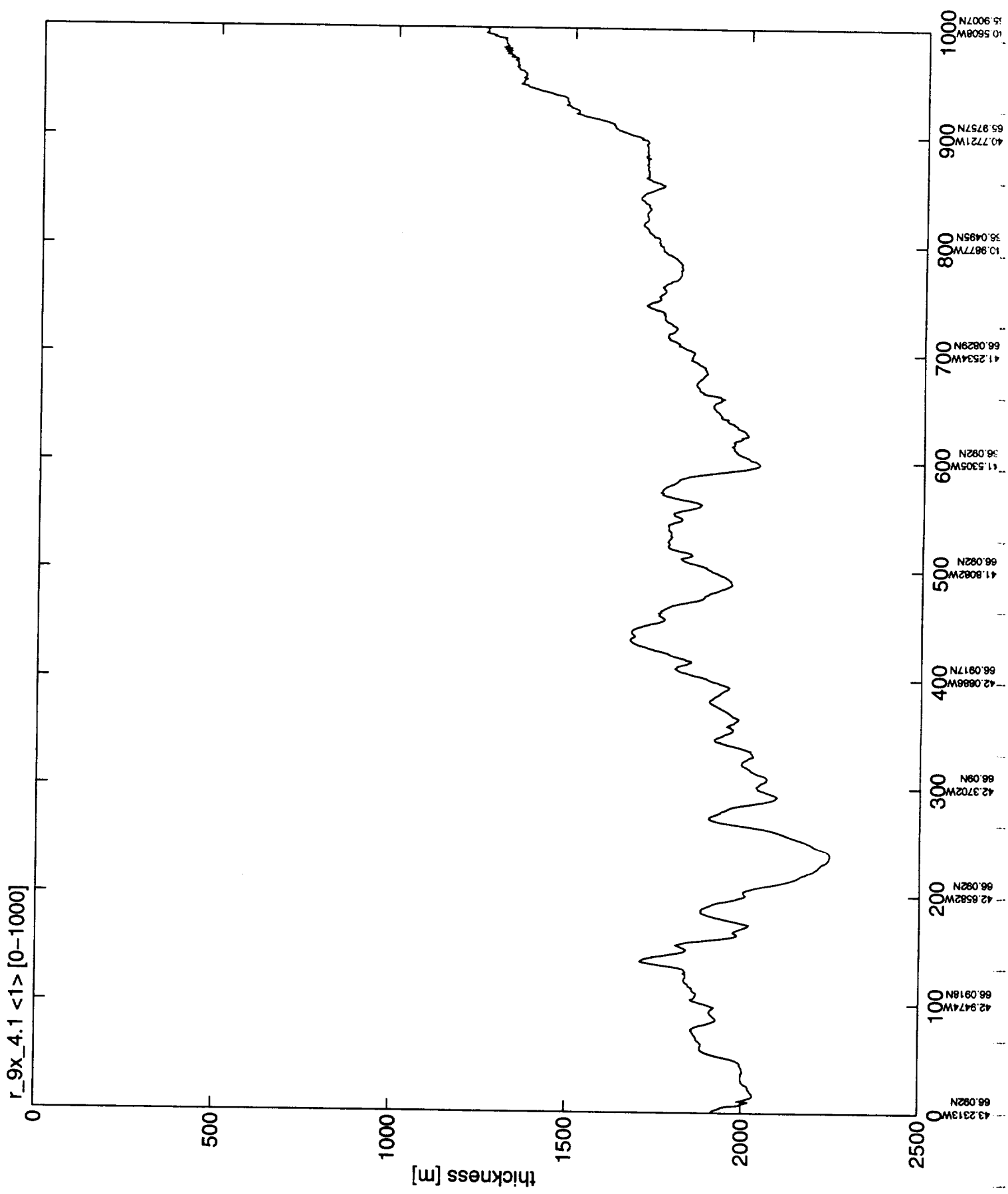


4.2427W 8.0919N
4.1711W 99.0922N
44.1007W 6.0921N
4.0289W 68.0841N
43.952W 68.0921N
3.886W 6.0921N
43.8146W 66.0921N
3.7423W 5.0921N
43.67W 56.0922N
3.5967W 3.0921N
43.5273W 56.0919N

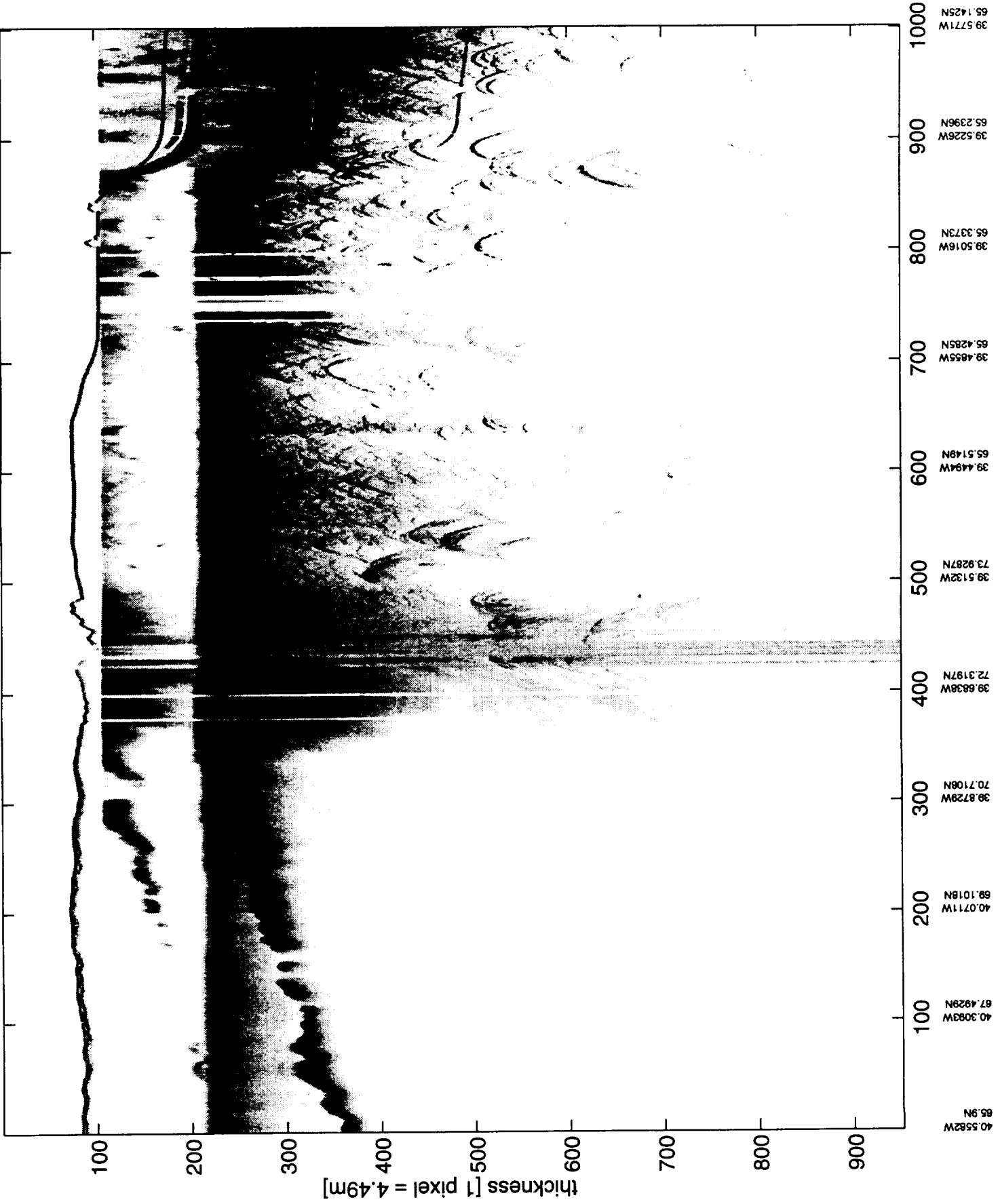
r_9x_4.1 <1> [0-1000]



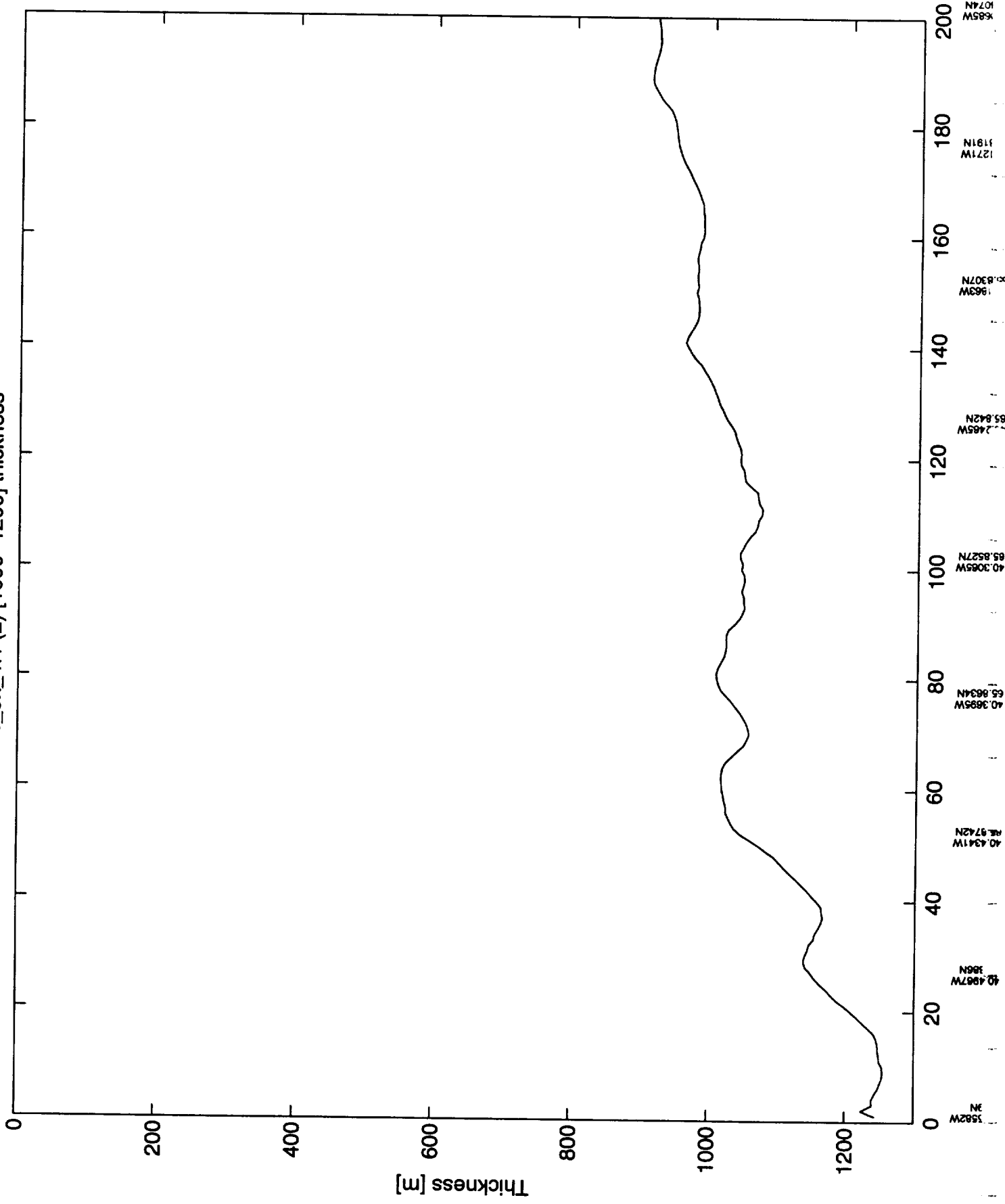
43.2313W 66.082N
42.9474W 66.0918N
42.6582W 66.082N
42.3702W 66.08N
42.0886W 66.0817N
41.8082W 66.082N
41.5305W 66.082N
41.2534W 66.0829N
40.9877W 66.0495N
40.7721W 65.9757N
40.5680W 65.9007N



r_9x_4.1 <2> [1000-2000]



r_9x_4.1 (2) [1000-1200] thickness

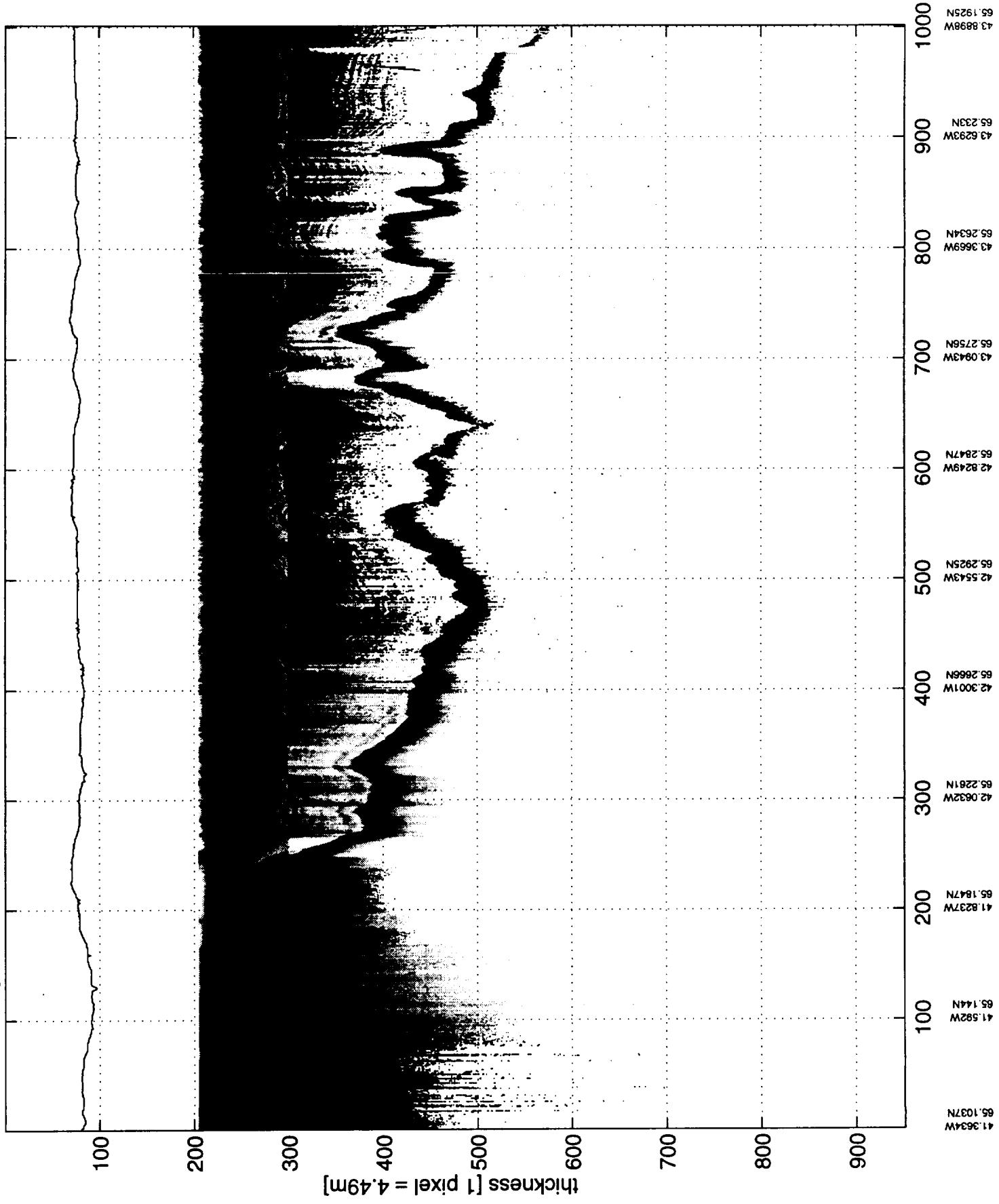


r_9x_4.1 <3> [2000-3000]



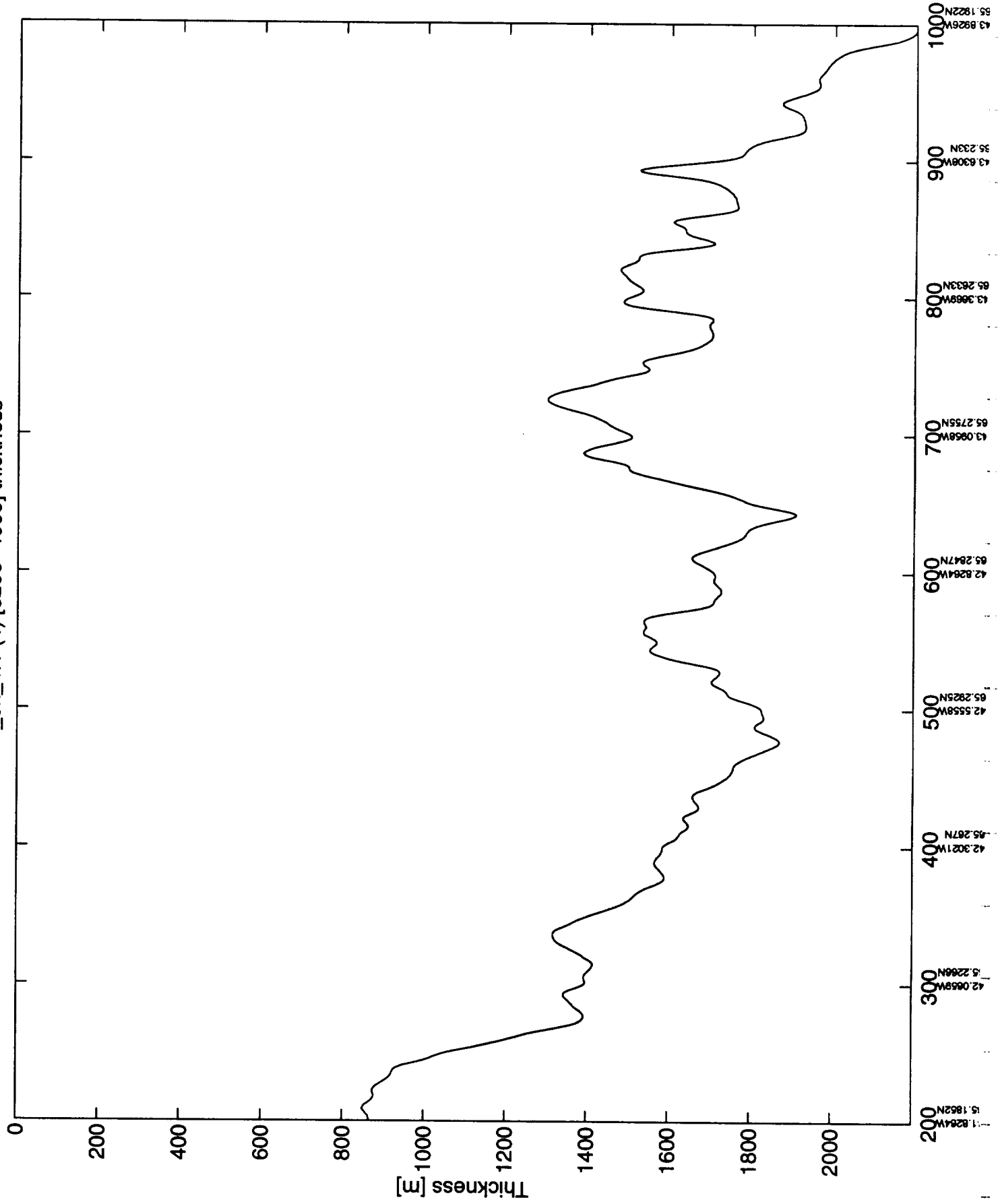
39.577W 65.1414N
39.8188W 65.0516N
39.6588W 64.9626N
39.7335W 64.8659N
39.6632W 64.8539N
40.1981W 64.8891N
40.4058W 64.9291N
40.6432W 64.9733N
40.8879W 65.0179N
41.1252W 65.0611N
41.3607W 65.1032N

r_9x_4.1 <4> [3000-4000]

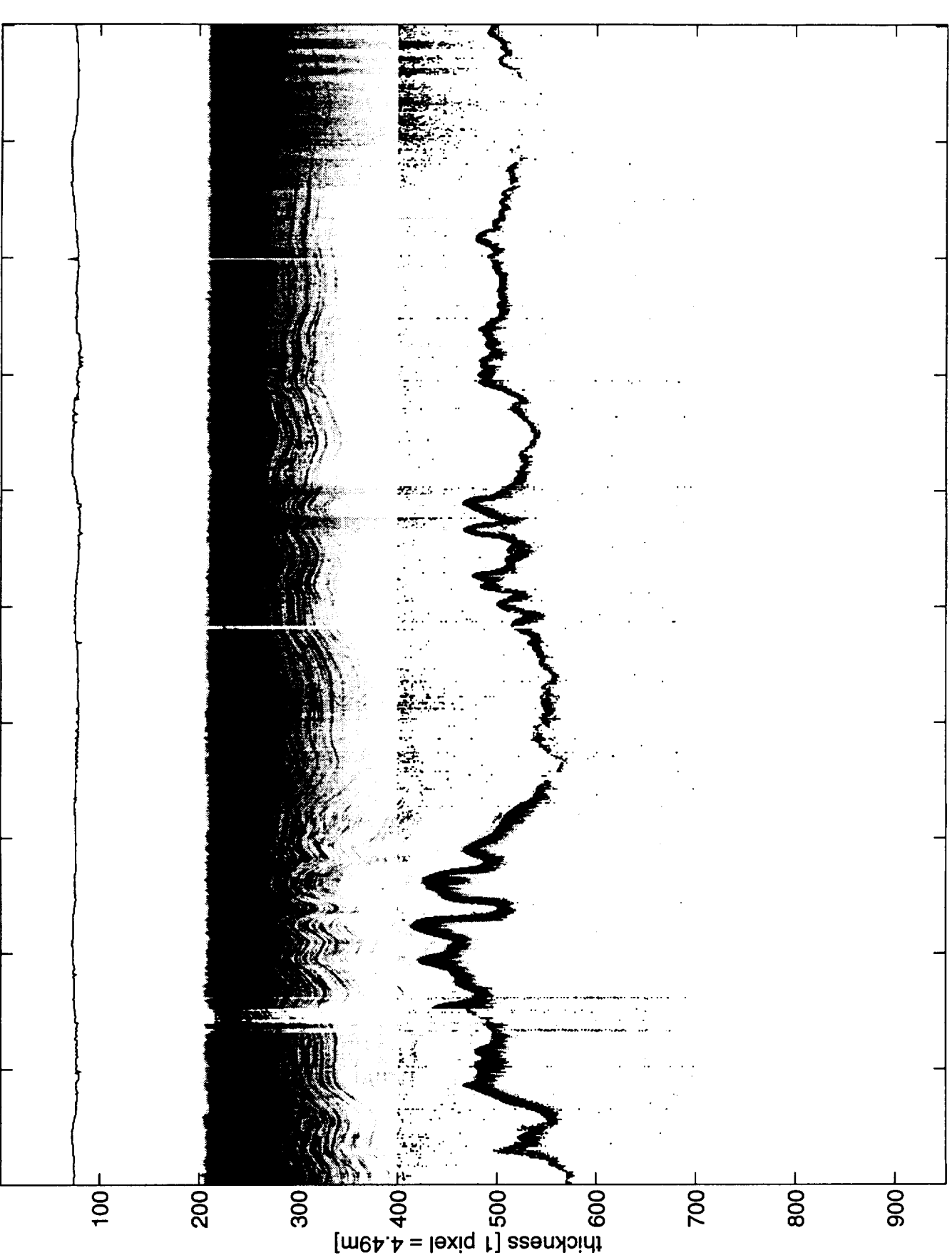


41.3634W 65.1037N
41.582W 65.144N
41.8237W 65.1847N
42.0632W 65.2281N
42.3001W 65.2666N
42.5543W 65.2925N
42.8249W 65.2847N
43.0843W 65.2756N
43.3669W 65.2634N
43.6293W 65.233N
43.8898W 65.1925N

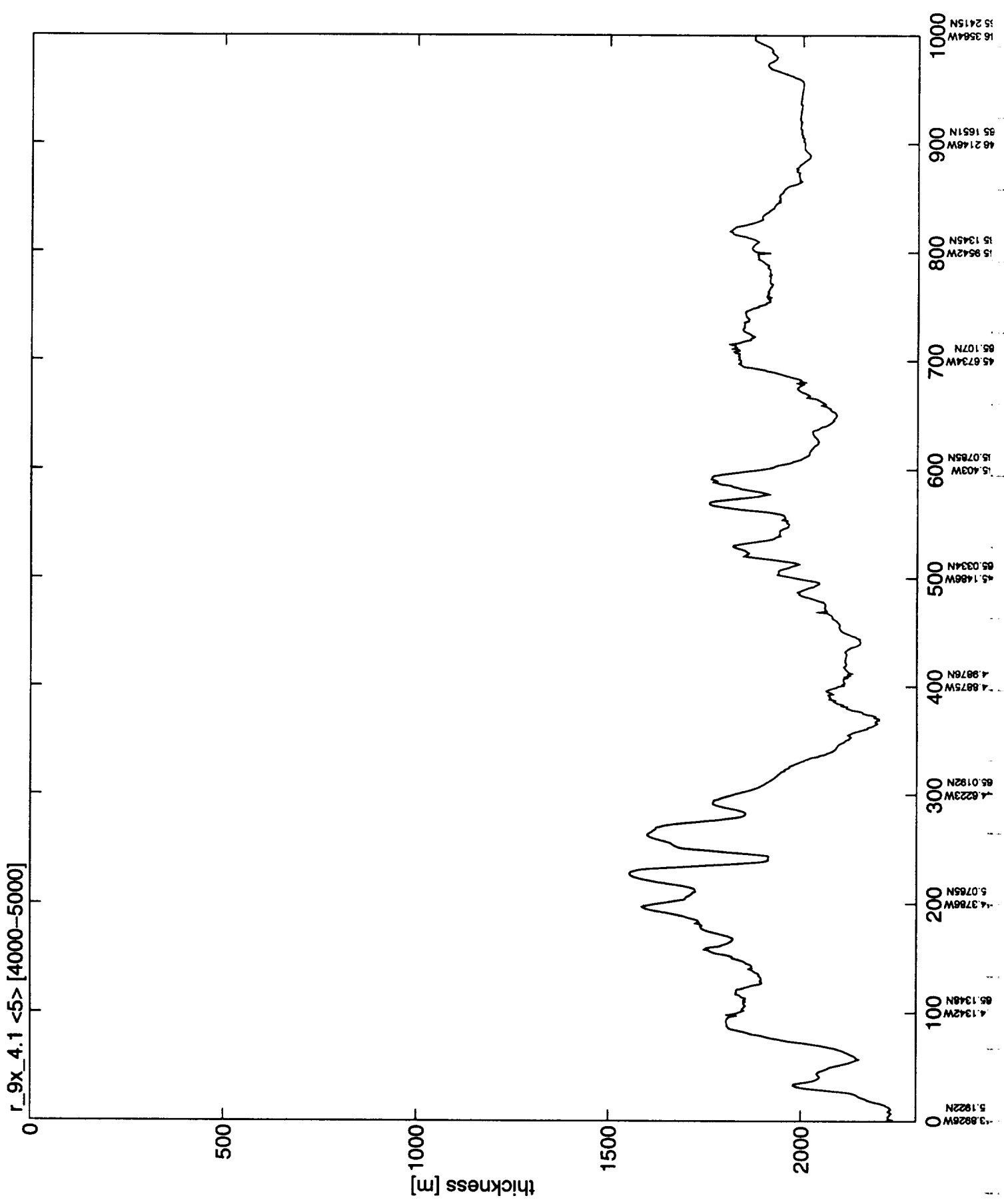
r_9x_4.1 (4) [3200-4000] thickness



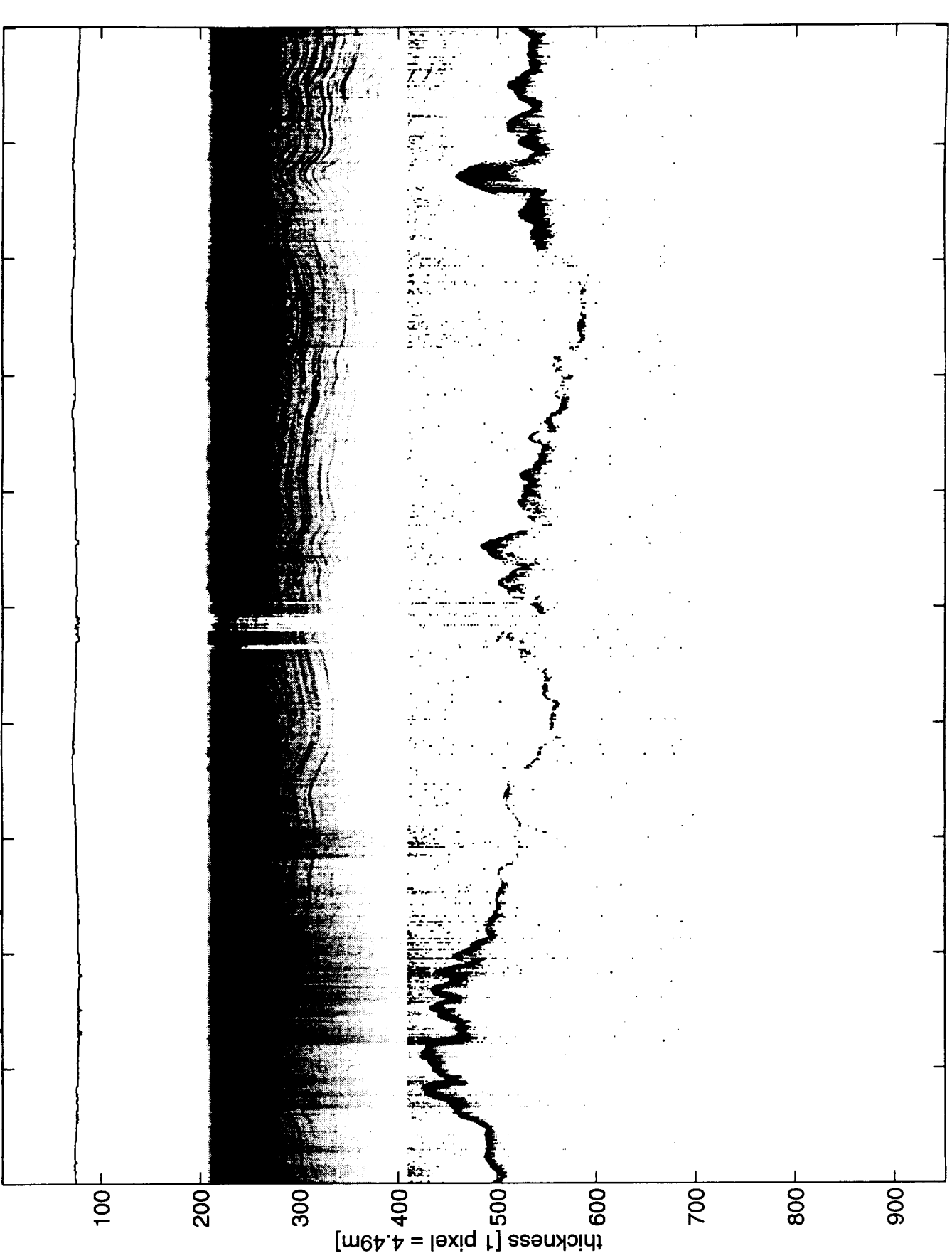
r_9x_4.1 <5> [4000-5000]



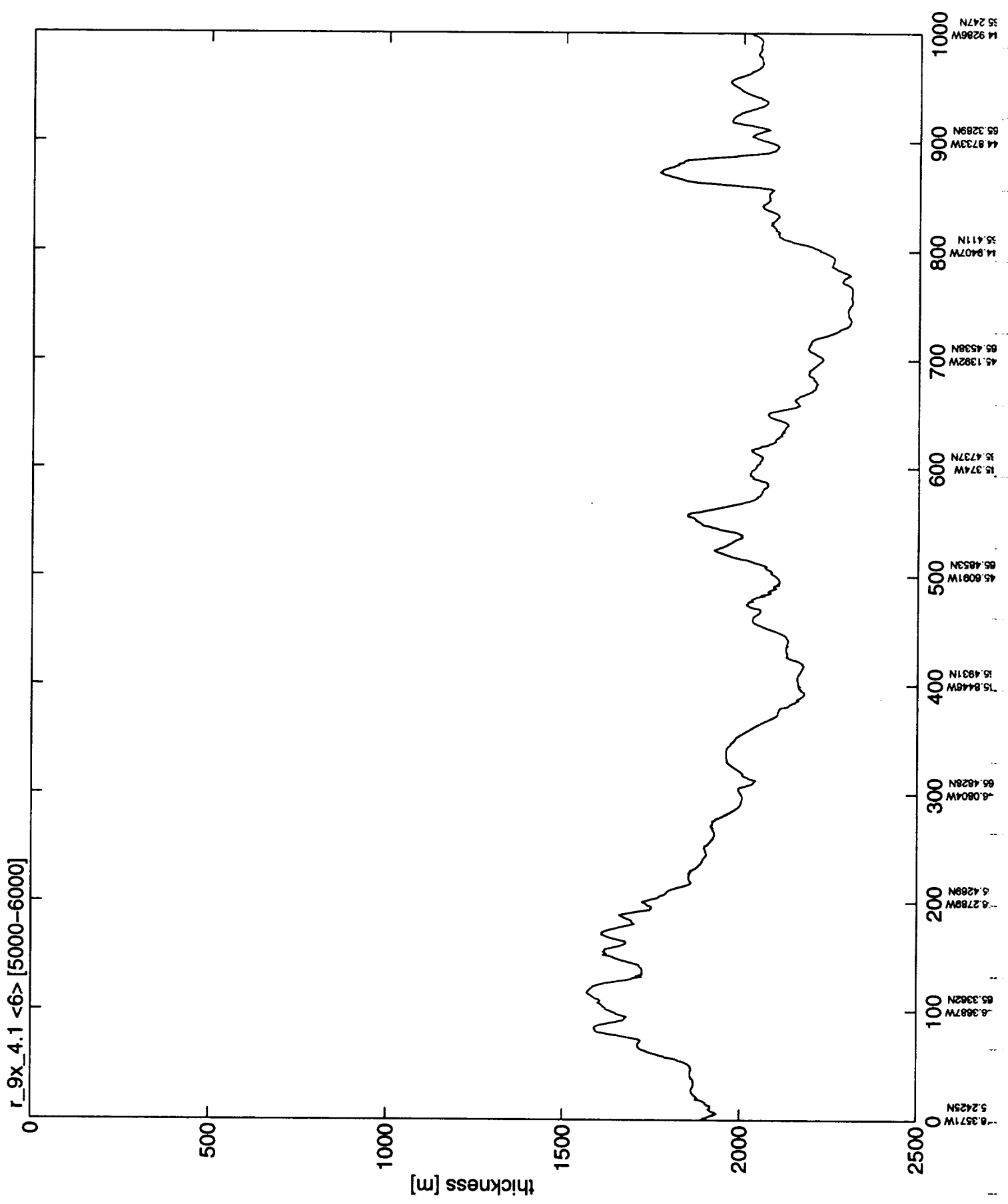
43.8926W 65.1922N
44.1342W 65.1348N
44.3786W 65.0765N
44.6223W 65.0182N
44.8875W 64.9878N
45.1486W 65.0334N
45.403W 65.0785N
45.6734W 65.107N
45.9542W 65.1345N
46.2146W 65.1651N
46.3564W 65.2415N



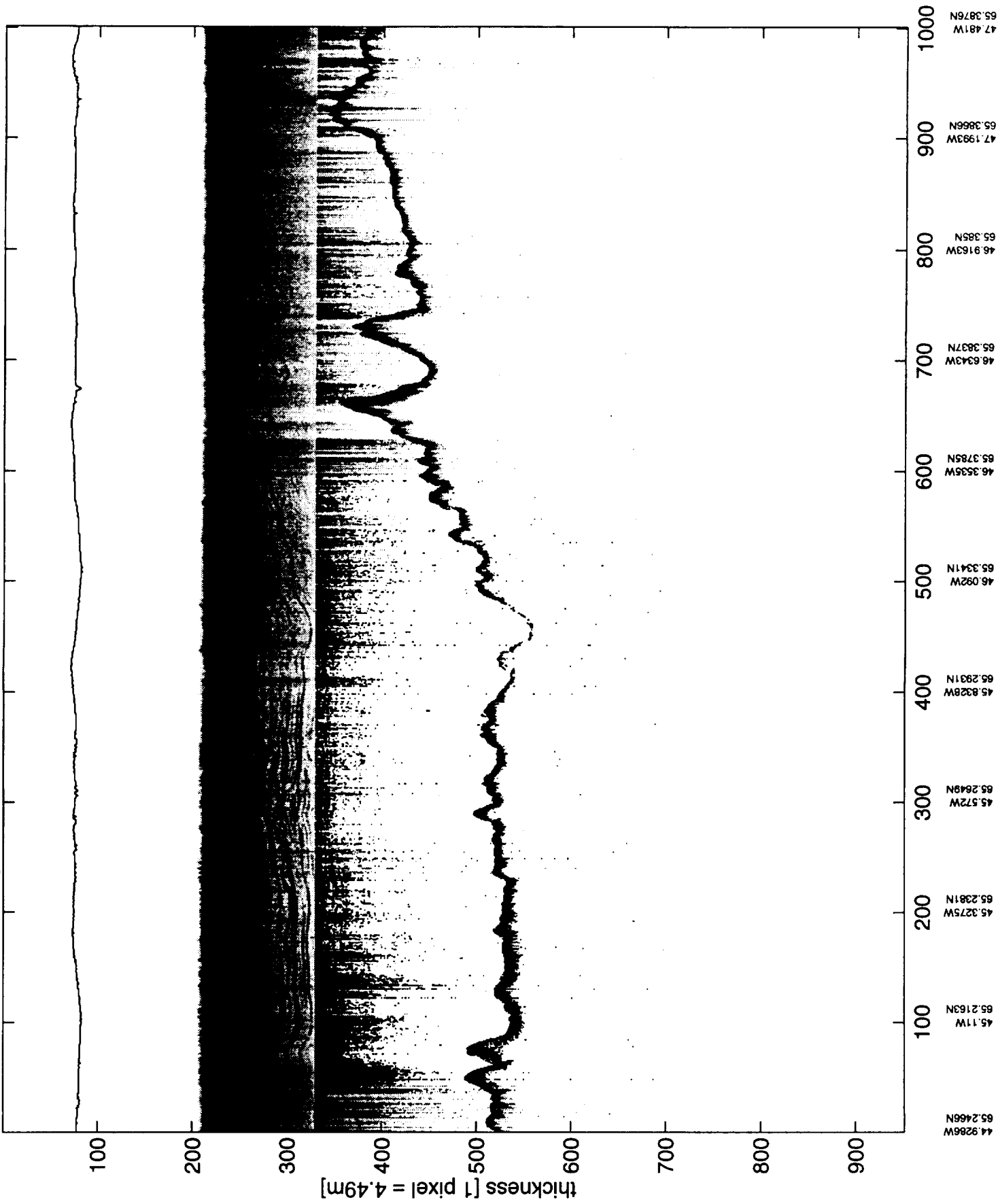
r_9x_4.1 <6> [5000-6000]



46.3571W
65.2425N
46.3687W
65.3362N
46.2789W
65.4269N
46.0804W
65.4828N
46.8448W
65.4831N
46.6091W
65.4853N
46.374W
65.4737N
45.1392W
65.4538N
44.9407W
65.411N
44.8733W
65.3289N
44.9286W
65.247N



r_9x_4.1 <7> [6000-7000]



44.9286W

65.2466N

45.11W

65.2163N

45.3275W

65.2381N

45.572W

65.2649N

45.8328W

65.2931N

46.092W

65.3341N

46.3535W

65.3785N

46.6343W

65.3837N

46.9163W

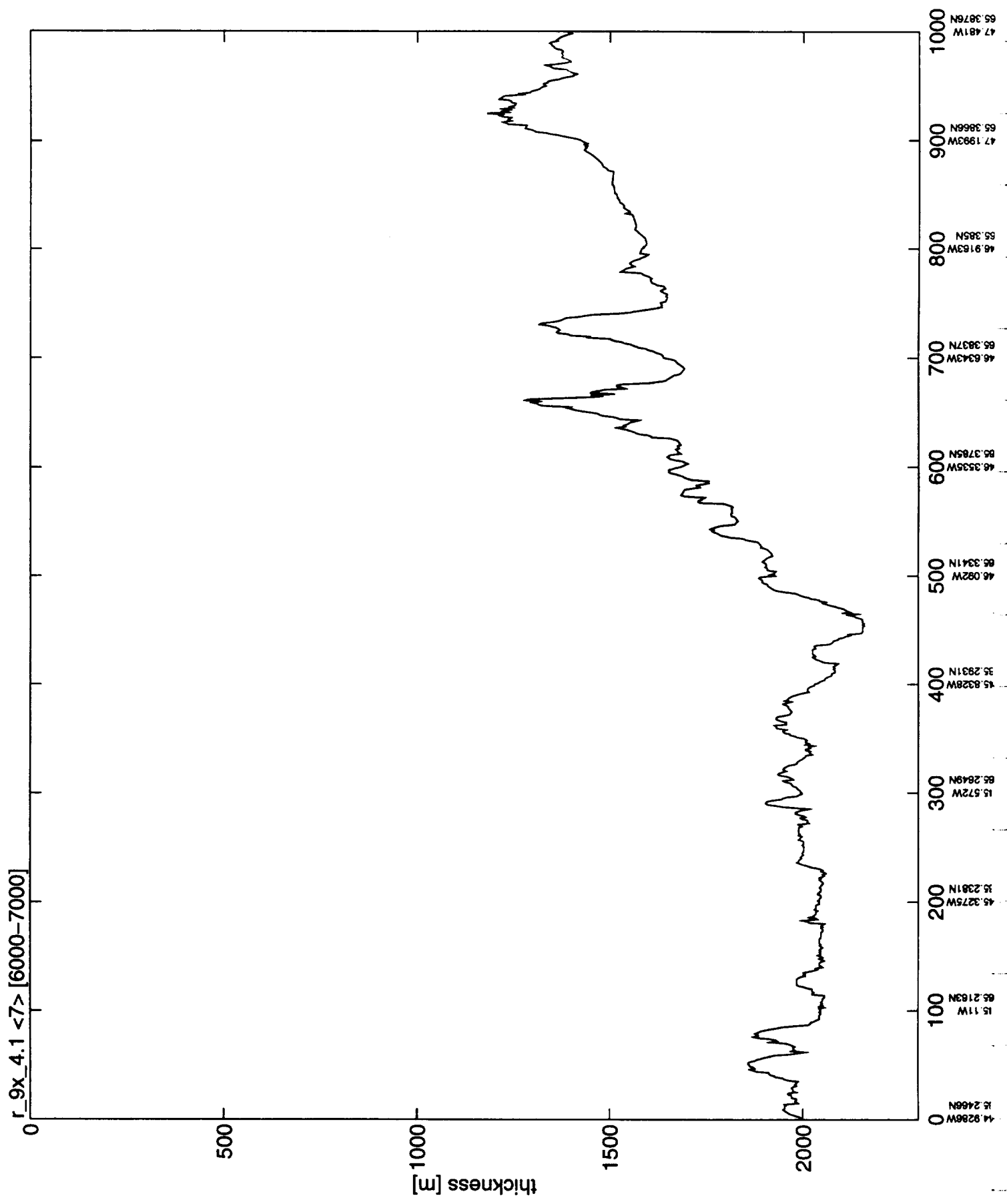
65.385N

47.1983W

65.3866N

47.481W

65.3876N



r_9x_4.1 <8> [7000-8000]

100

200

300

400

500

600

700

800

900

thickness [1 pixel = 4.49m]

100

200

300

400

500

600

700

800

900

1000

47.4841W
65.3877N

47.7602W
65.3885N

48.0387W
65.3898N

48.3192W
65.397N

48.5971W
65.4063N

48.8678W
65.414N

49.1423W
65.4217N

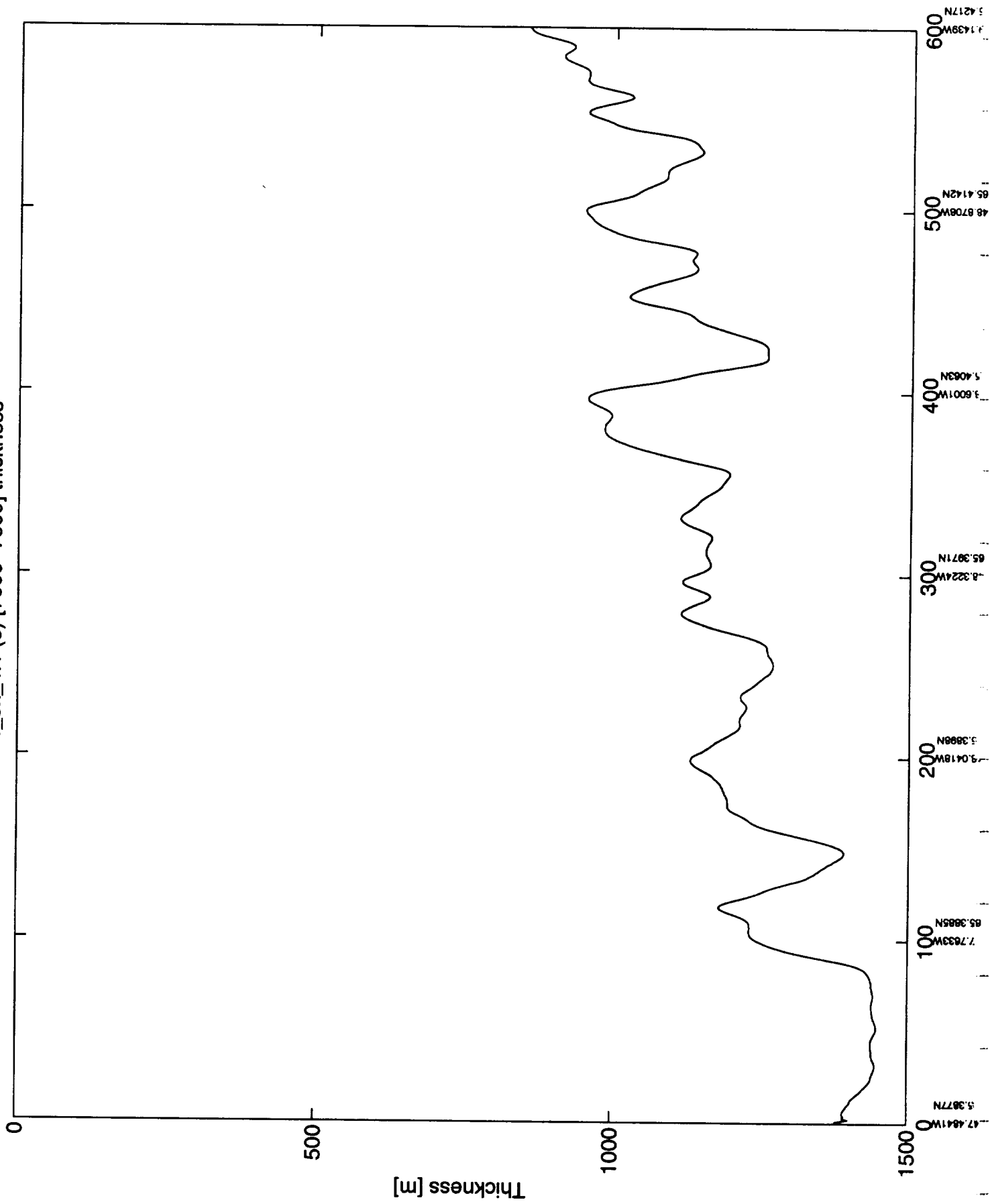
49.4266W
65.4293N

49.7055W
65.437N

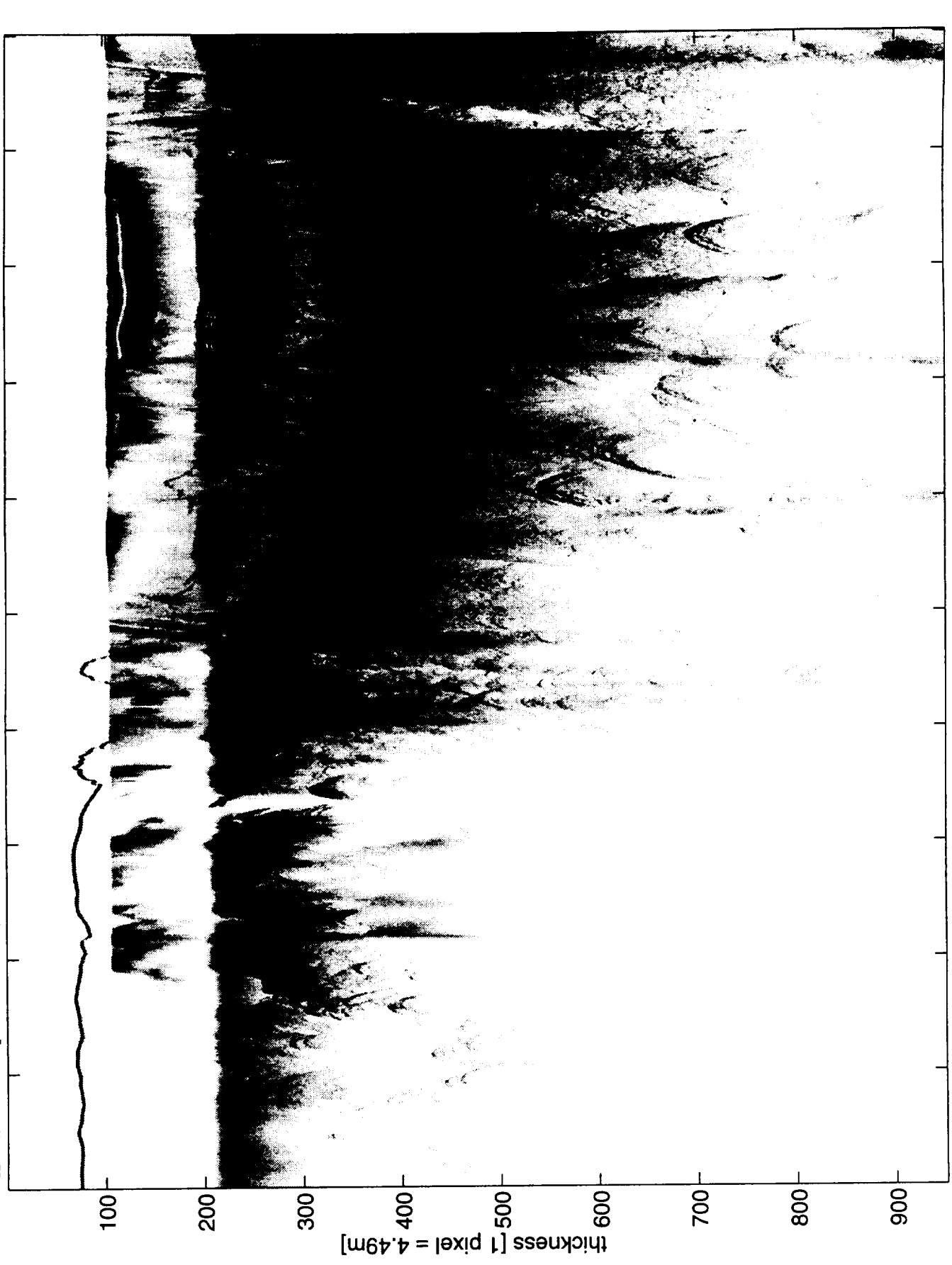
49.9726W
65.3915N

50.2051W
65.3452N

r_9x_4.1 (8) [7000-7600] thickness



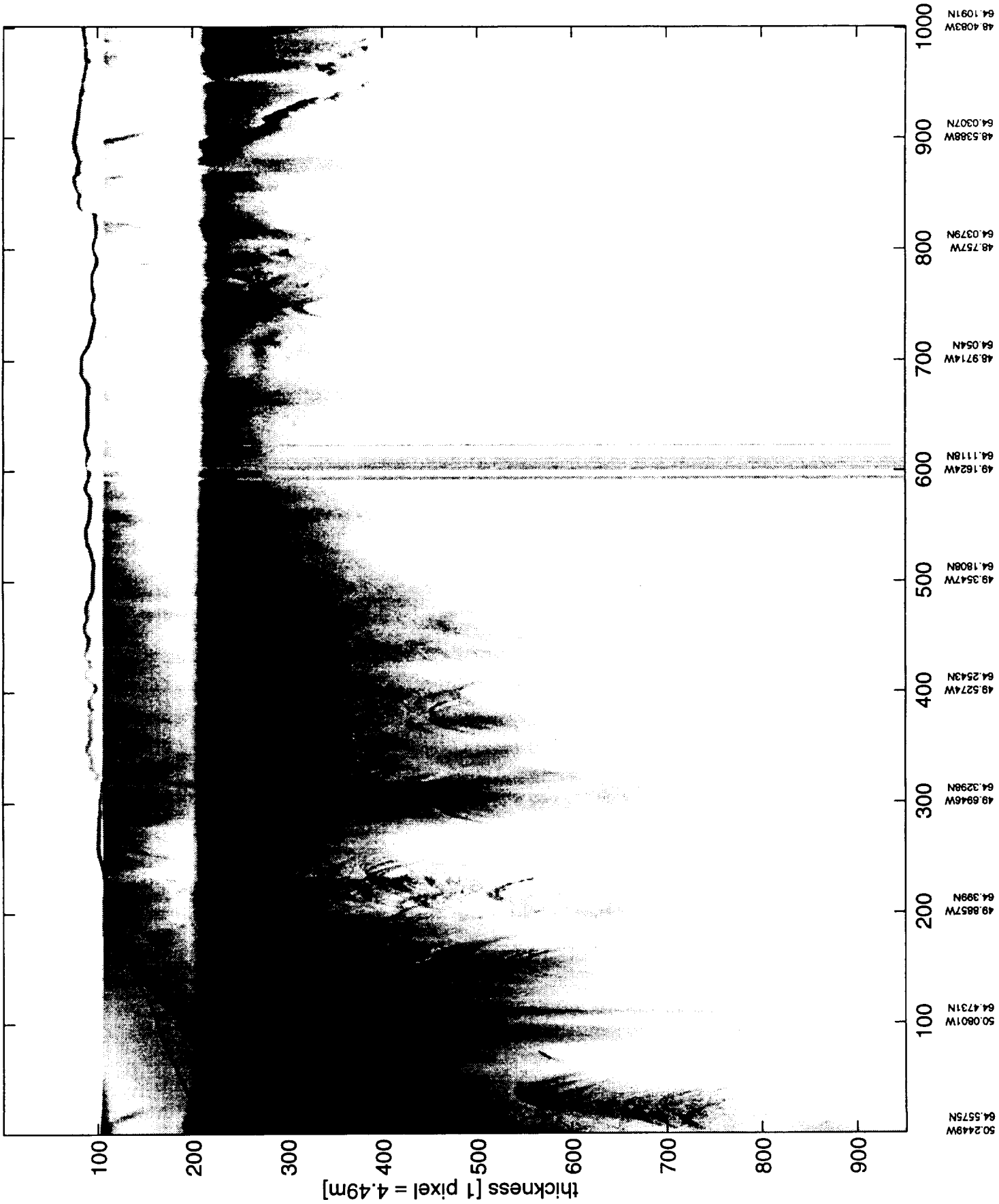
r_9x_4.1 <9> [8000-9000]

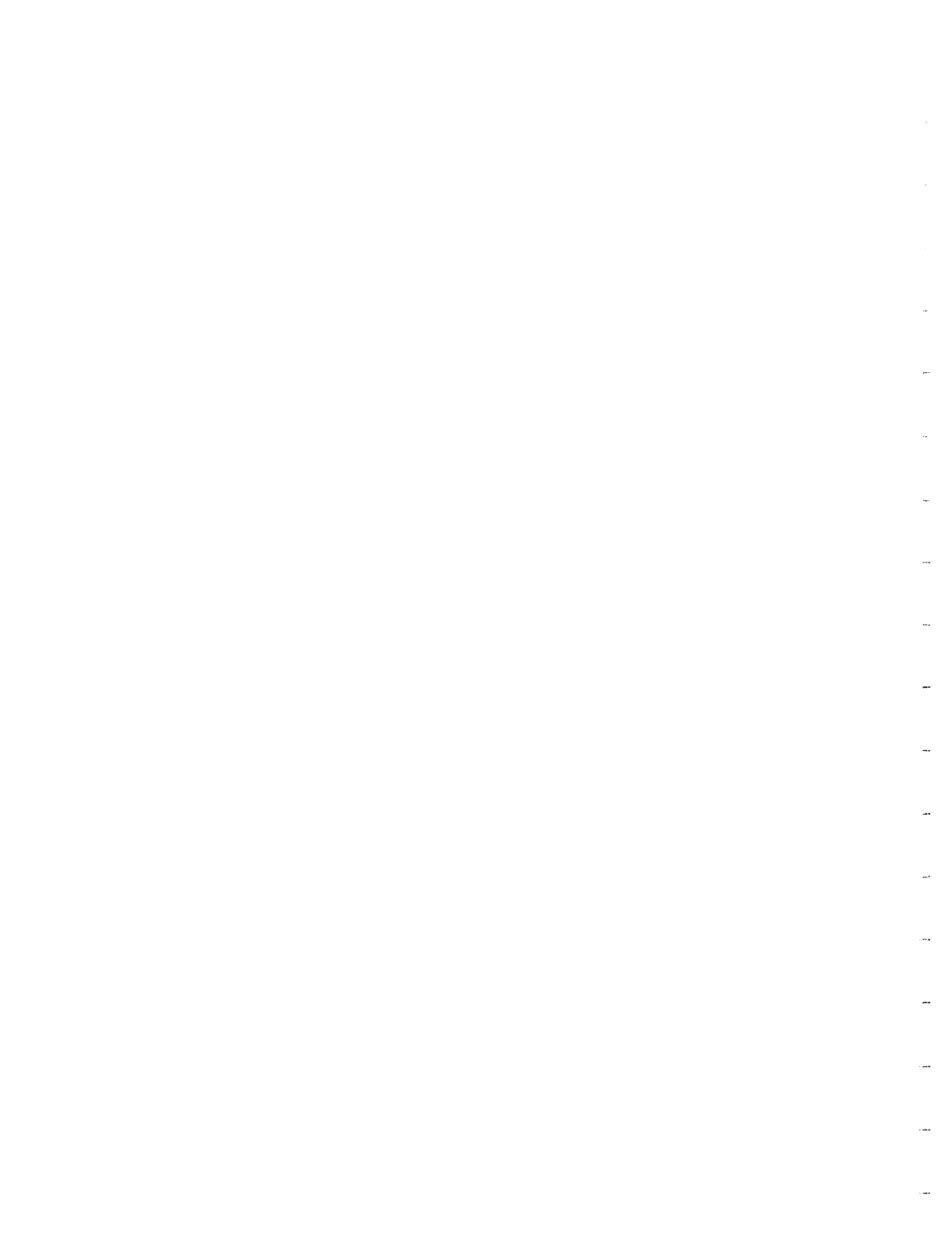


50.207W 65.345N
50.435W 65.2891N
50.6347W 65.2168N
50.813W 65.1404N
51.0166W 65.0768N
50.9791W 64.9871N
50.8238W 64.9089N
50.6989W 64.8188N
50.5609W 64.7309N
50.4057W 64.6452N
50.2467W 64.5585N

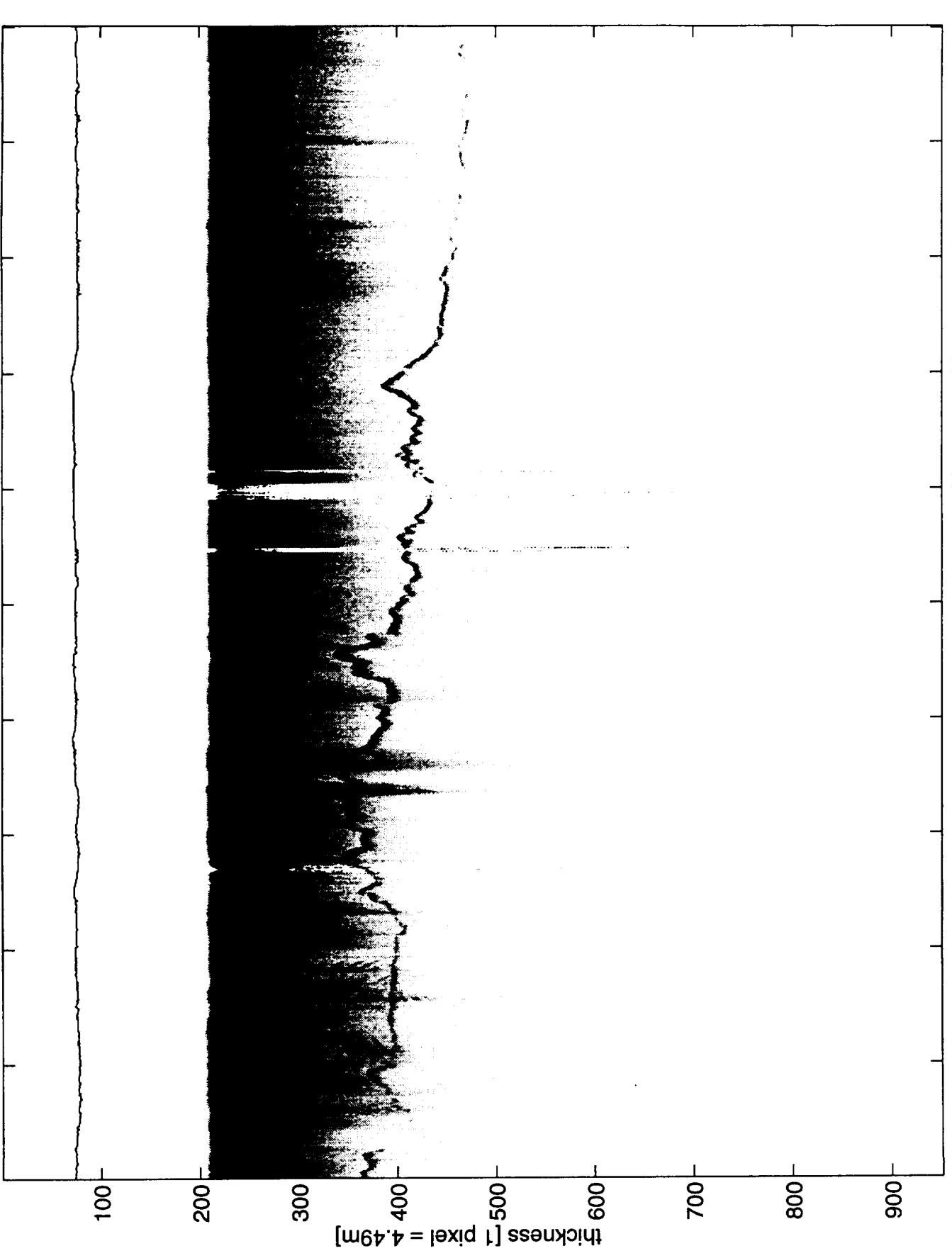


r_9x_4.1 <10> [9000-10000]



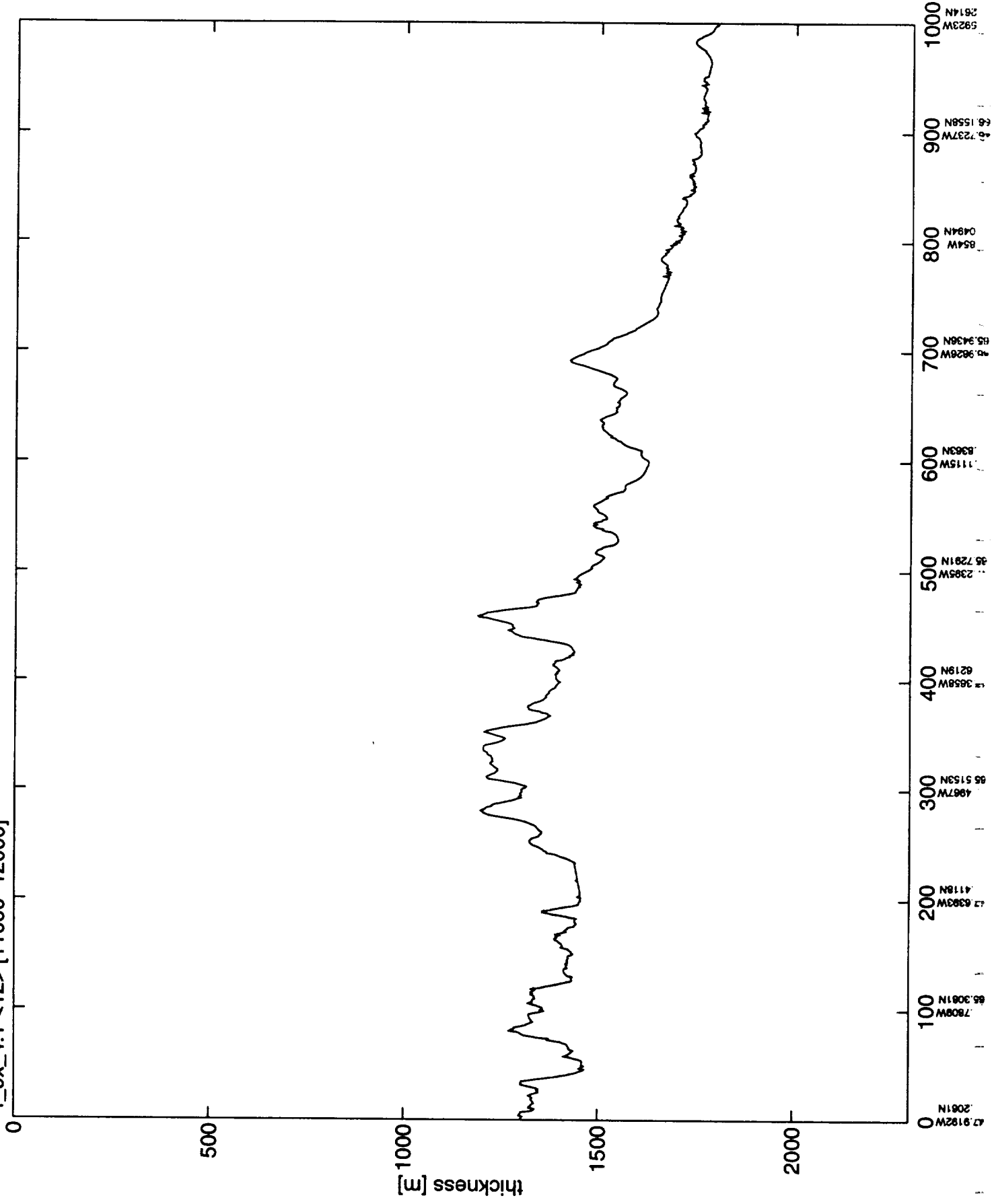


r_9x_4.1 <12> [11000-12000]

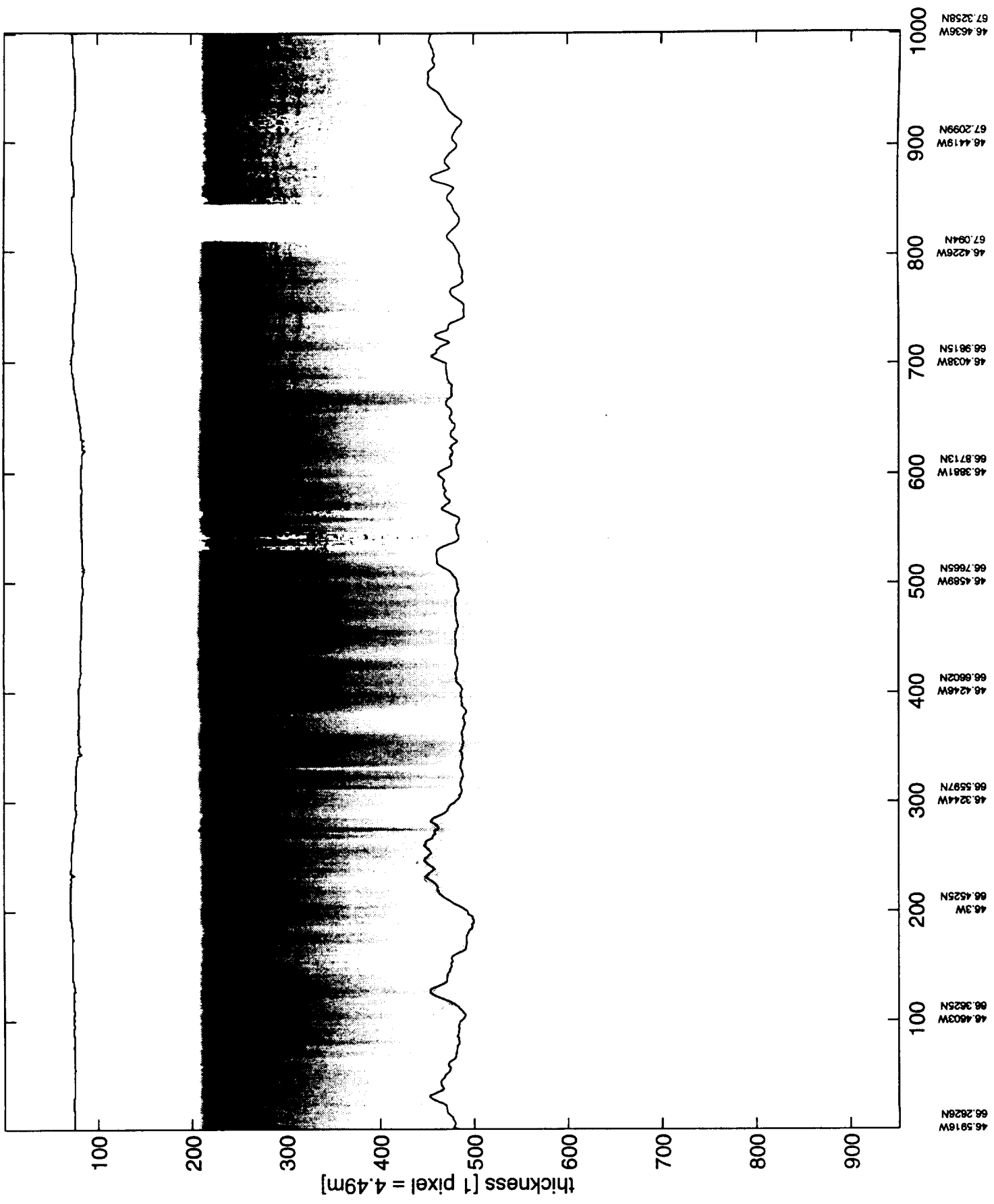


65.2061N 47.9192W
65.3081N 47.7809W
65.4118N 47.6393W
65.5153N 47.4967W
65.6219N 47.3558W
65.7291N 47.2395W
65.8363N 47.1115W
65.9436N 46.9826W
66.0494N 46.854W
66.1558N 46.7237W
66.2614N 46.5923W

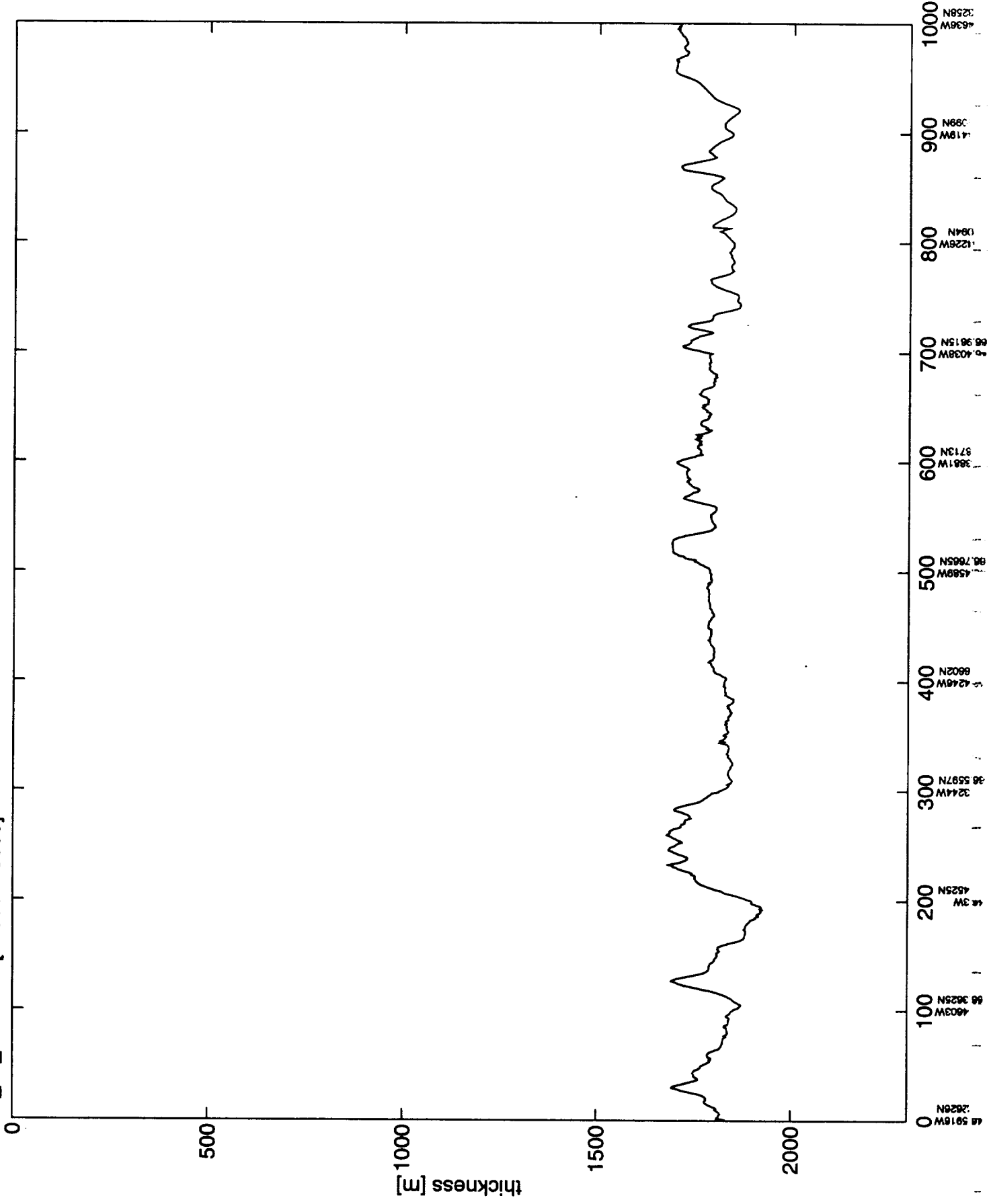
r_9x_4.1 <12> [11000-12000]



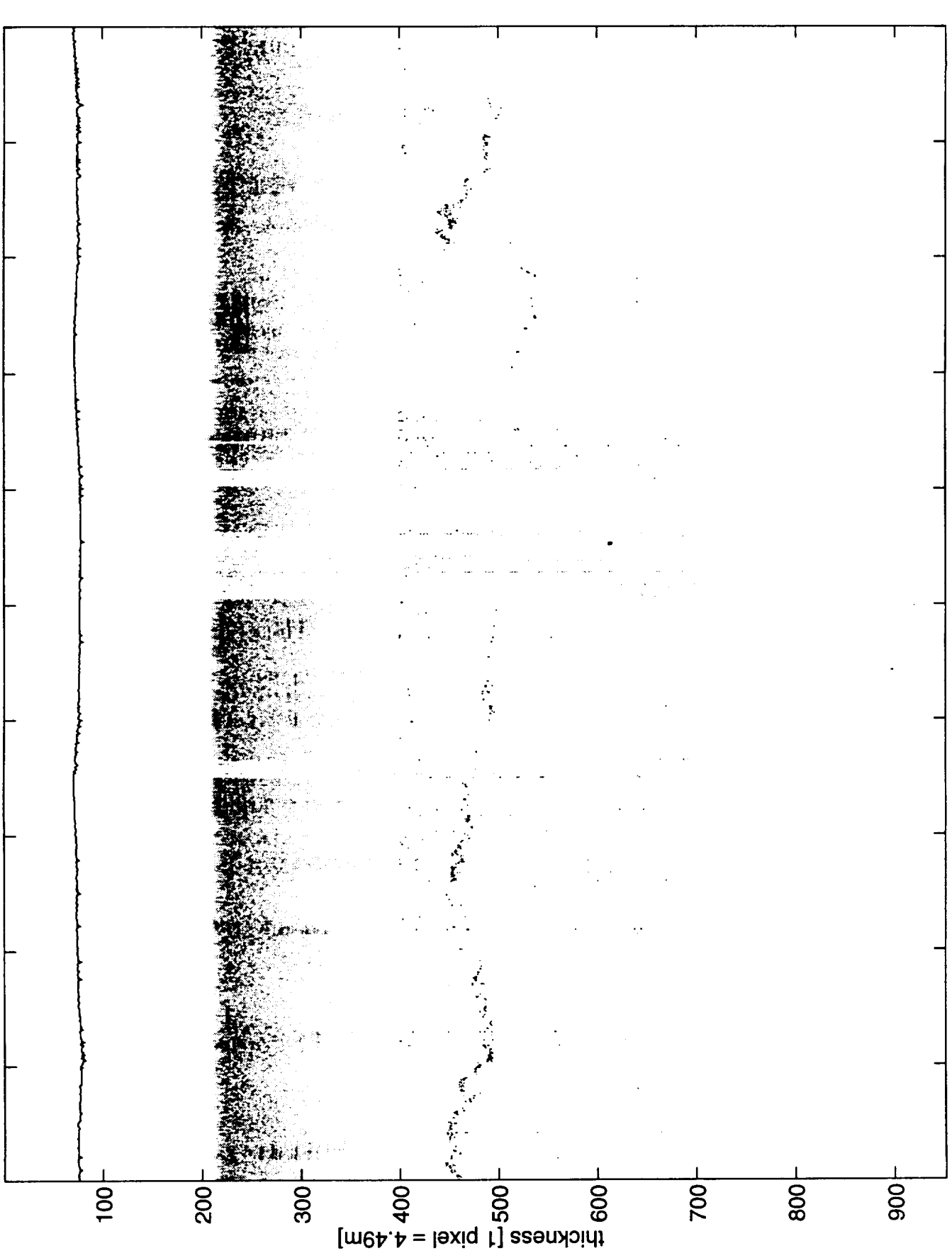
r_9x_4.1 <13> [12000-13000]



r_9x_4.1 <13> [12000-13000]

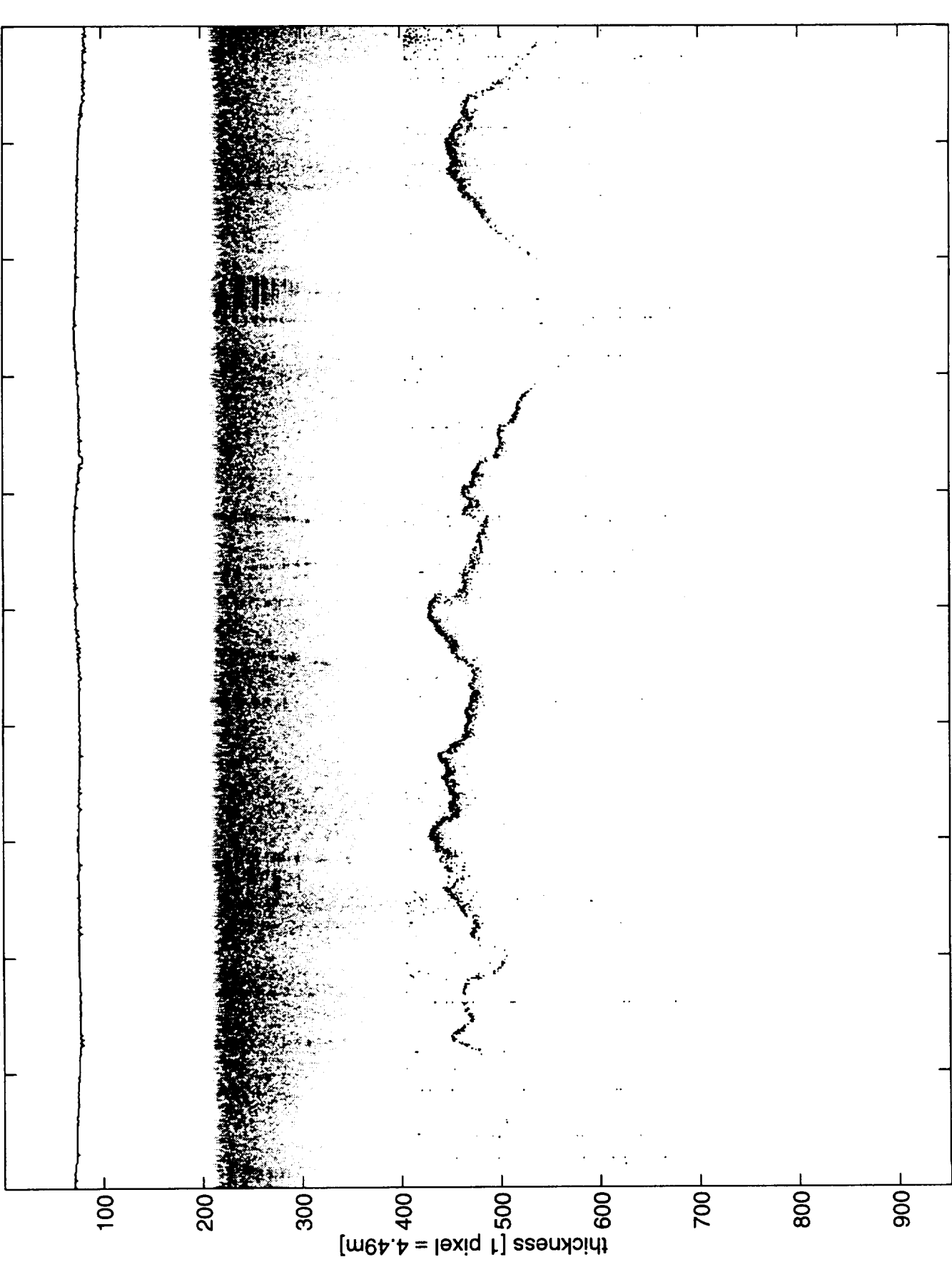


r_9x_5.1 <1> [0-2000]



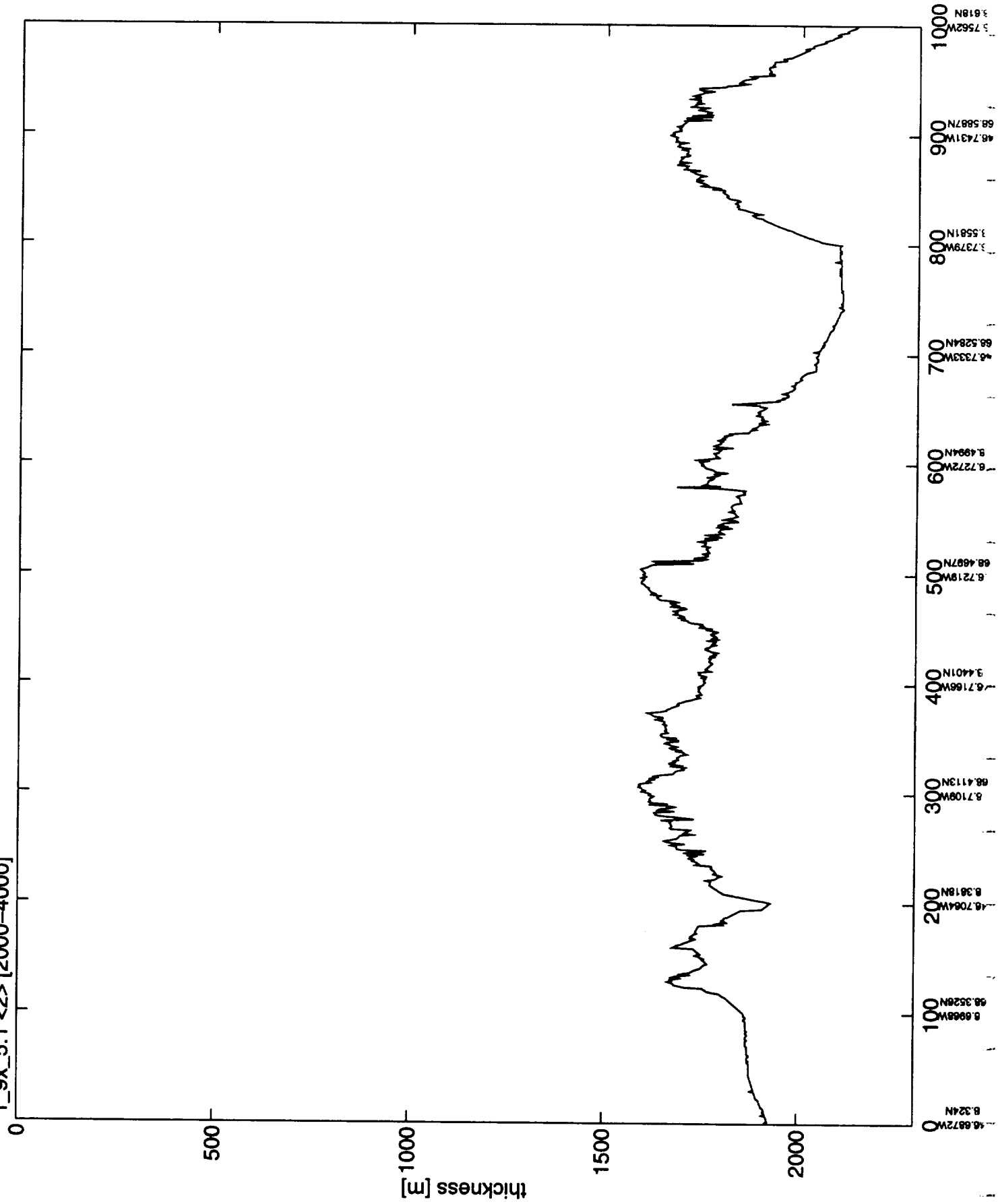
46.5954W 68.0315N
46.6043W 68.06N
46.6136W 68.086N
46.6231W 68.1161N
46.6316W 68.1477N
46.6412W 68.1769N
46.6505W 68.2049N
46.6592W 68.2352N
46.6687W 68.2649N
46.6787W 68.2945N
46.687W 68.3234N

r_9x_5.1 <2> [2000-4000]

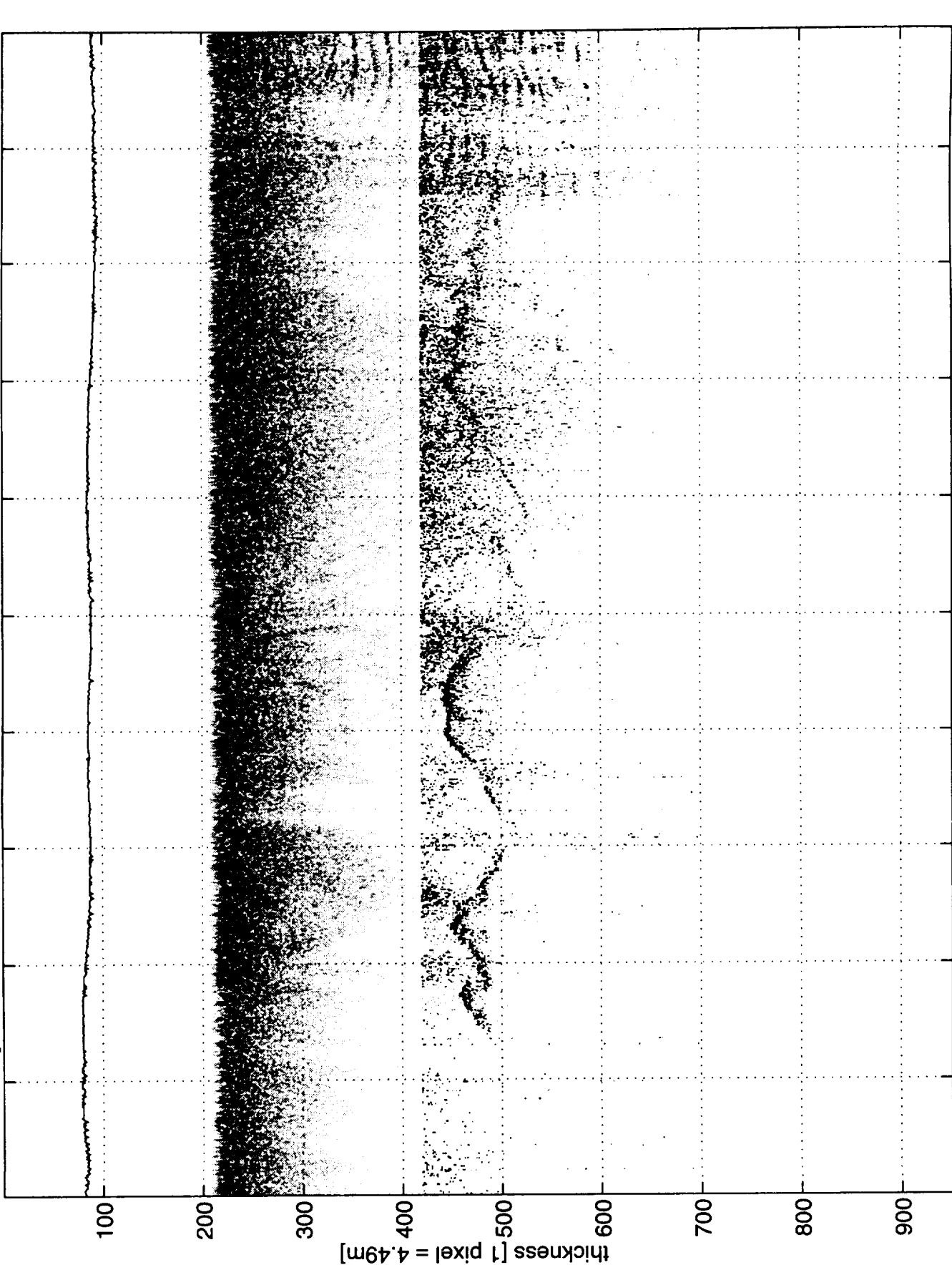


46.6872W 68.324N
46.6968W 68.3528N
46.7064W 68.3818N
46.7109W 68.413N
46.7166W 68.4401N
46.7219W 68.4687N
46.7272W 68.4984N
46.7333W 68.5284N
46.7379W 68.5581N
46.7431W 68.5887N
46.7562W 68.618N

r_9x_5.1 <2> [2000-4000]

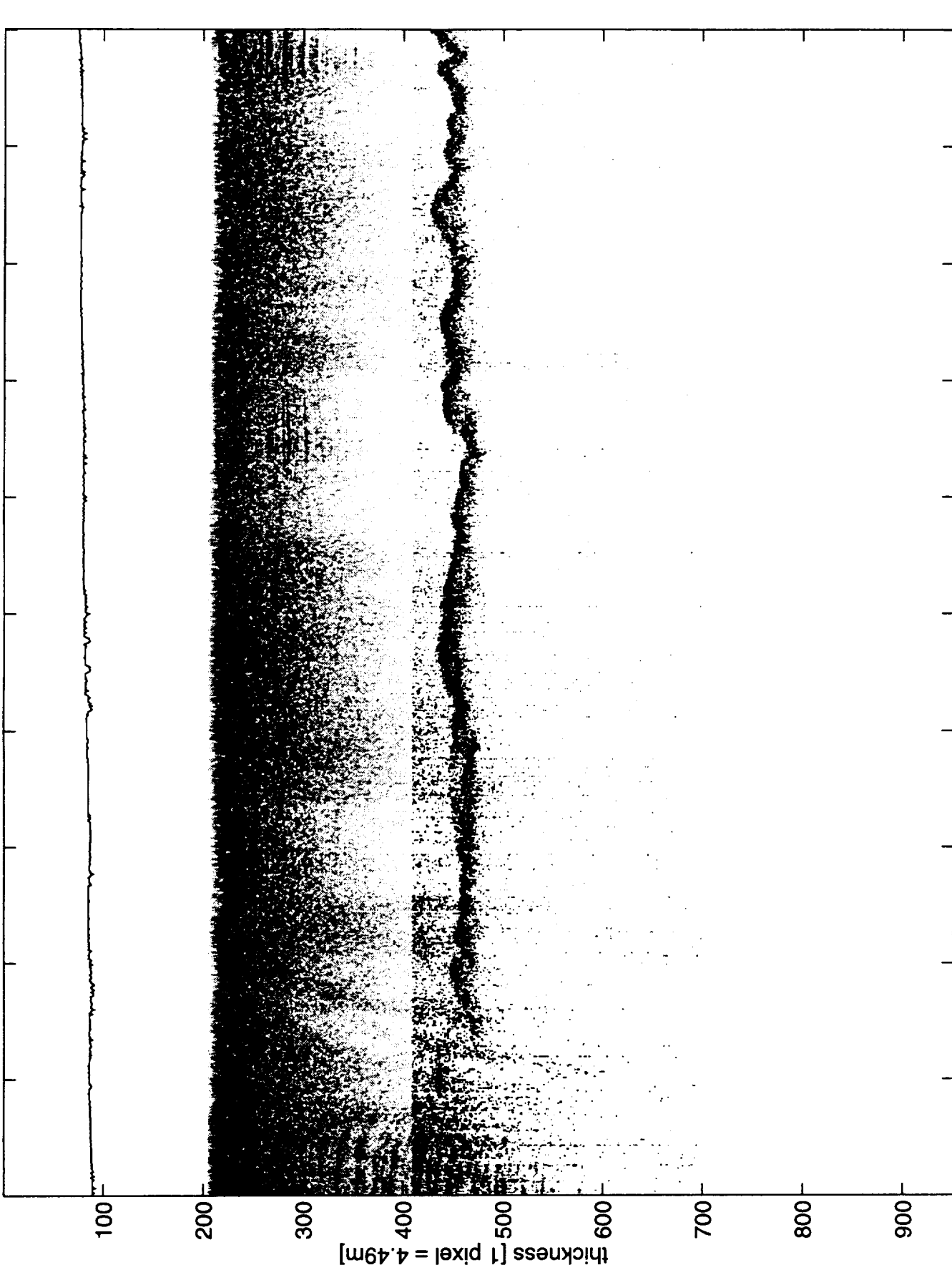


r_9x_5.1 <3> [4000-6000]

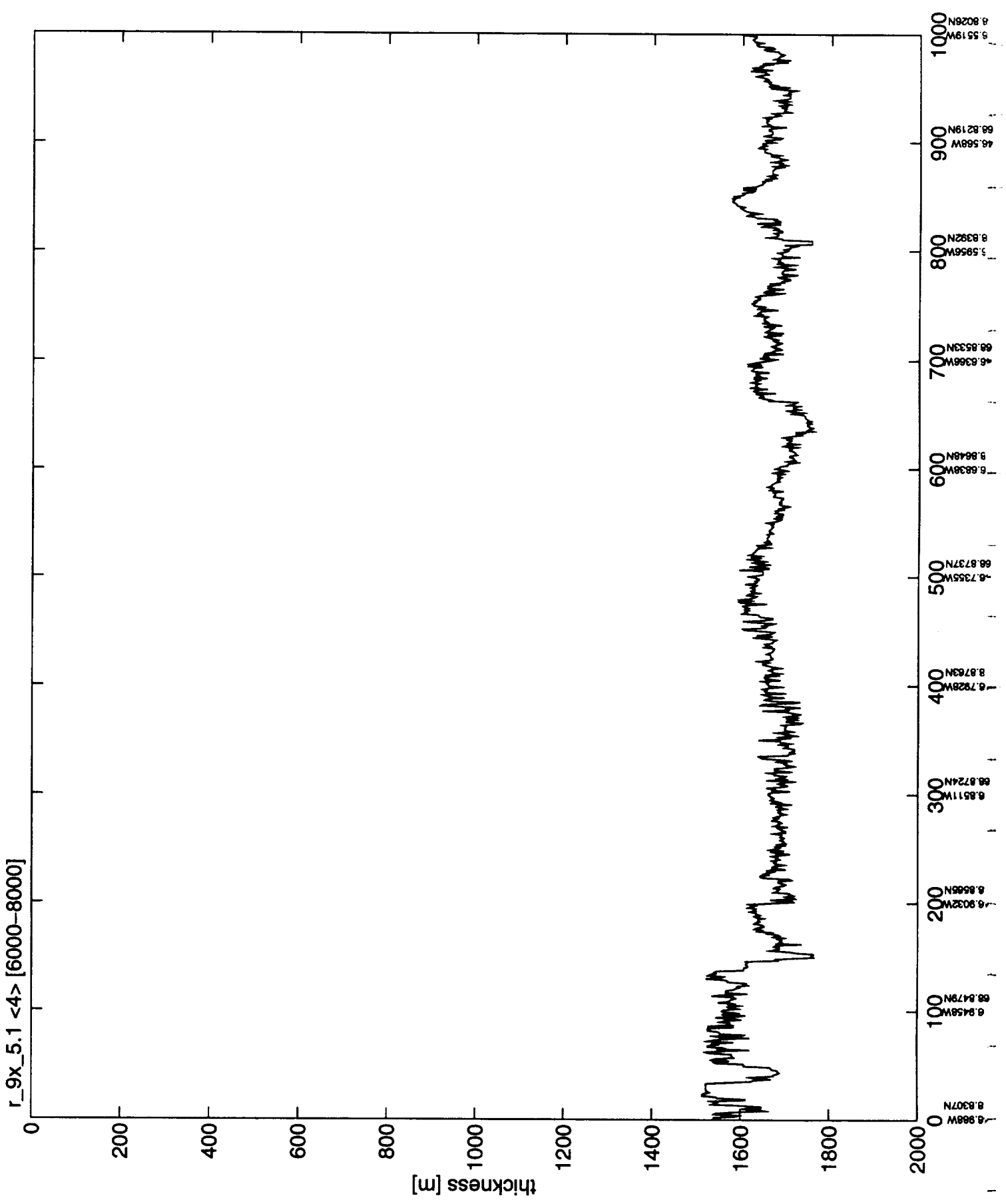


46.7562W
46.7817W
46.8443N
46.8224W
46.8668N
46.8745W
46.8839N
46.9299W
46.8979N
46.9746W
46.7162N
47.0084W
46.7374N
47.0275W
46.7612N
47.0292W
46.7857N
47.0156W
46.8093N
46.989W
46.8305N

r_9x_5.1 <4> [6000-8000]

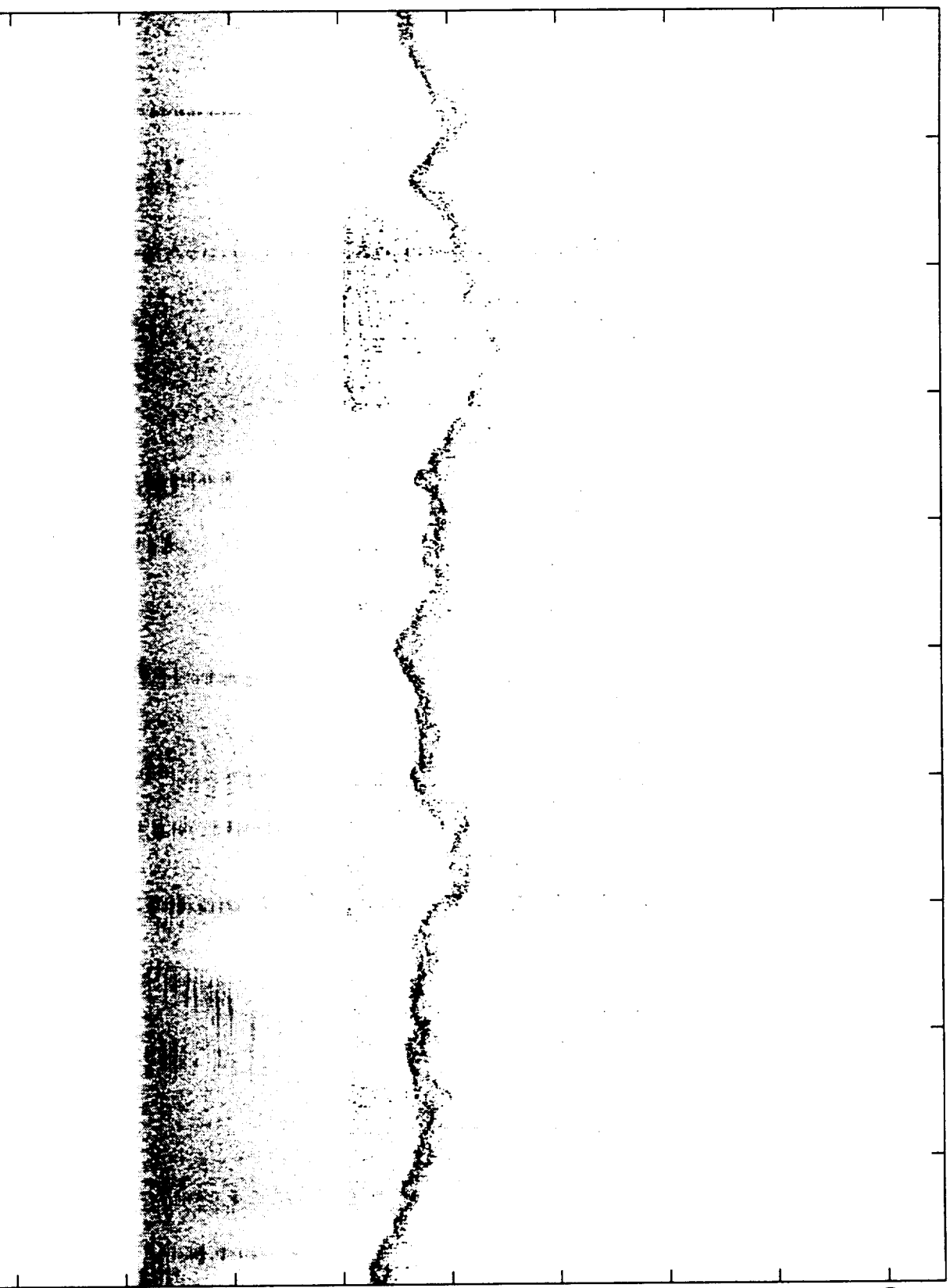


46.988W 68.8307N
46.9458W 68.8479N
46.9032W 68.8585N
46.8511W 68.8724N
46.7928W 68.8793N
46.7355W 68.8737N
46.6838W 68.8648N
46.6365W 68.8533N
46.5956W 68.8392N
46.568W 68.8219N
46.5519W 68.8026N



r_9x_5.1 <5> [8000-10000]

thickness [1 pixel = 4.9m]



46.5519W

68.8026N

46.5427W

68.7817N

46.5474W

68.7611N

46.5609W

68.7409N

46.5754W

68.7204N

46.5898W

68.6993N

46.6059W

68.6779N

46.6296W

68.6561N

46.6666W

68.6354N

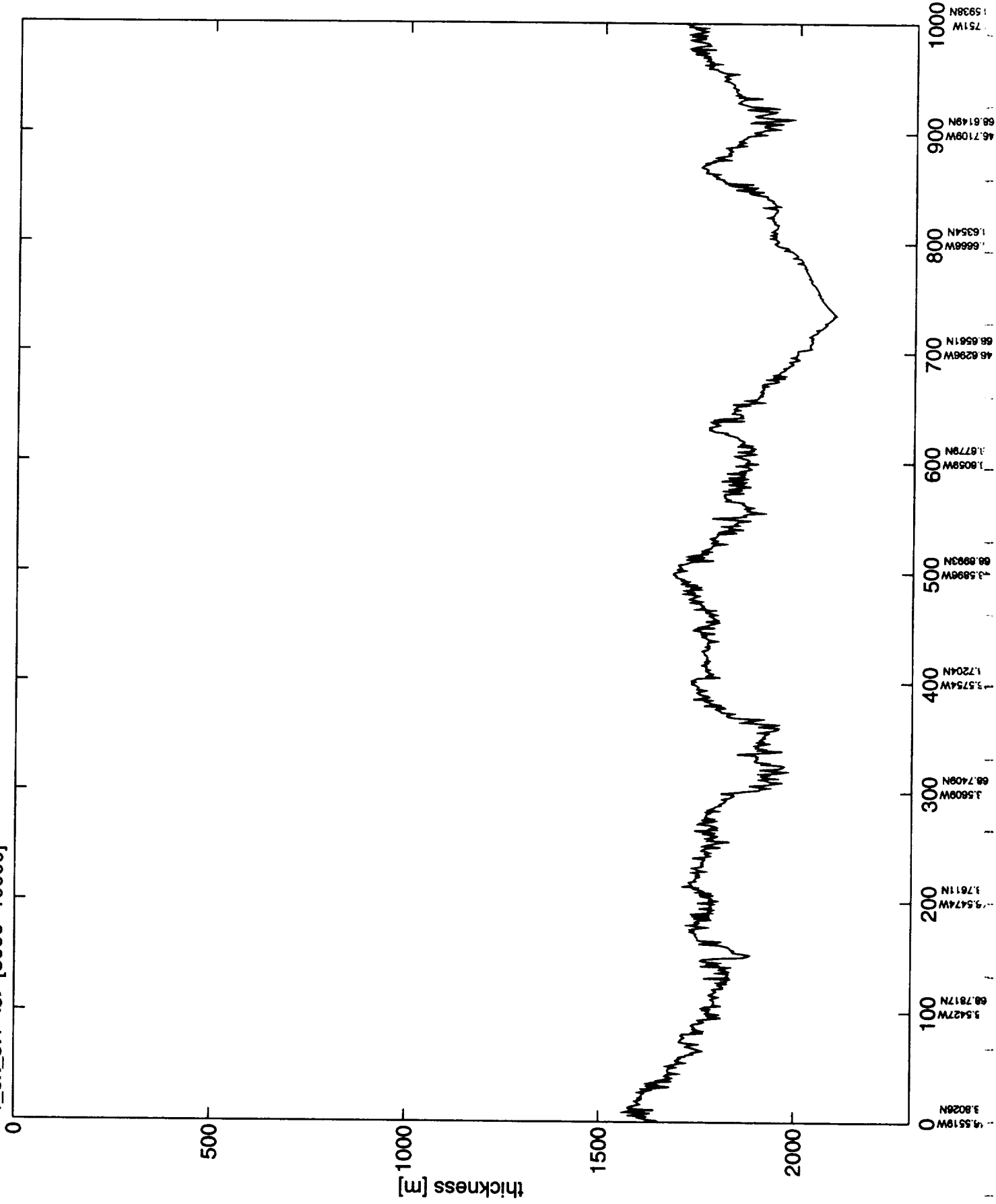
46.7109W

68.6149N

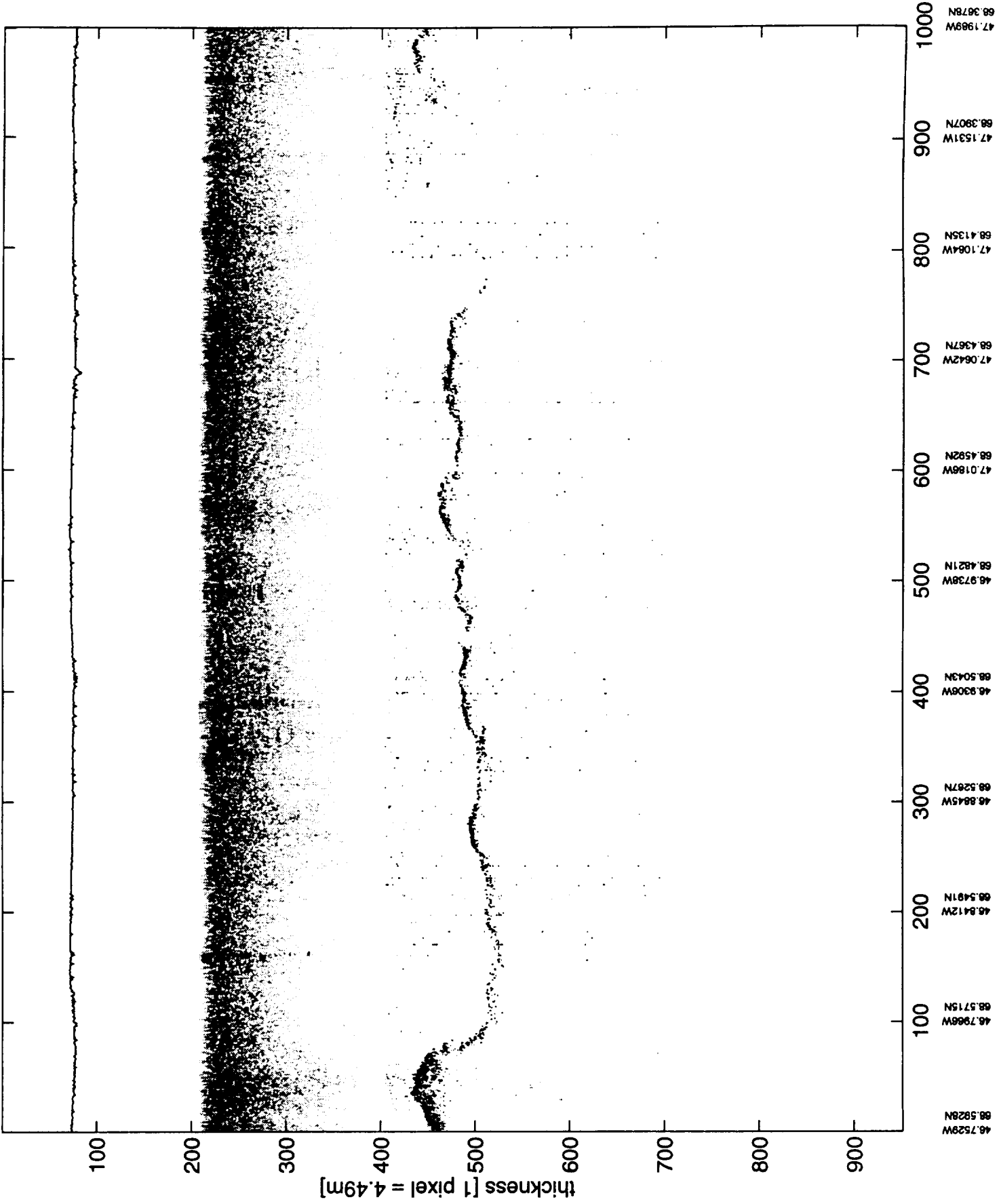
46.7511W

68.5938N

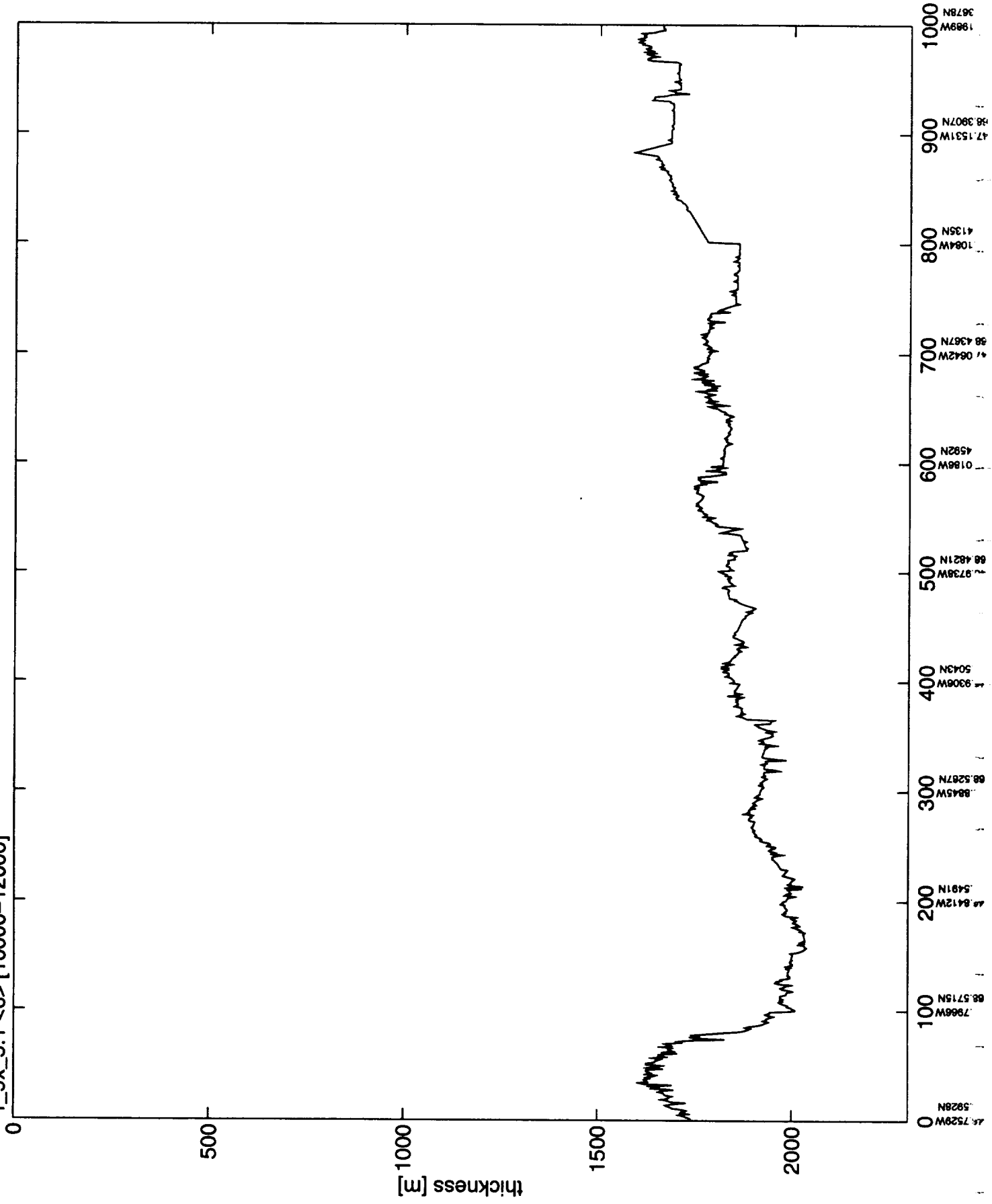
r_9x_5.1 <5> [8000-10000]



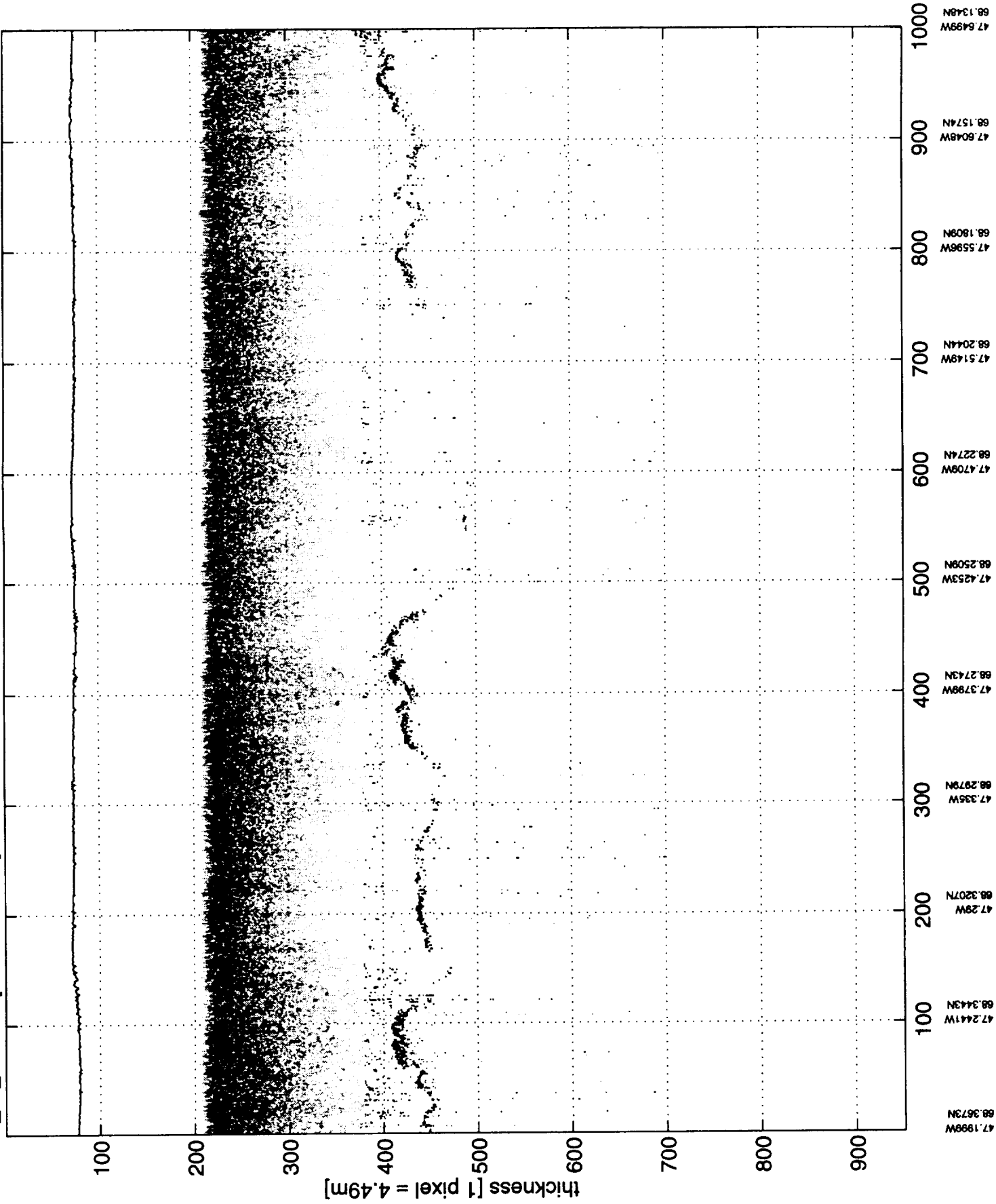
r_9x_5.1 <6> [10000-12000]

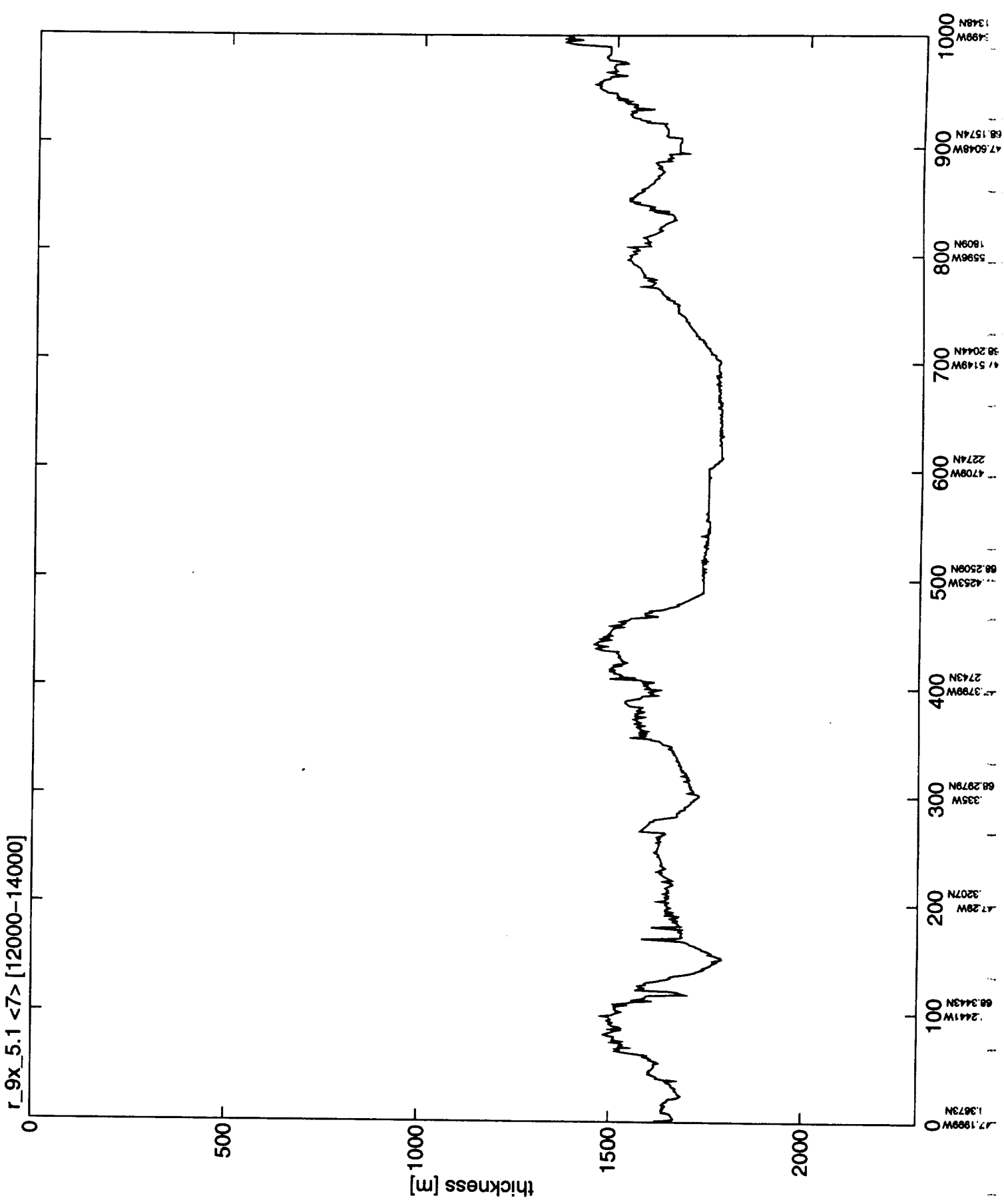


r_9x_5.1 <6> [10000-12000]

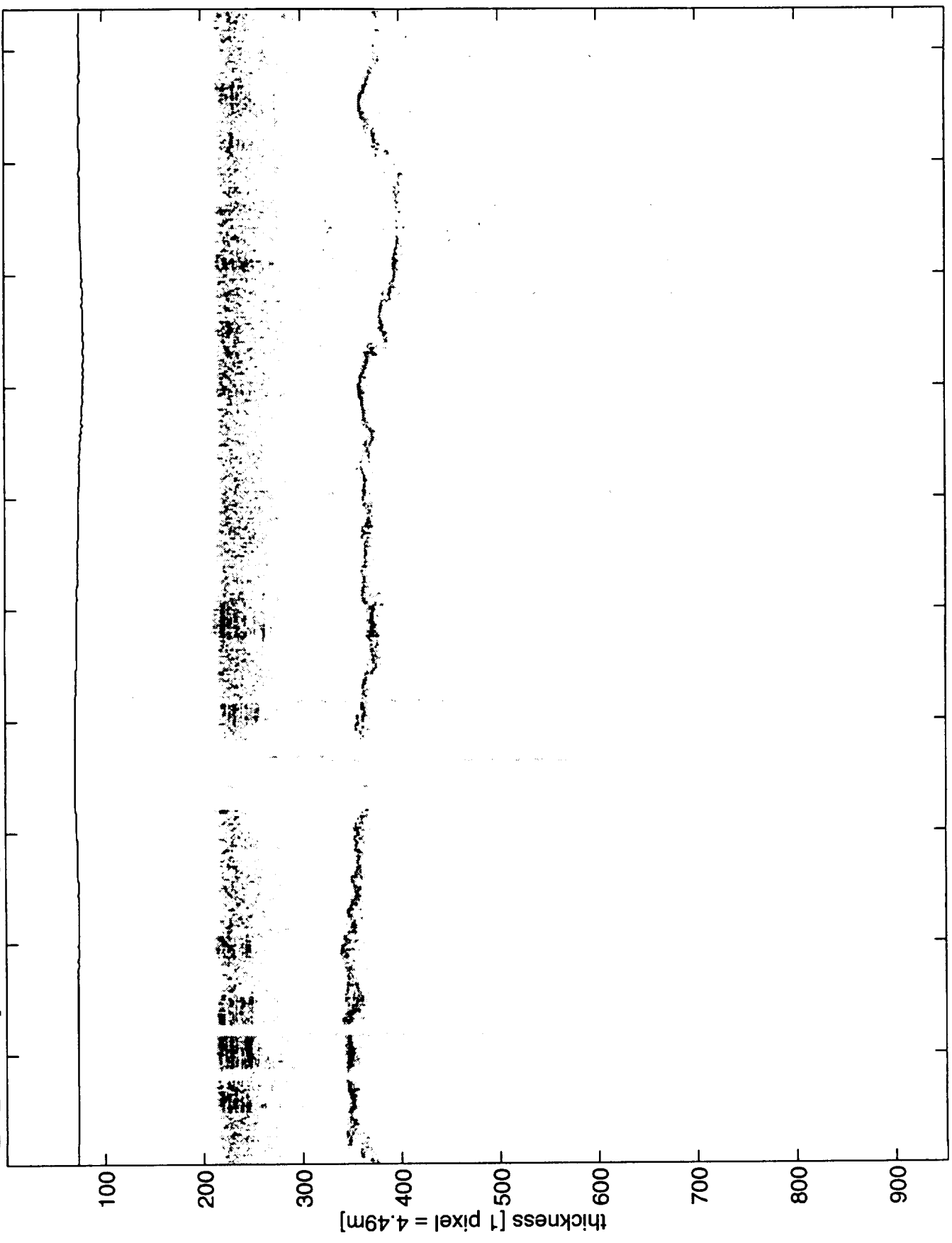


r_9x_5.1 <7> [12000-14000]



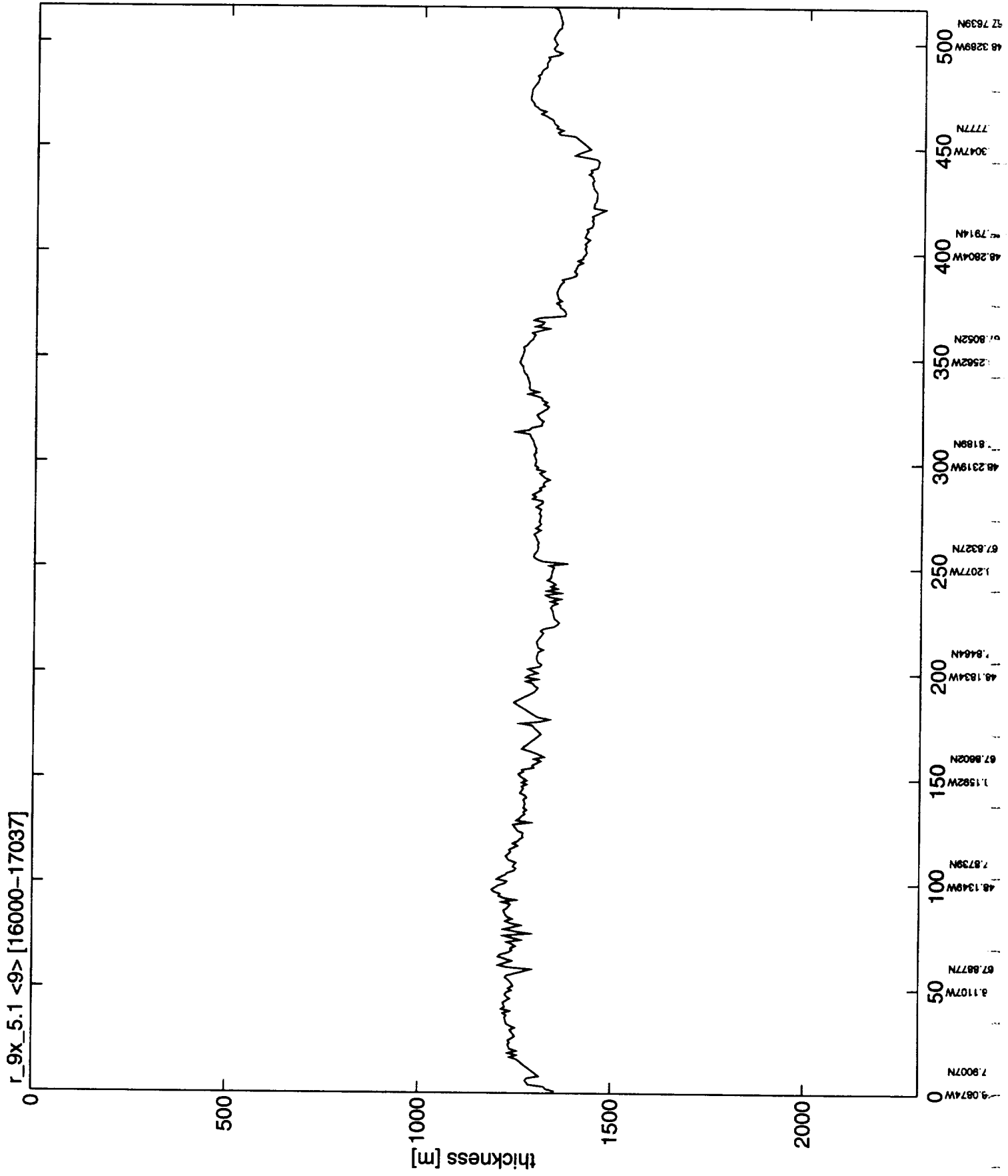


r_9x_5.1 <9> [16000-17037]



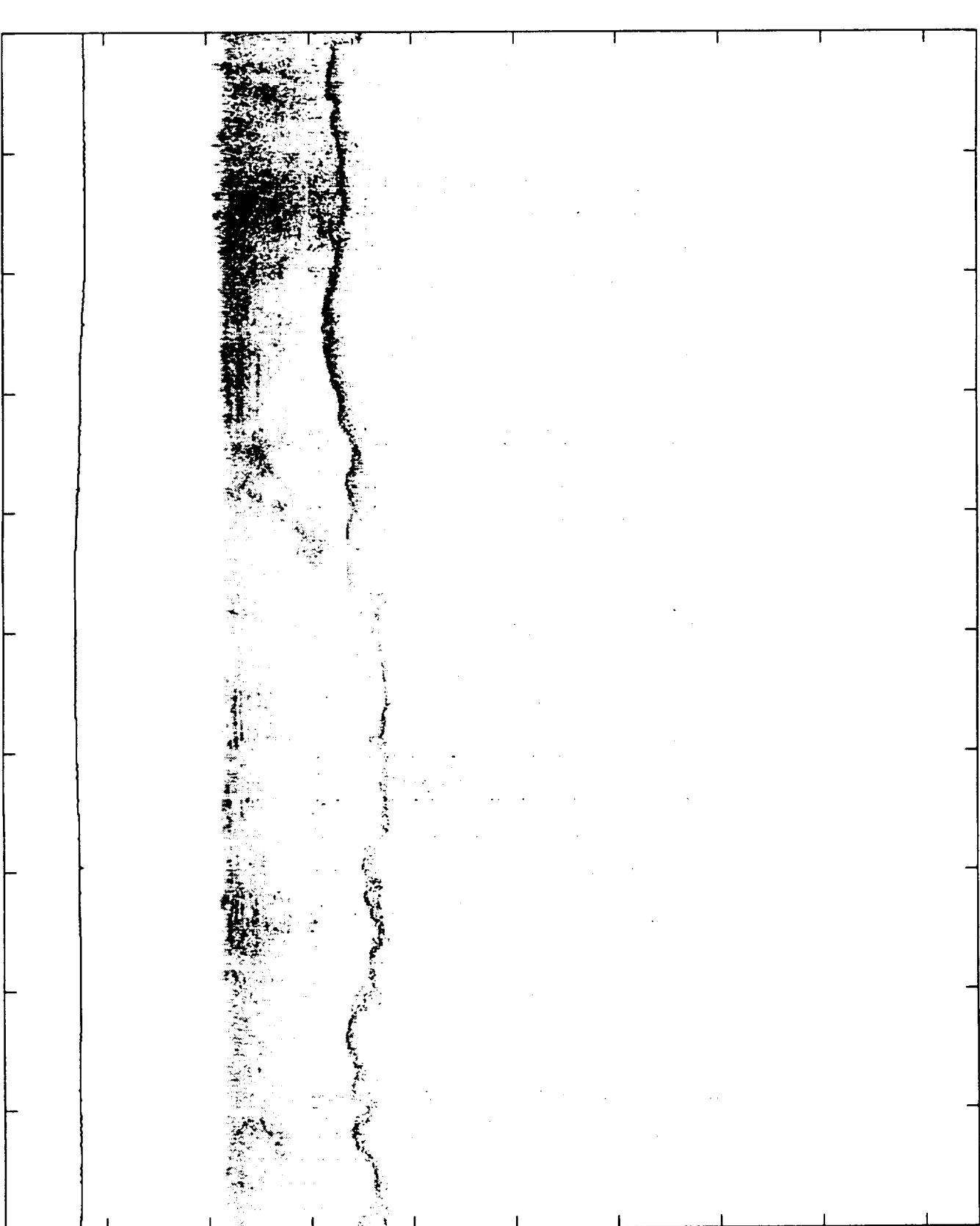
48.0874W 67.9007N
48.1107W 67.8877N
48.1349W 67.8739N
48.1592W 67.8602N
48.1834W 67.8464N
48.2077W 67.8327N
48.2319W 67.8189N
48.2562W 67.8052N
48.2804W 67.7914N
48.3047W 67.7777N
48.3289W 67.7639N

r_9x_5.1 <9> [16000-17037]



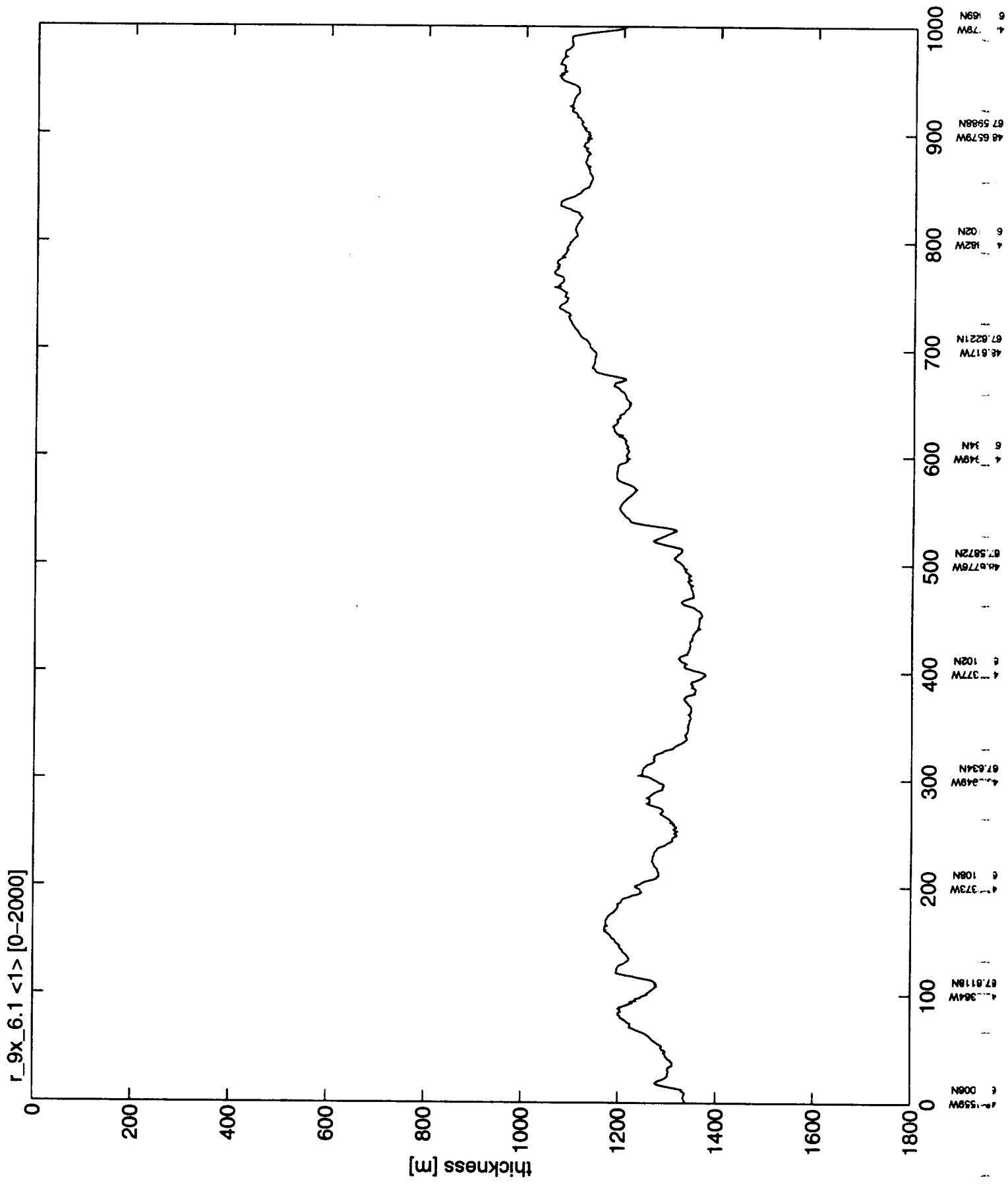
r_9x_6.1 <1> [0-2000]

thickness [1 pixel = 4.49m]

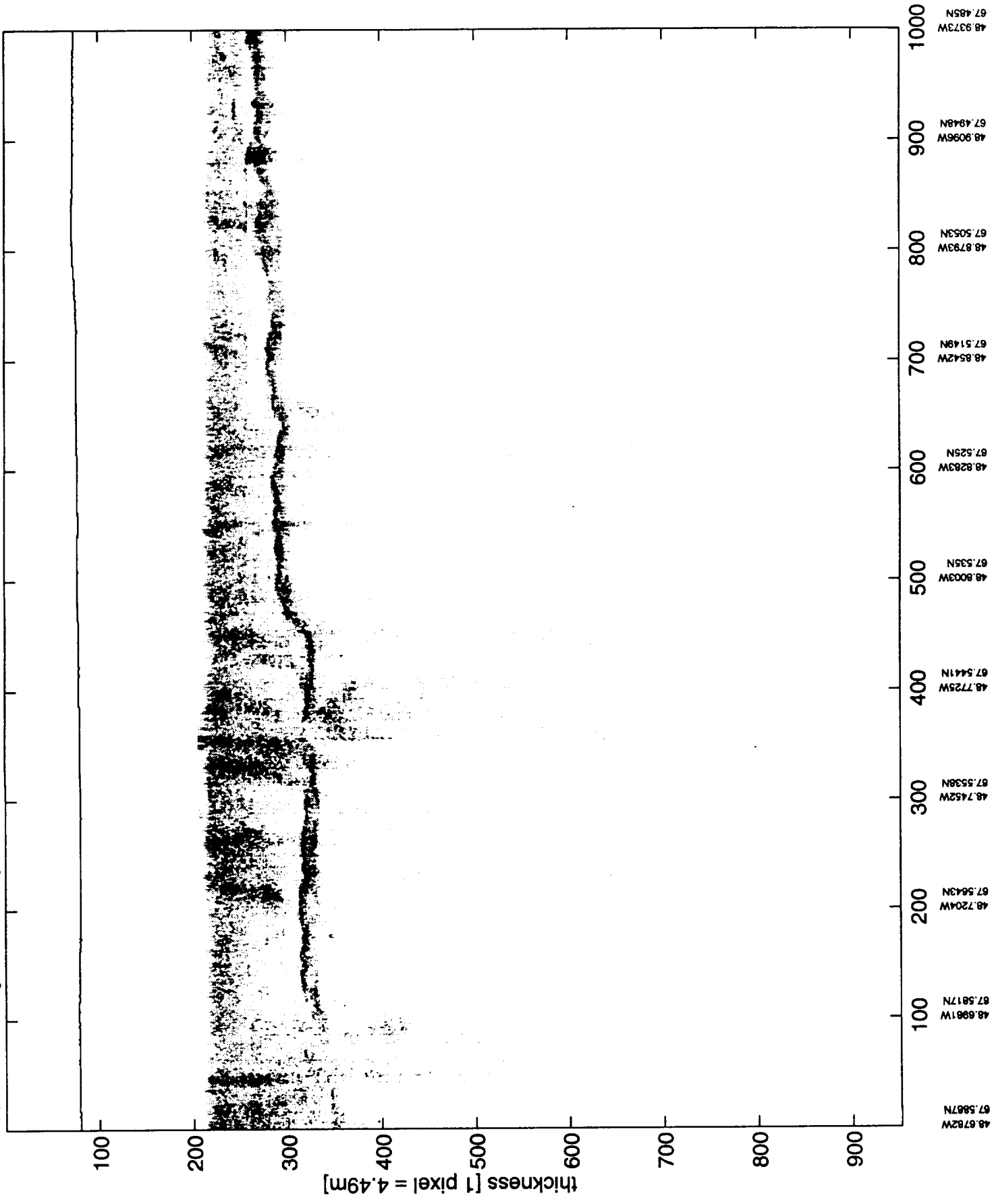


48.4559W 67.7008N
48.6364W 67.6118N
48.6373W 67.6108N
48.5949W 67.634N
48.6377W 67.6102N
48.6776W 67.5872N
48.5949W 67.634N
48.617W 67.6221N
48.632W 67.6102N
48.6579W 67.5988N
48.679W 67.5869N

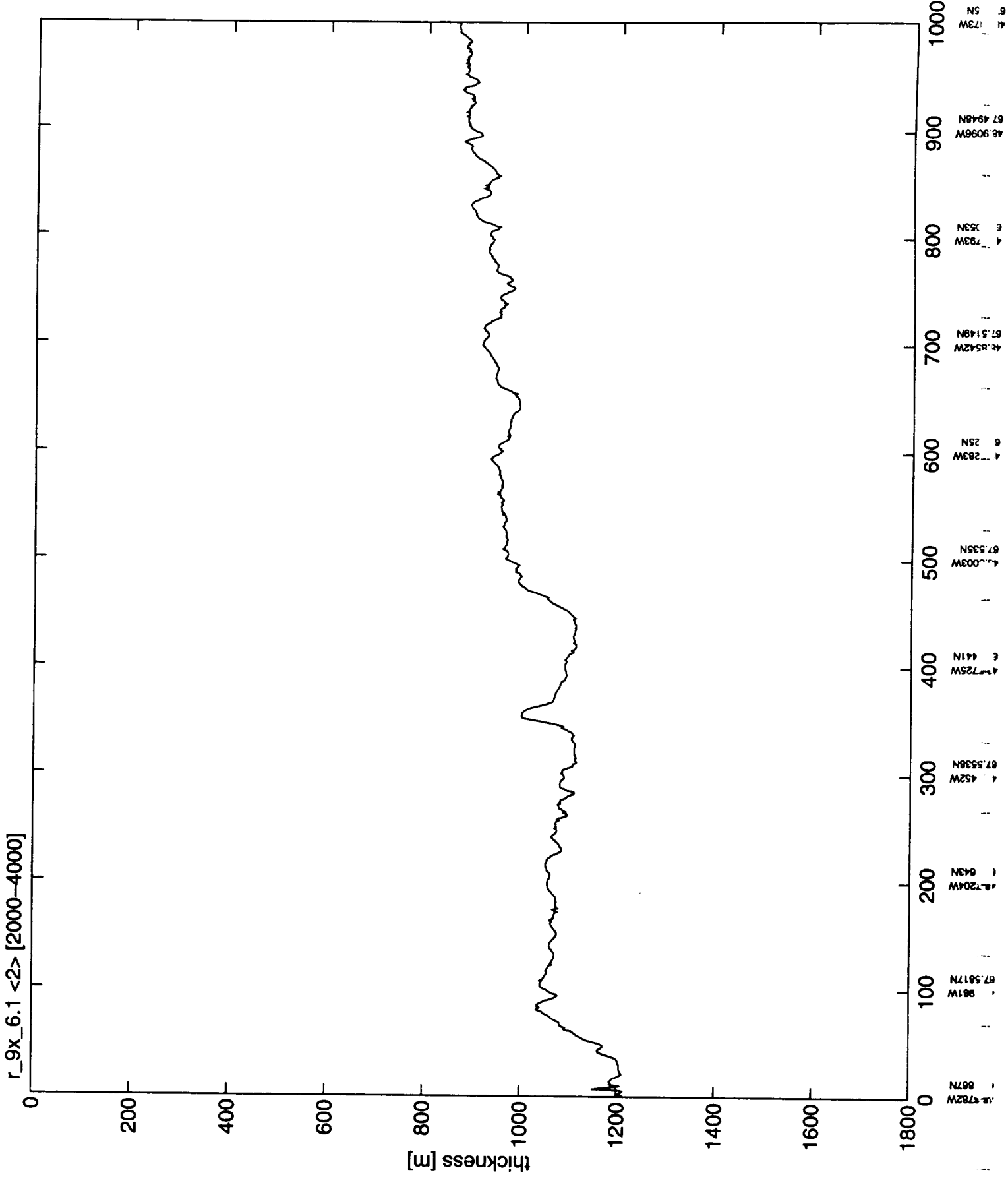
r_9x_6.1 <1> [0-2000]

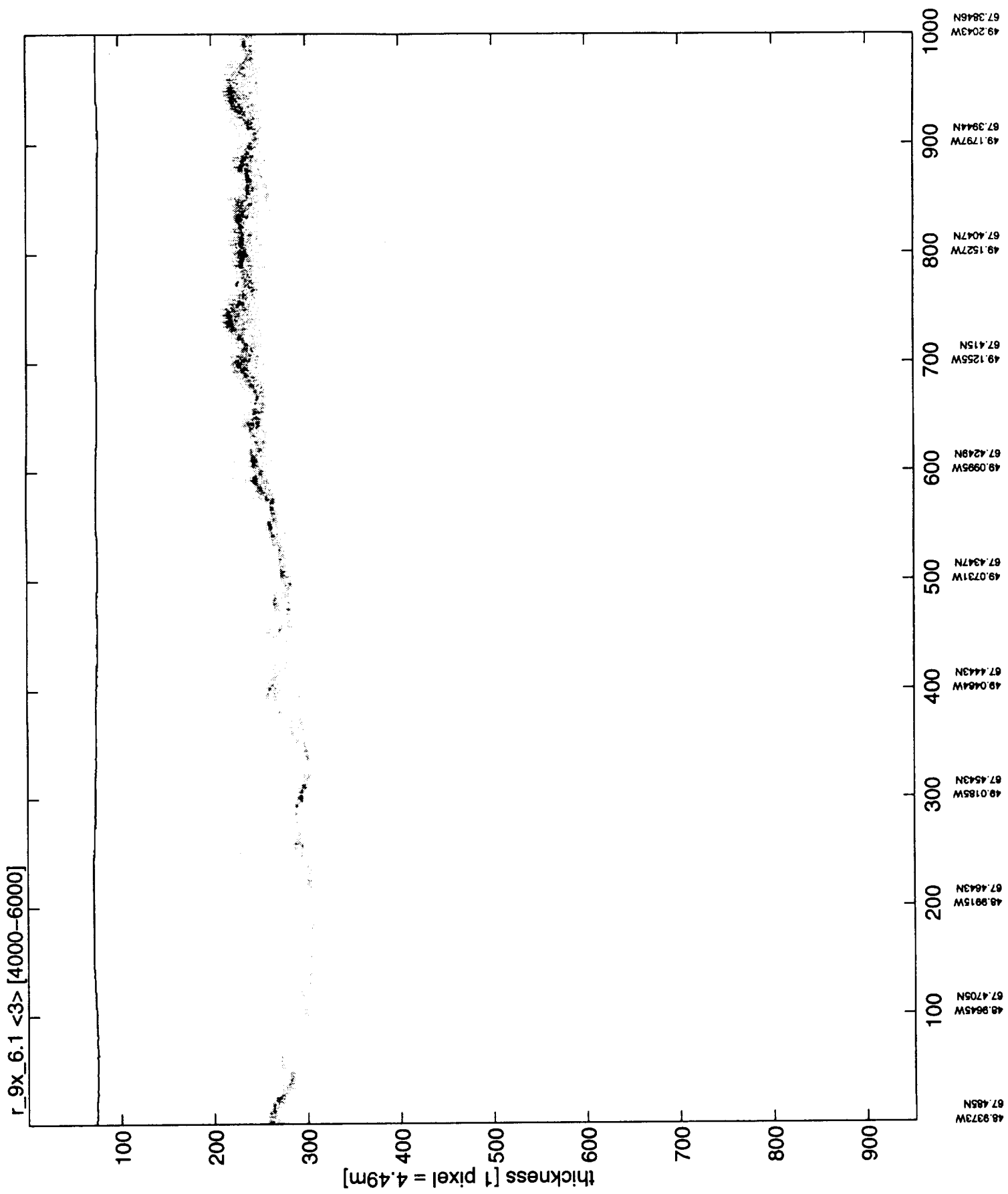


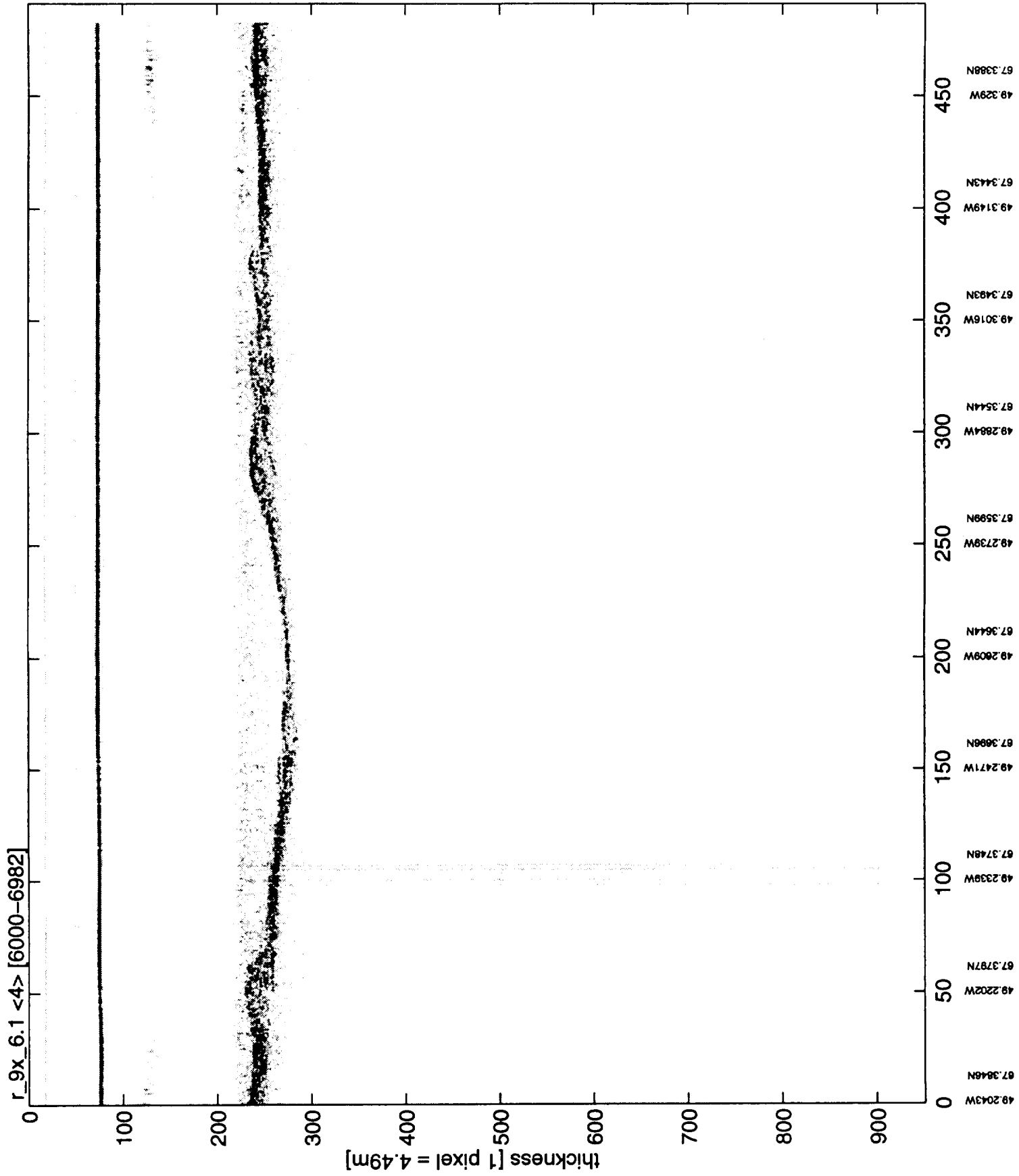
r_9x_6.1 <2> [2000-4000]

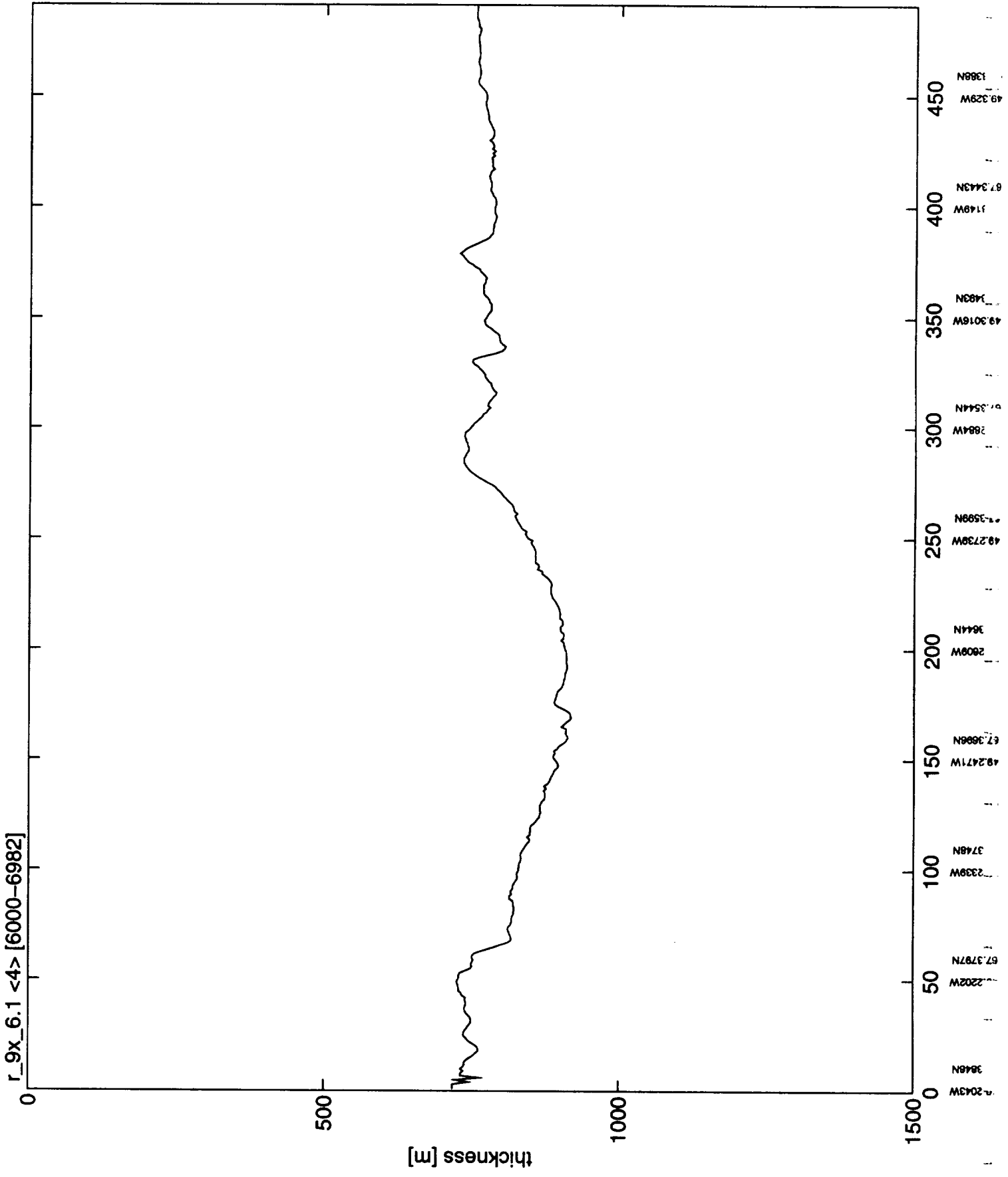


r_9x_6.1 <2> [2000-4000]





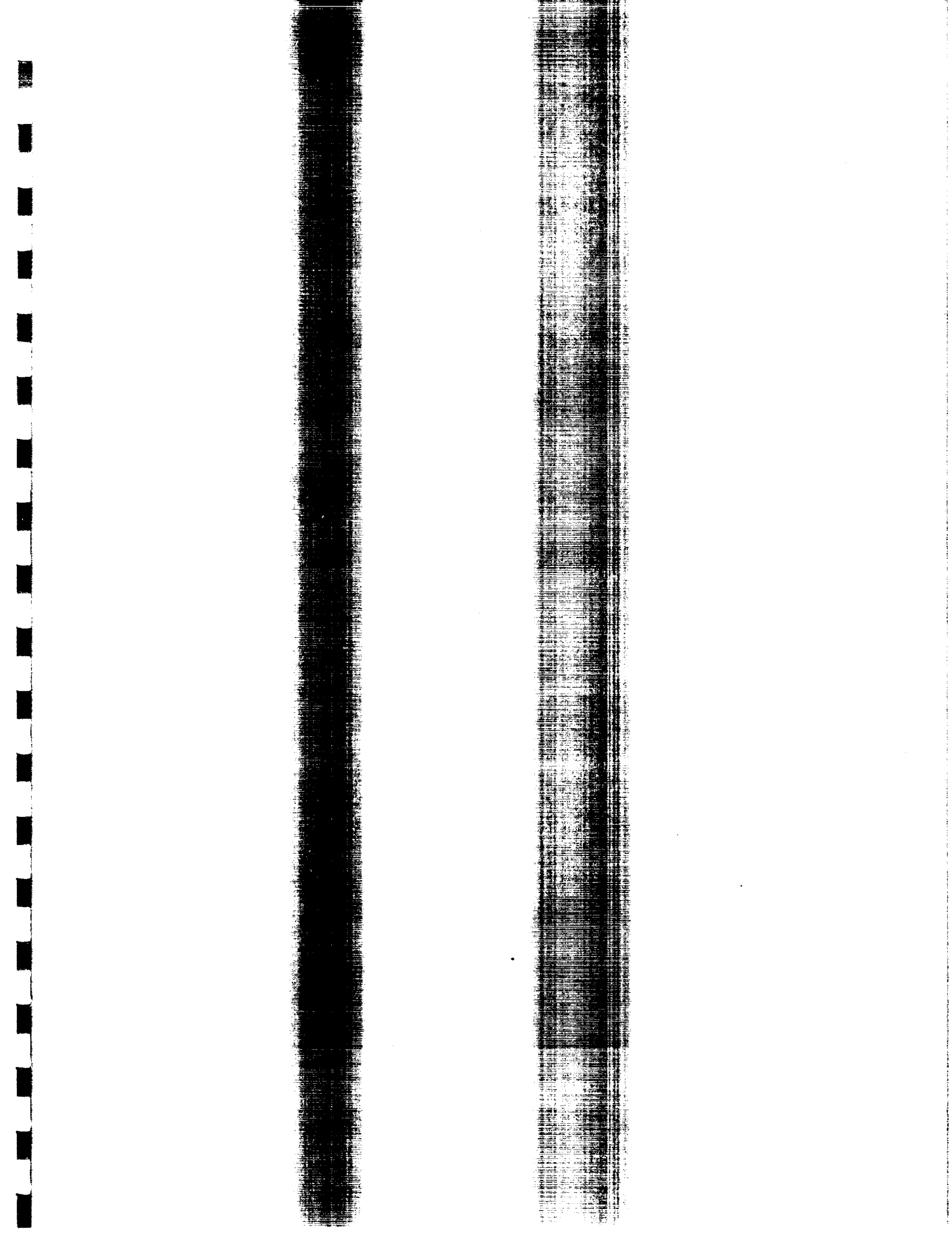


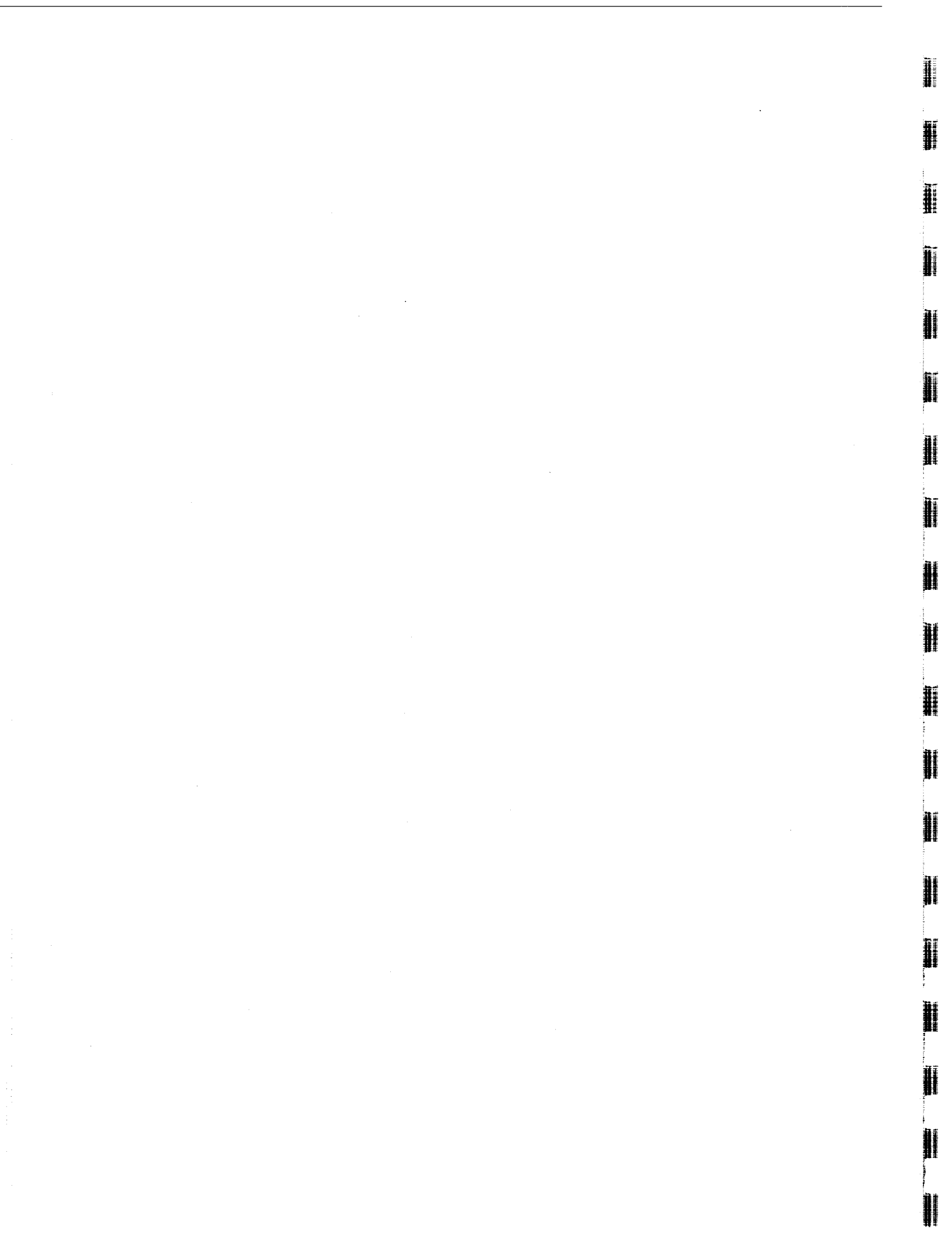


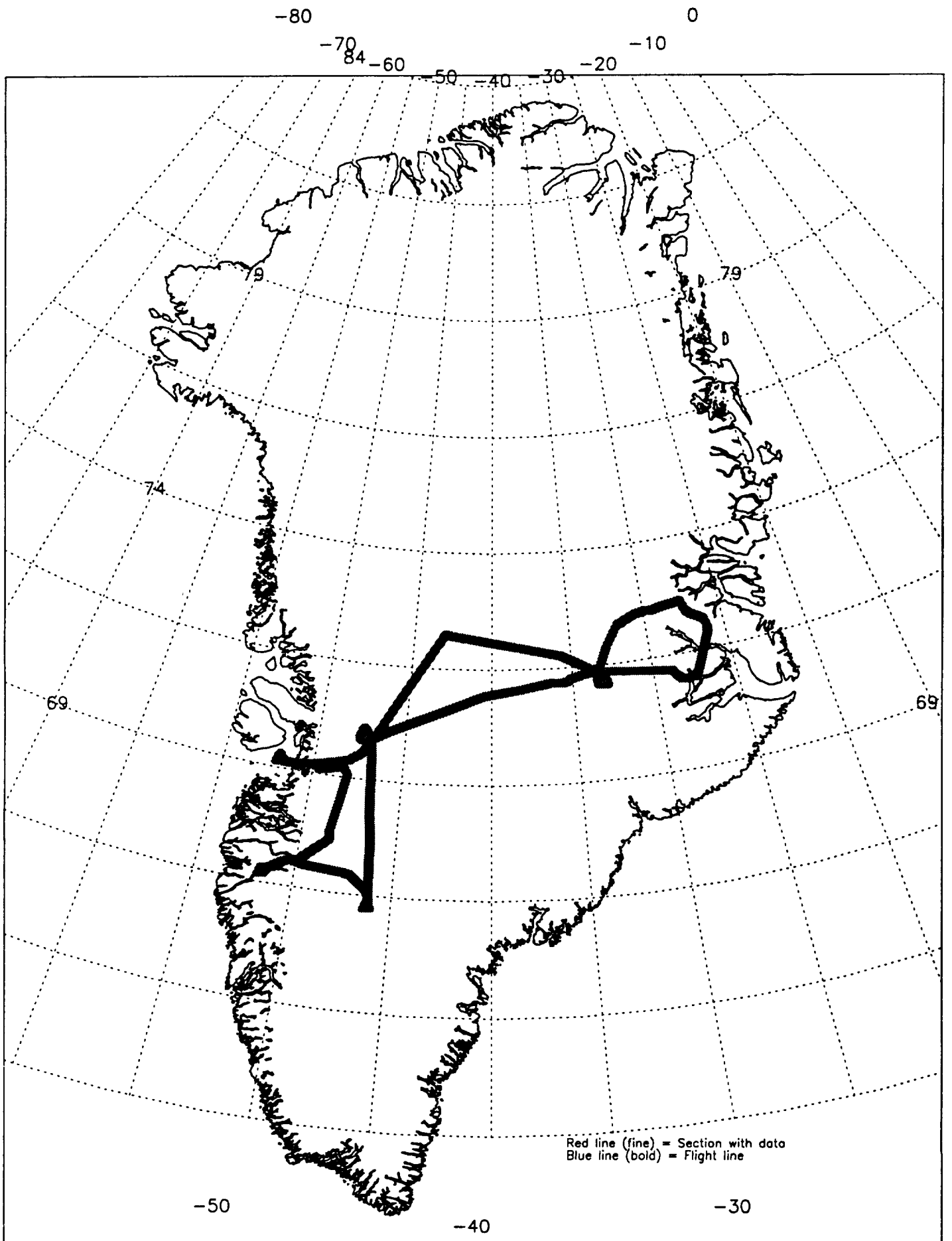
Appendix J

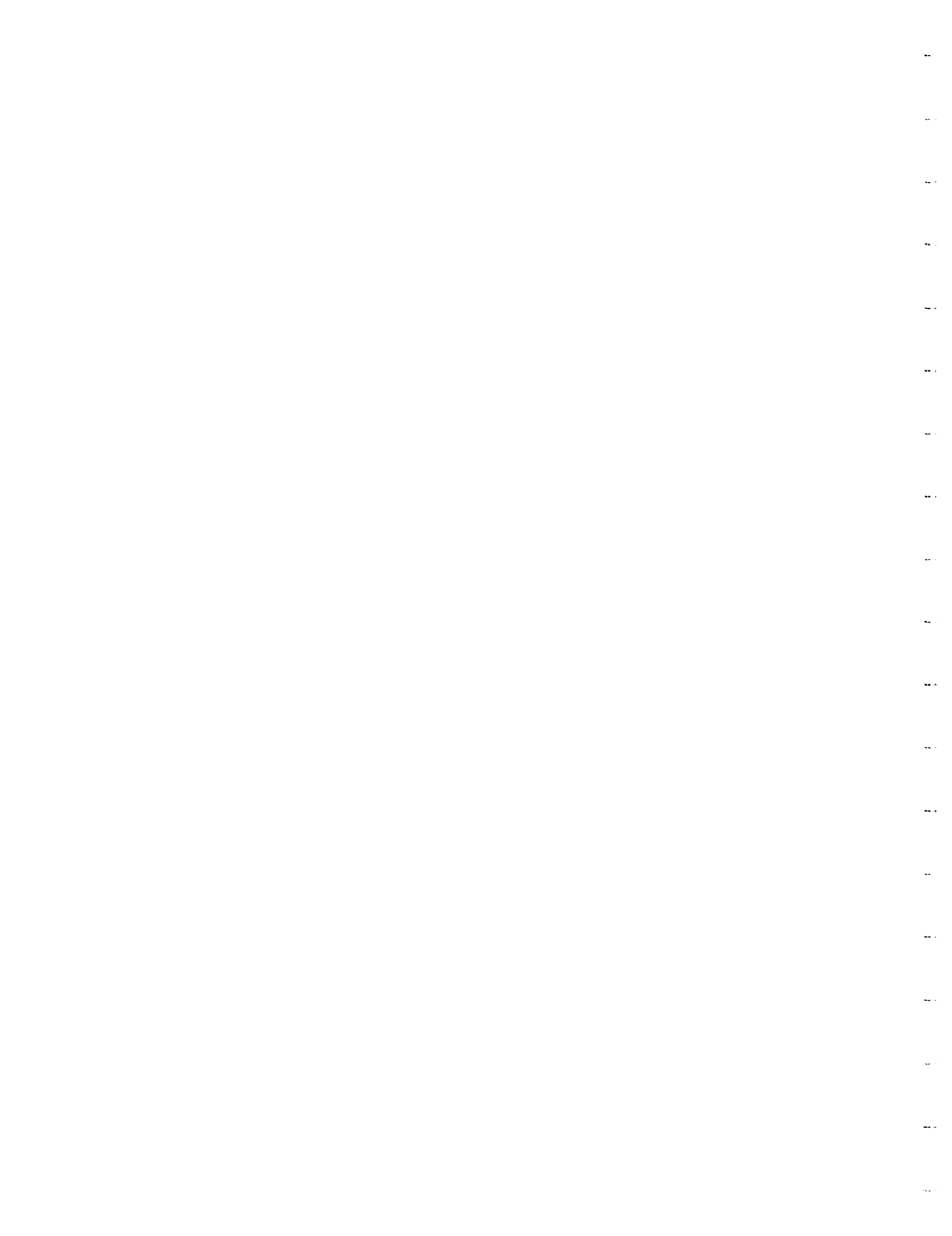
July 9, 1993



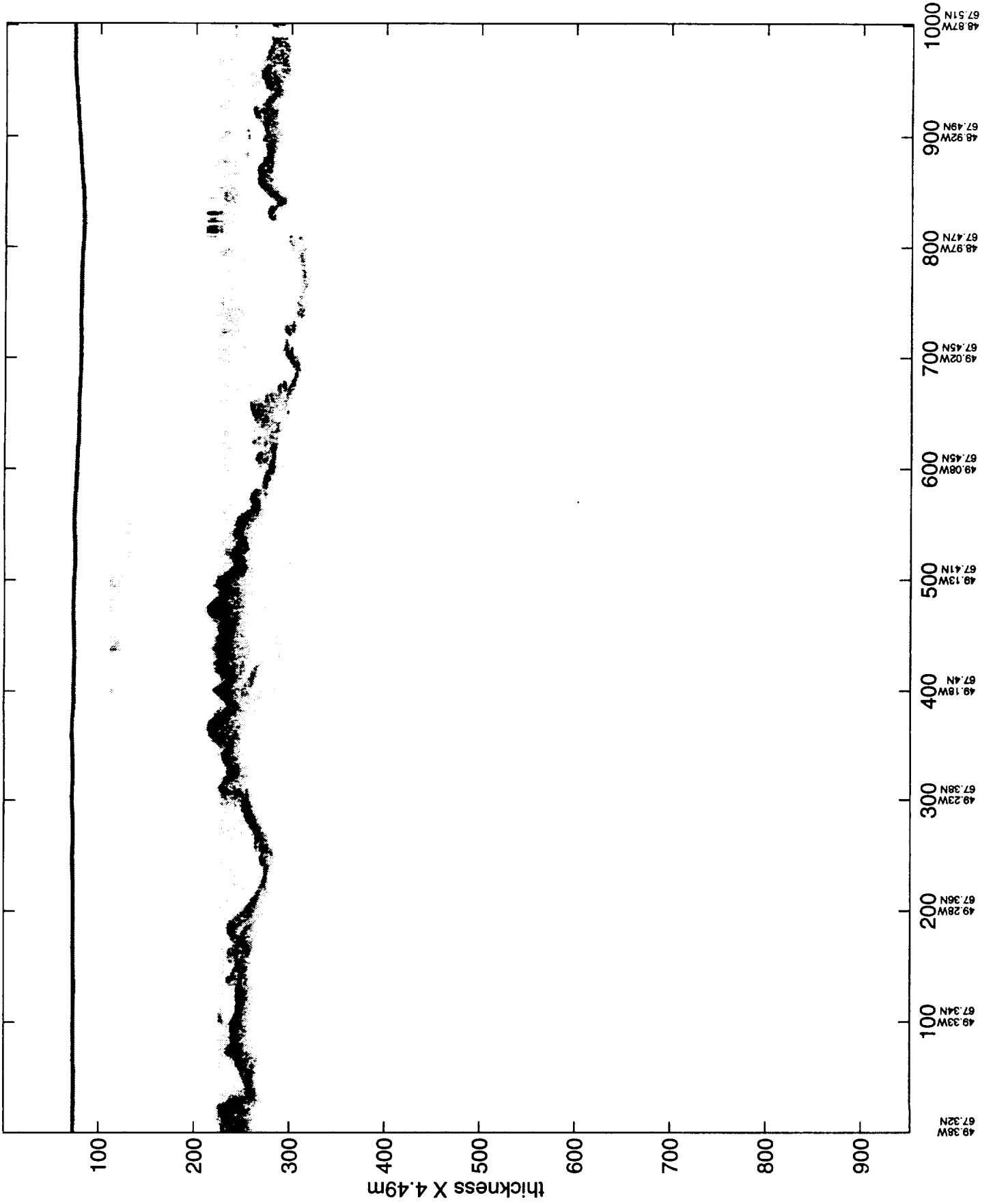




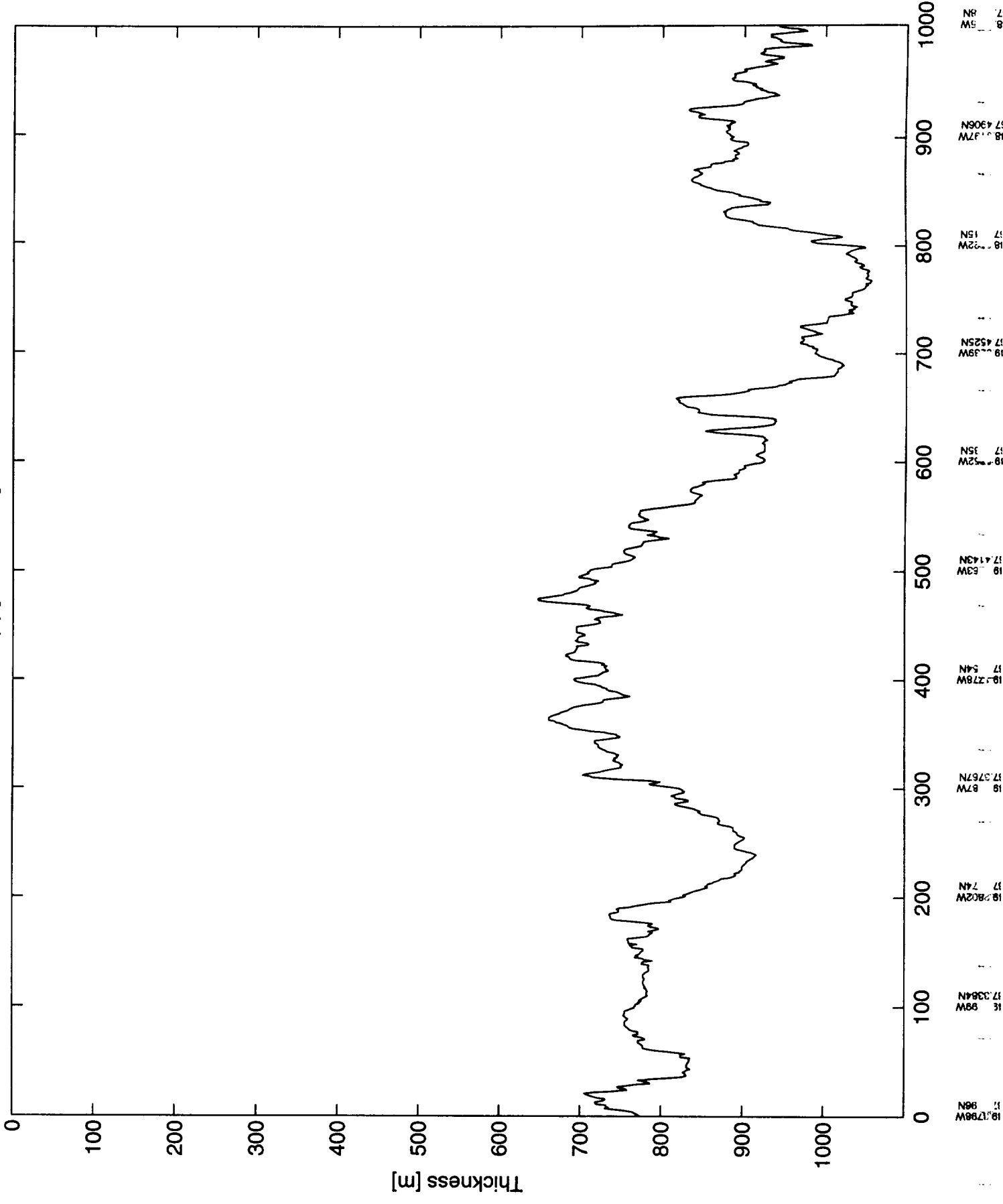




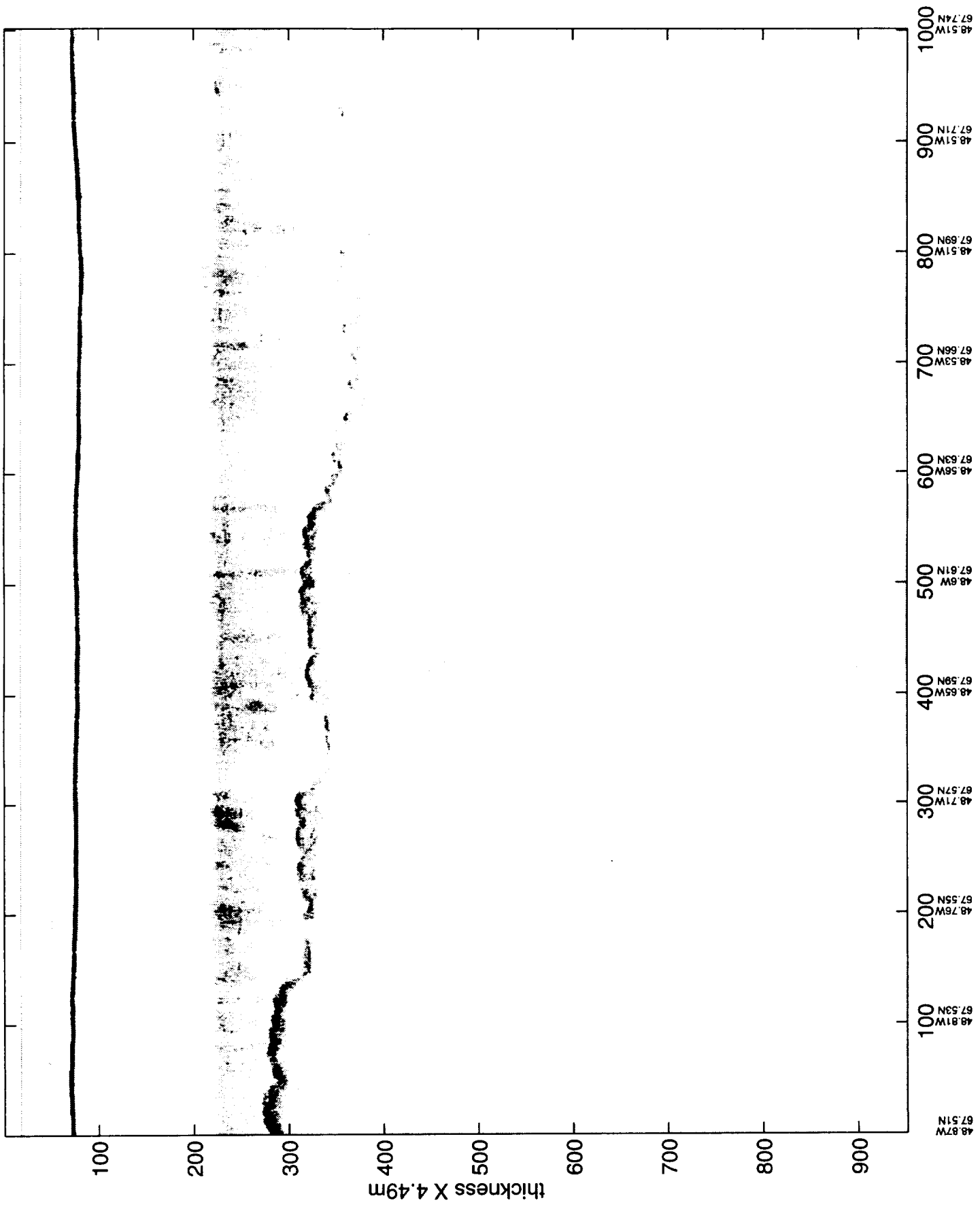
r_5|_2.13 [2000-3000]



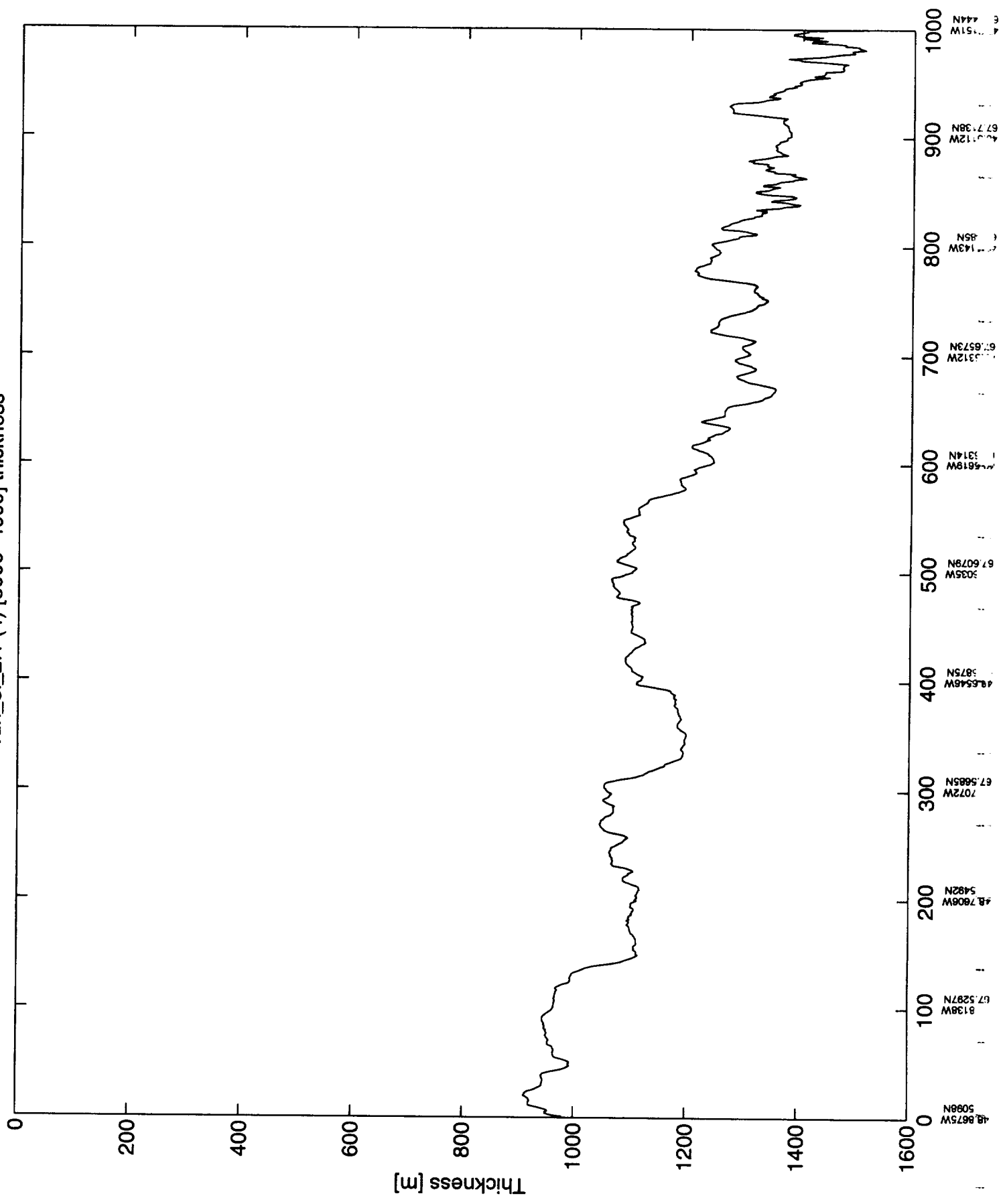
run_5l_2.1 (3) [2000-3000] thickness



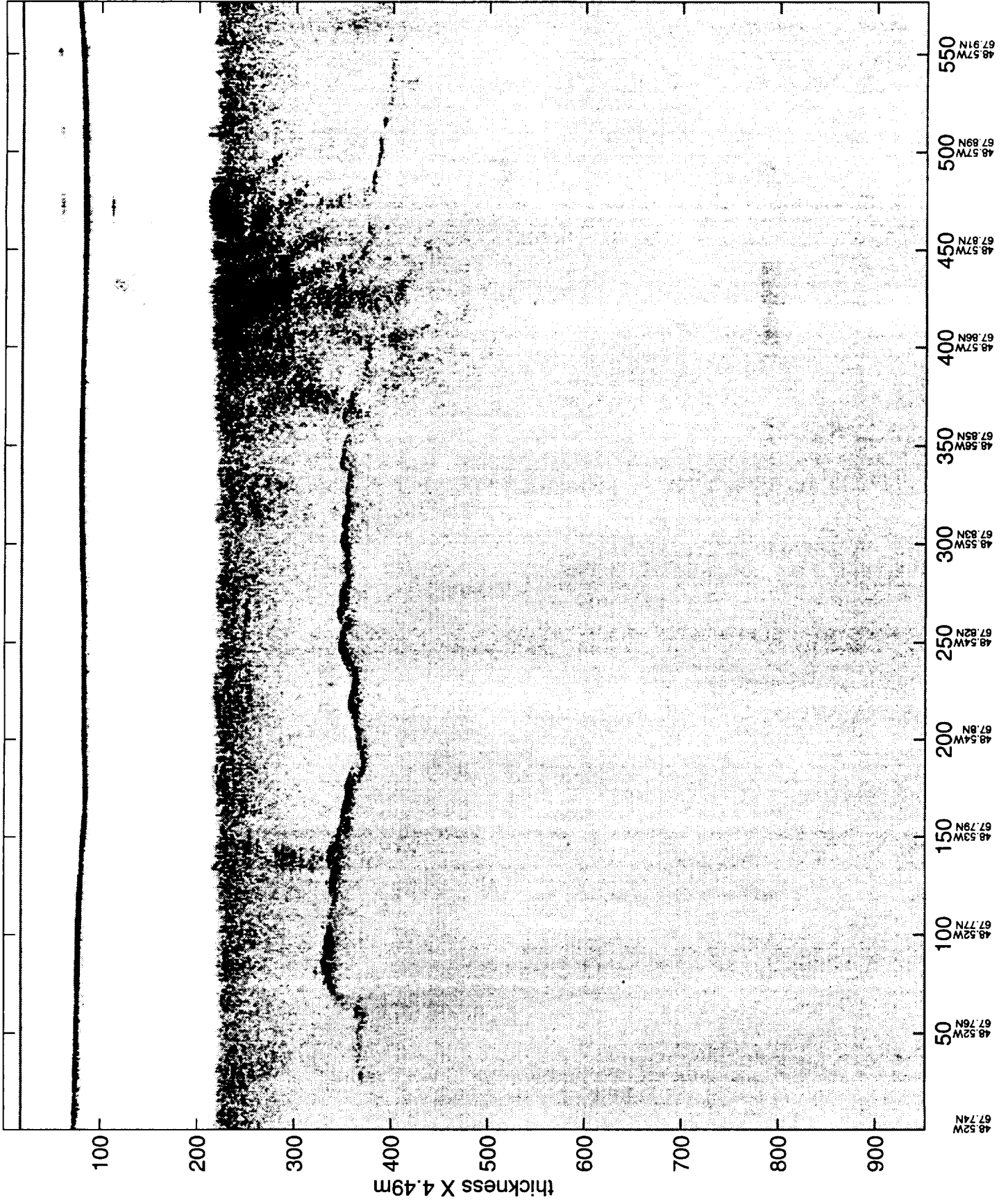
r_5l_2.14 [3000-4000]



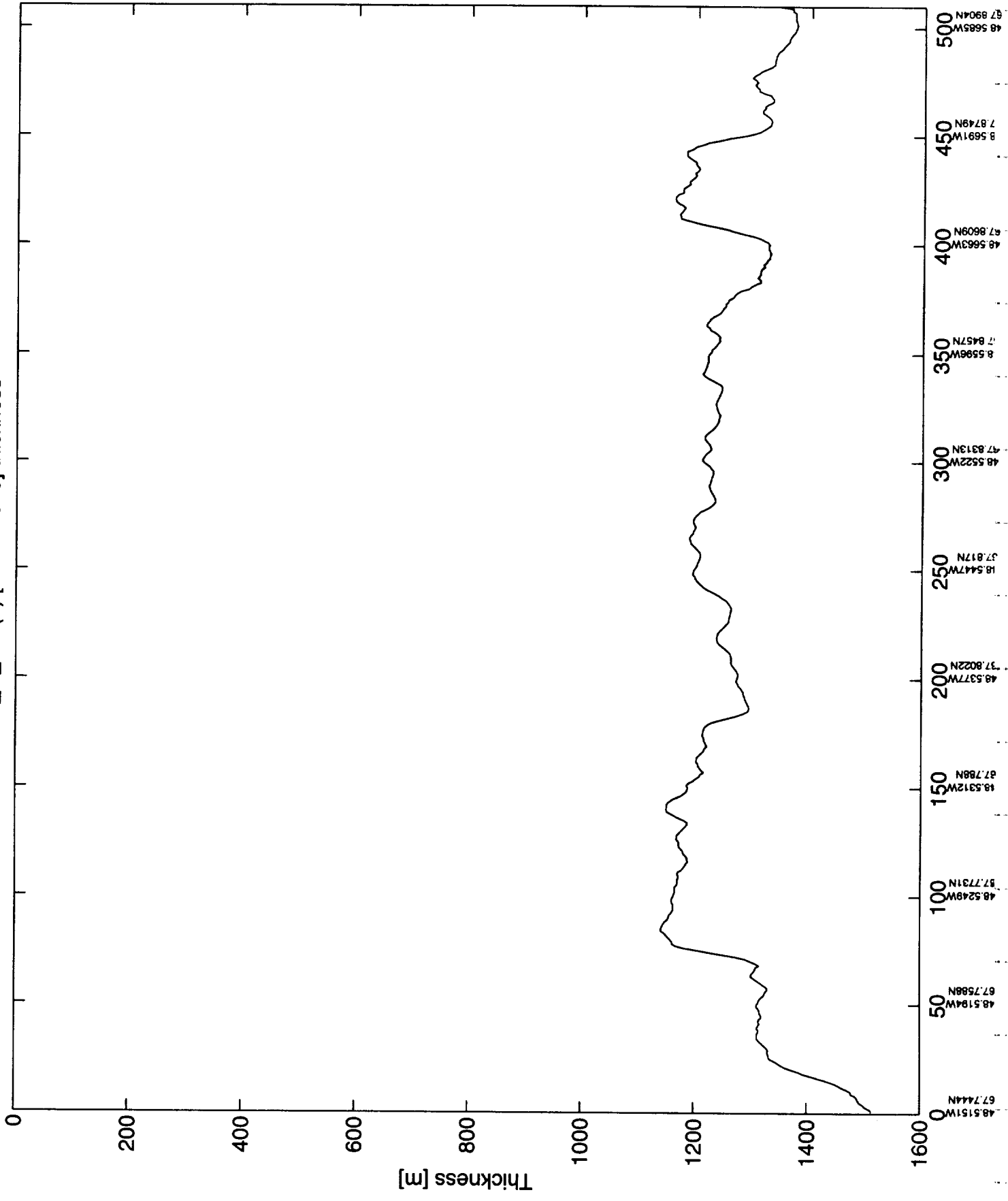
run_5l_2.1 (4) [3000-4000] thickness



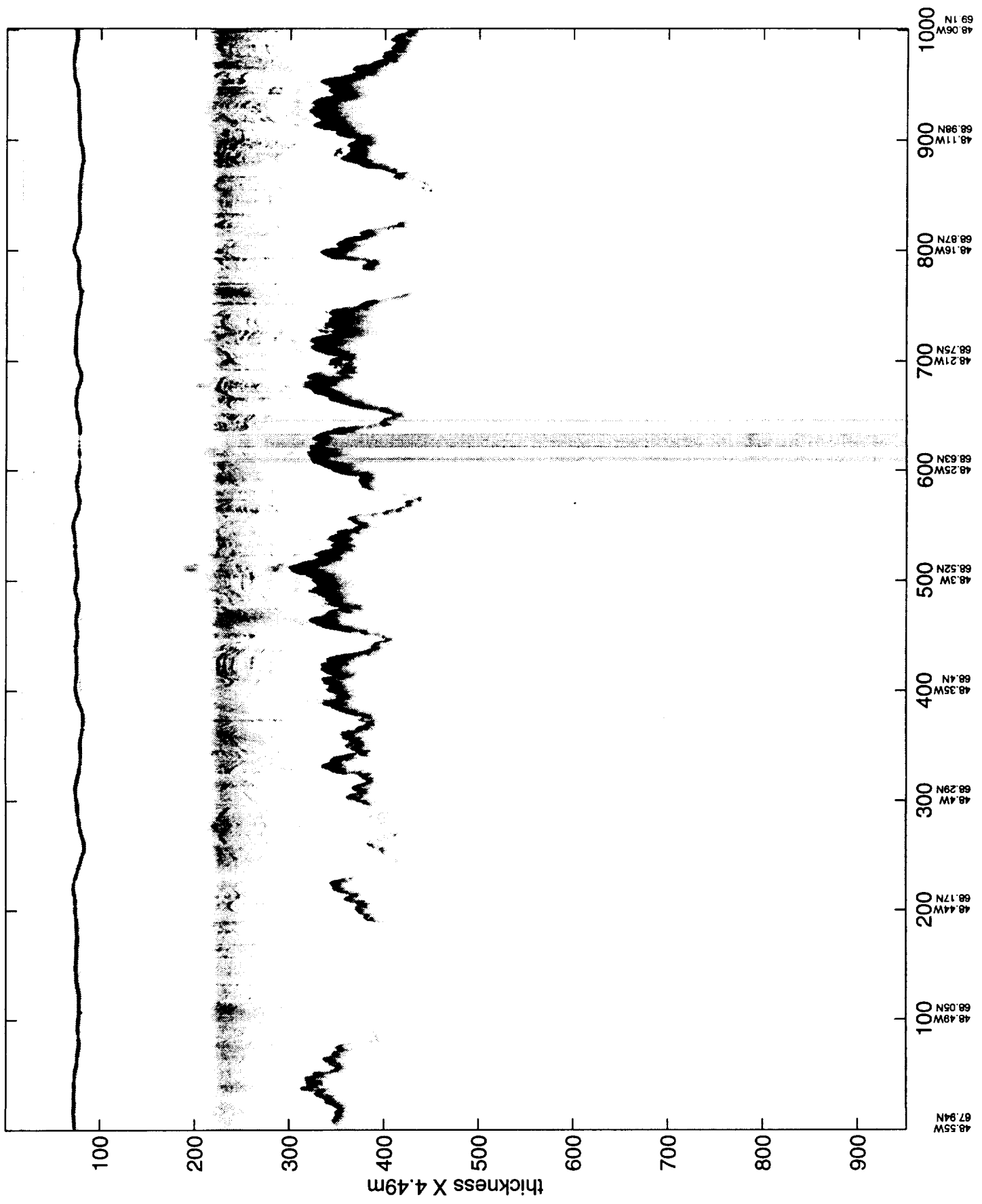
r_5l_2.15 [4000-4576]



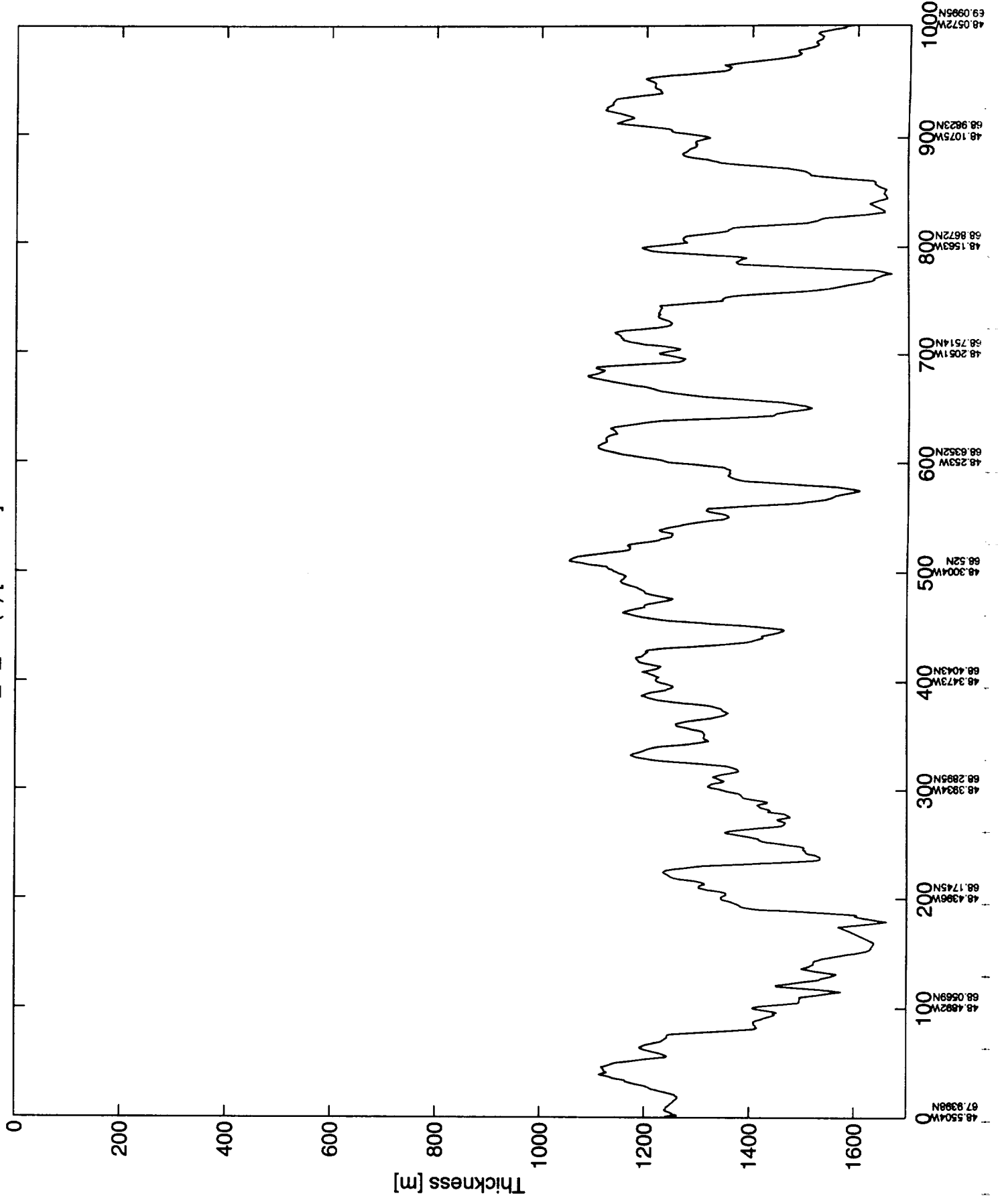
run_5l_2.1 (5) [4000-4510] thickness



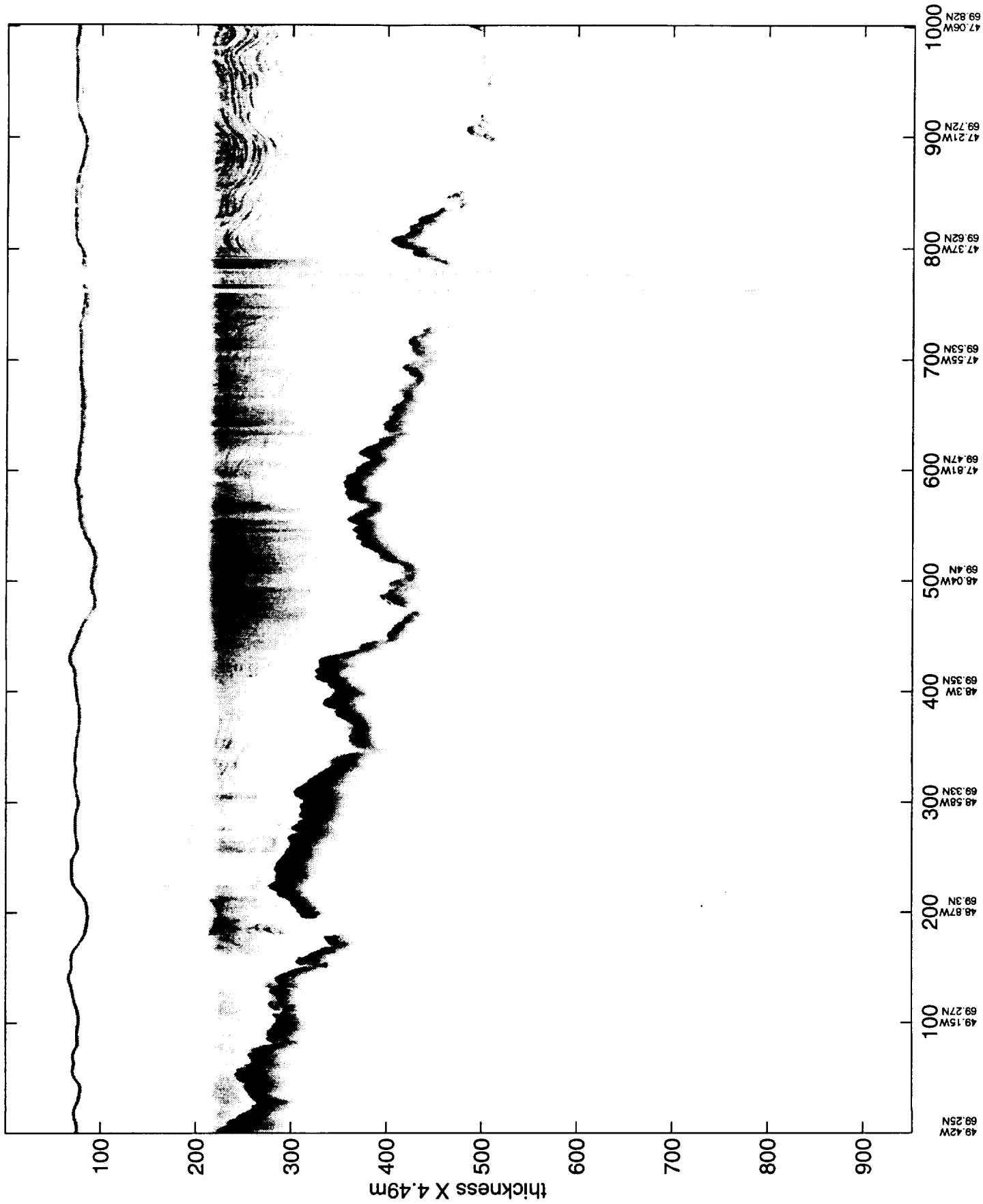
r_5[3.11 [0-1000]



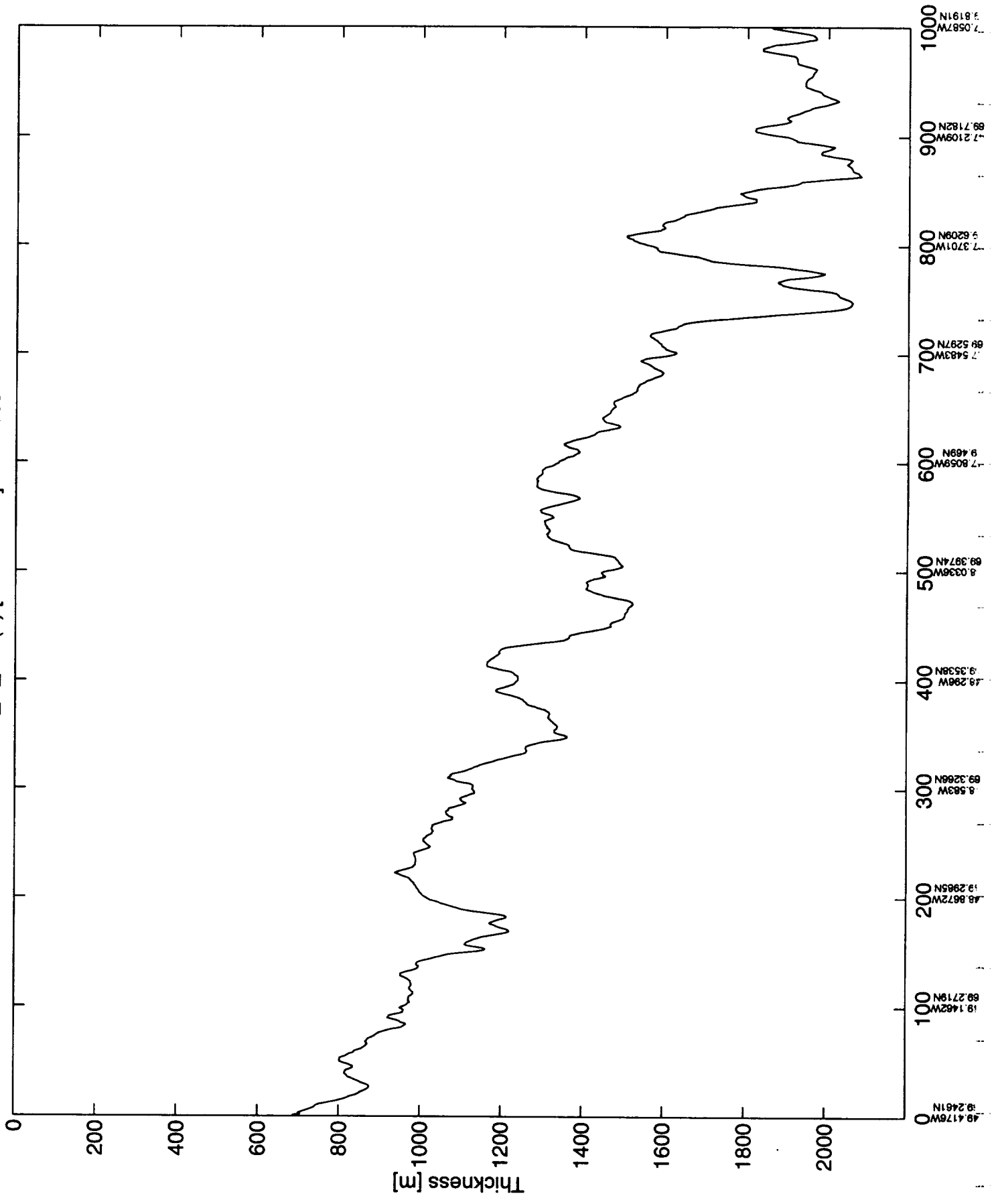
run_5l_3.1 (1) [0-1000] thickness

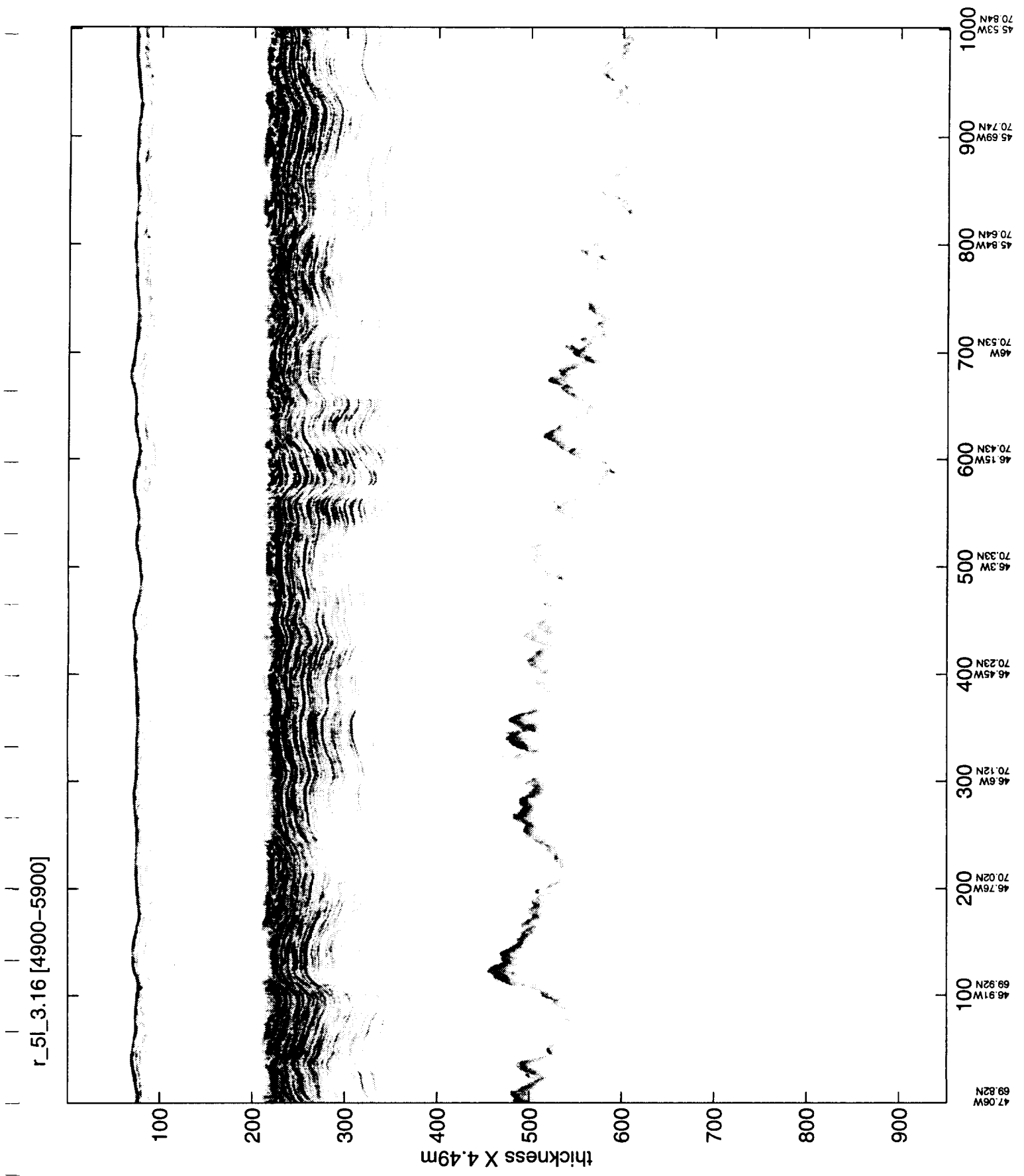


r_5l_3.15 [3900-4900]



run_5l_3.1 (5) [3900-4900] thickness

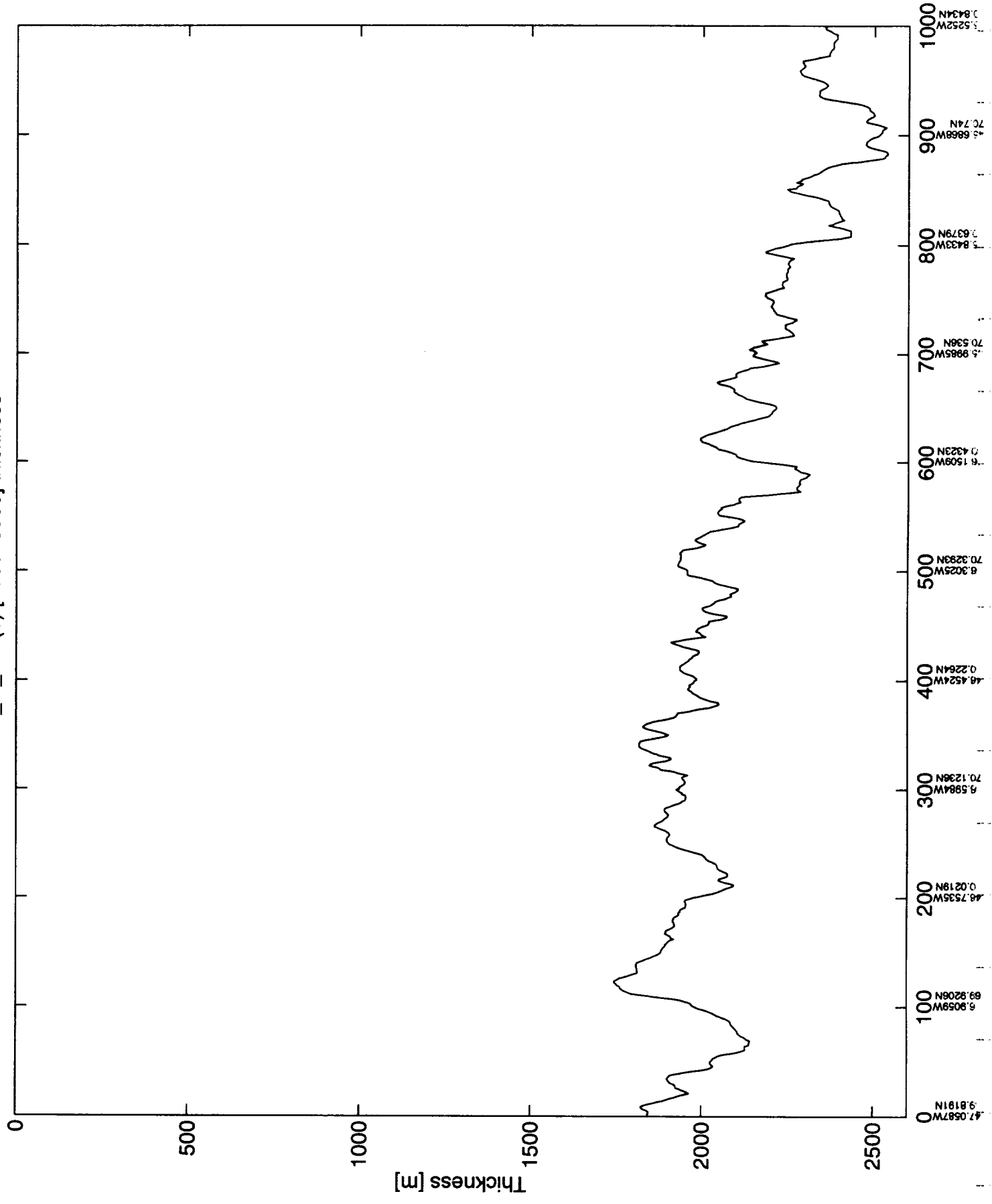




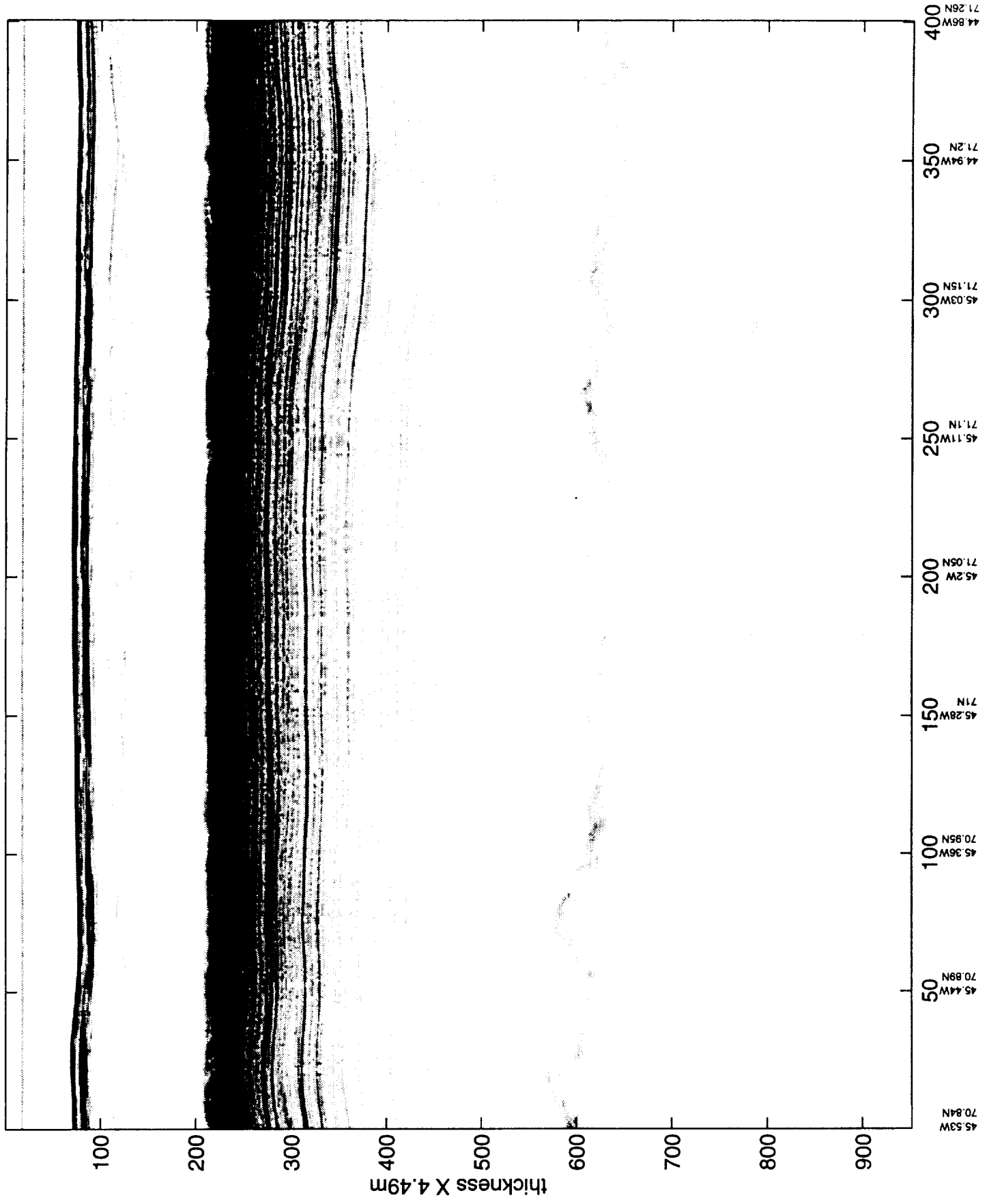
r_5l_3.16 [4900-5900]

thickness X 4.49m

run_5[3.1 (6) [4900-5900] thickness

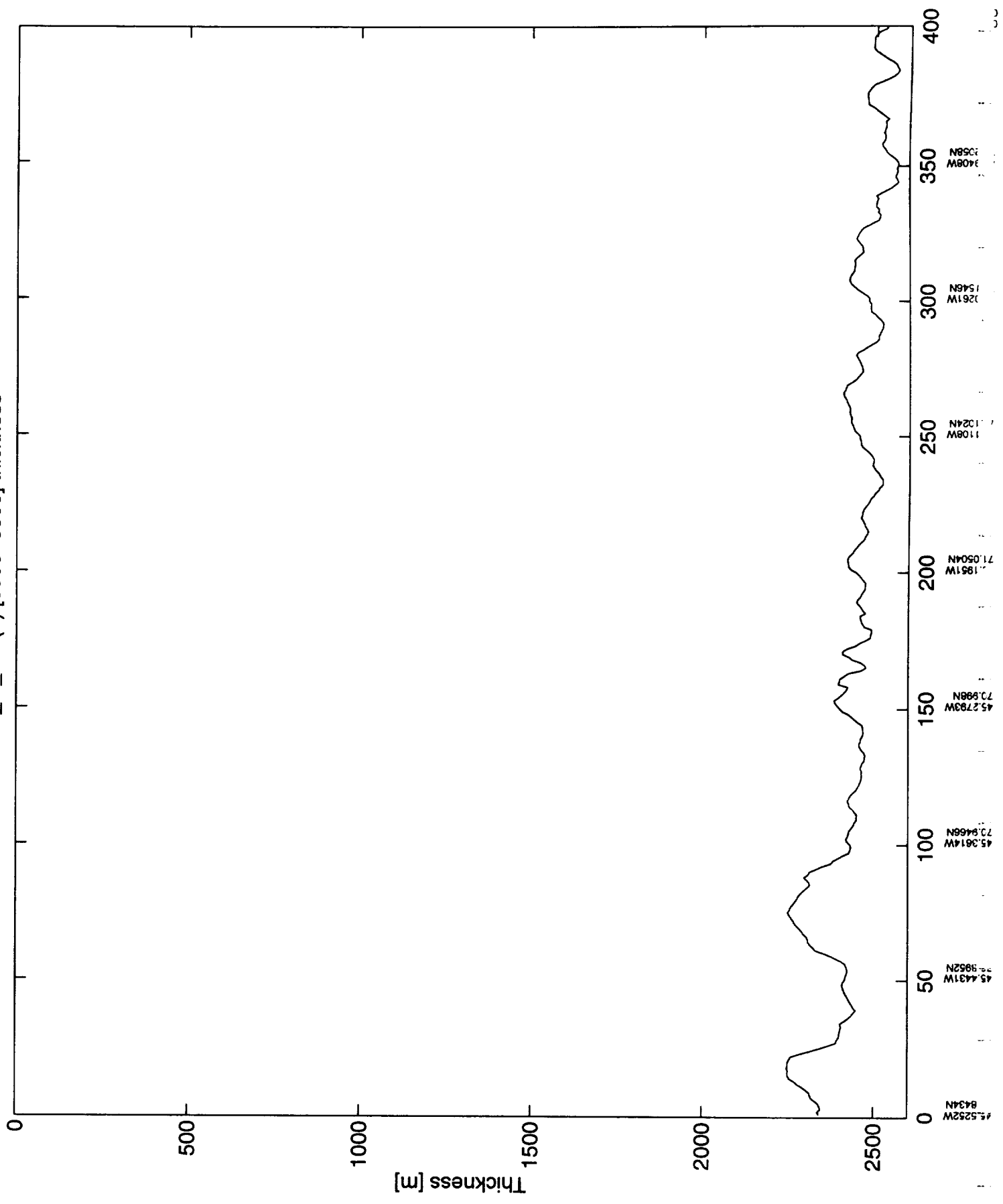


r_5|_3.17 [5900-6300]

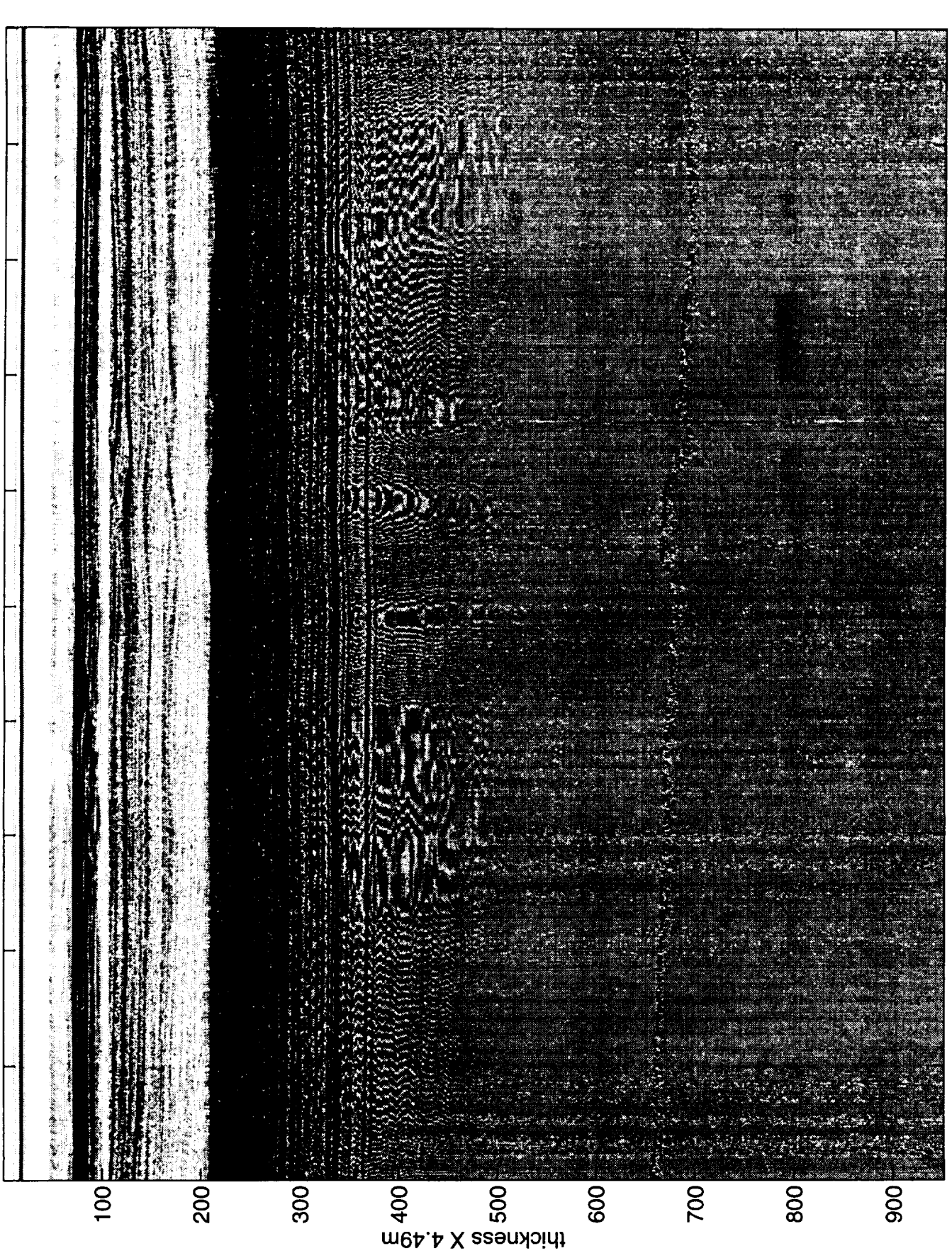


45.53W 70.84N
45.44W 70.89N
45.36W 70.85N
45.28W 71N
45.2W 71.05N
45.17W 71.1N
45.03W 71.15N
44.94W 71.2N
44.86W 71.26N

run_5l_3.1 (7) [5900-6300] thickness

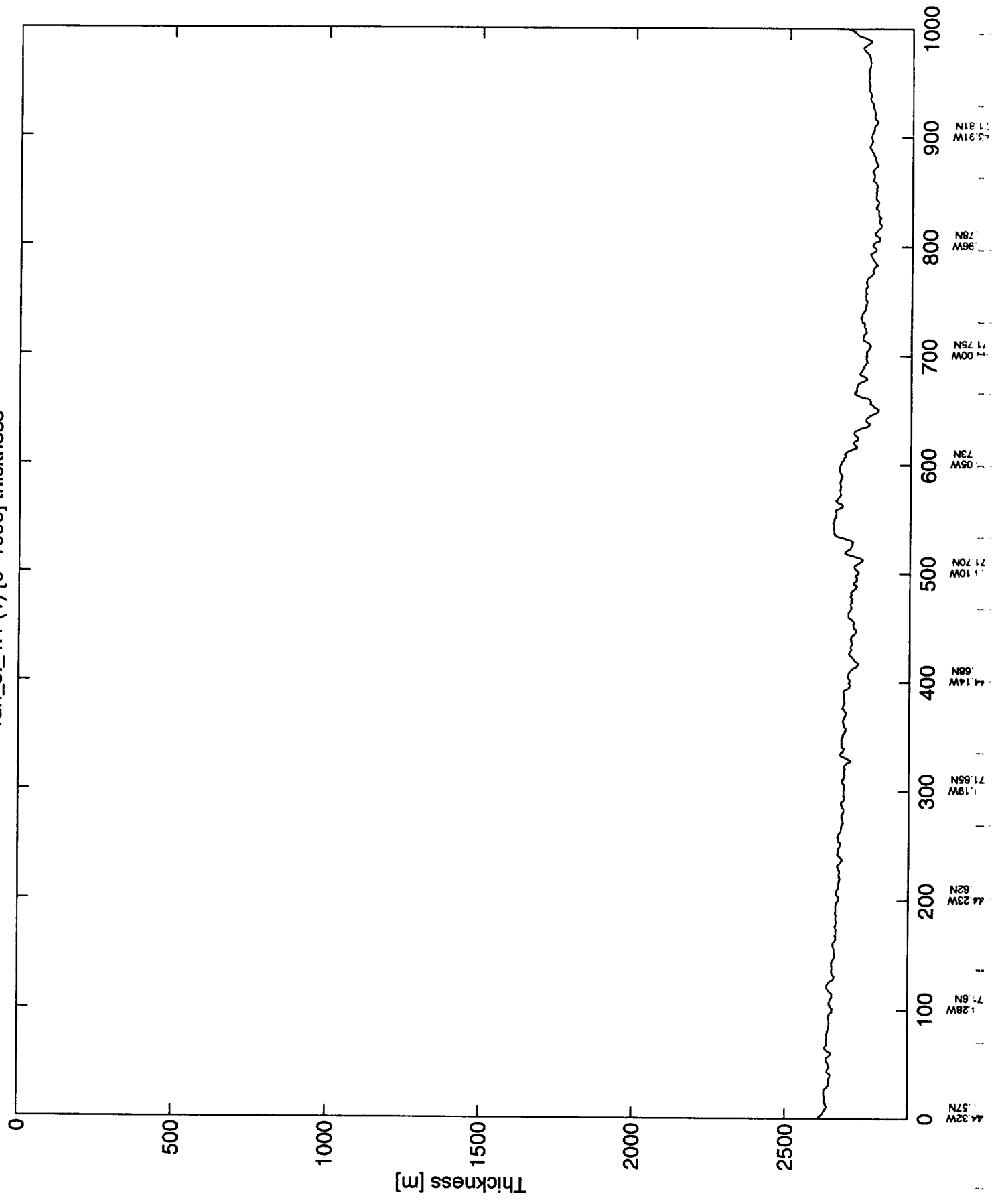


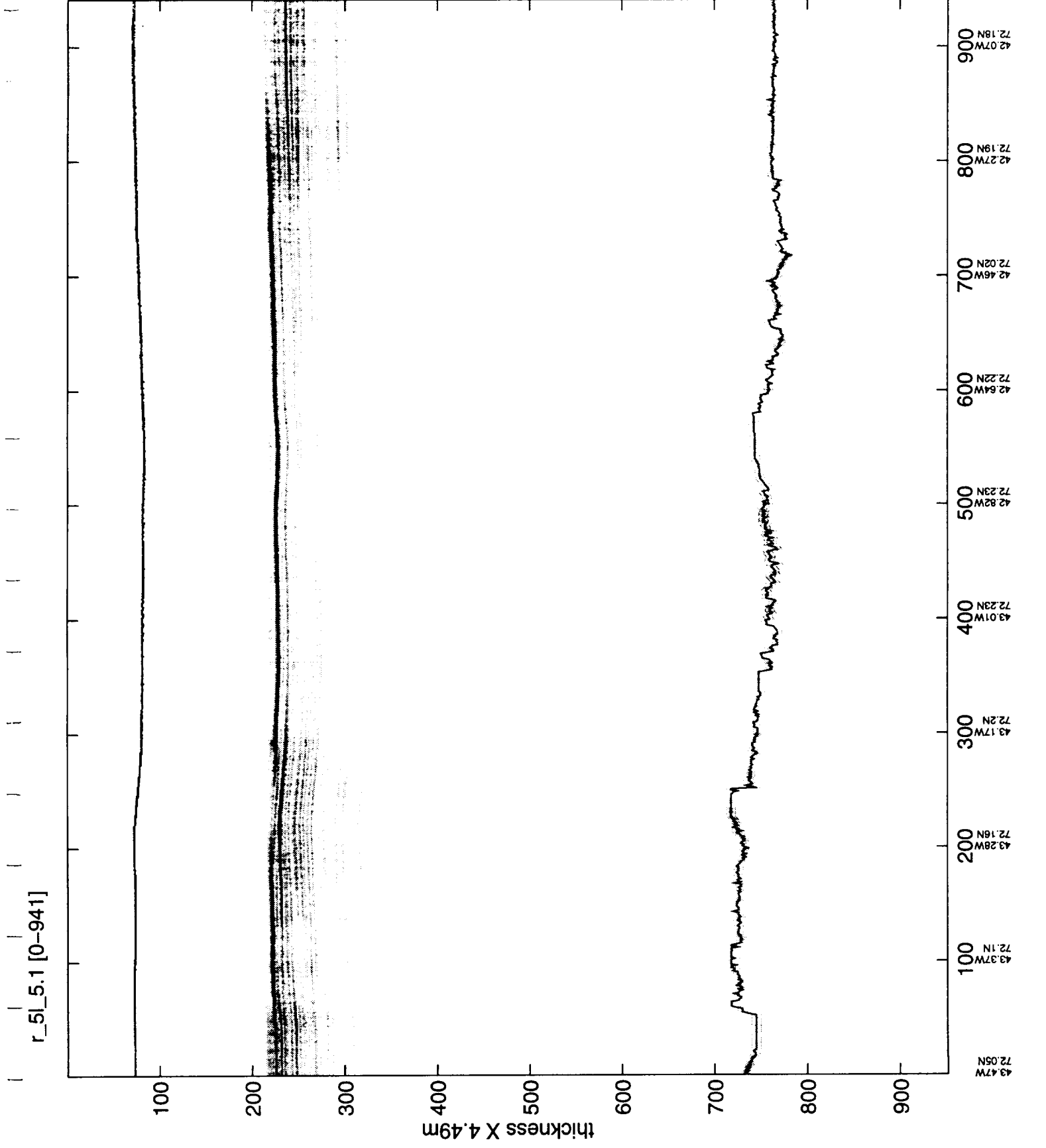
r_5l_4.11 [0-1000]



44.32W 71.57N
44.28W 71.6N
44.23W 71.62N
44.19W 71.65N
44.14W 71.68N
44.1W 71.7N
44.05W 71.73N
44W 71.75N
43.96W 71.78N
43.91W 71.81N
43.87W 71.83N

run_5l_4.1 (1) [0-1000] thickness



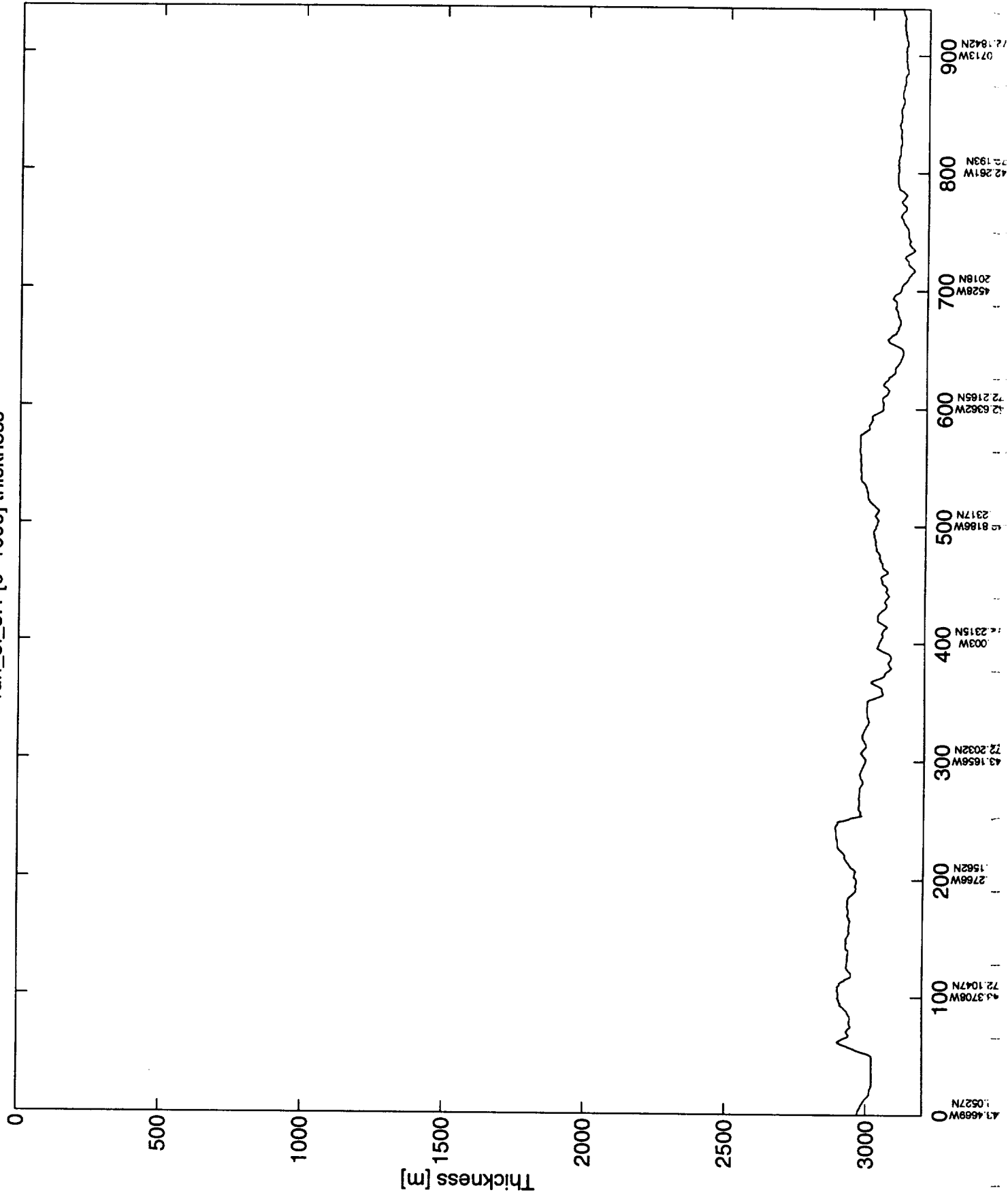


r_5|_5.1 [0-941]

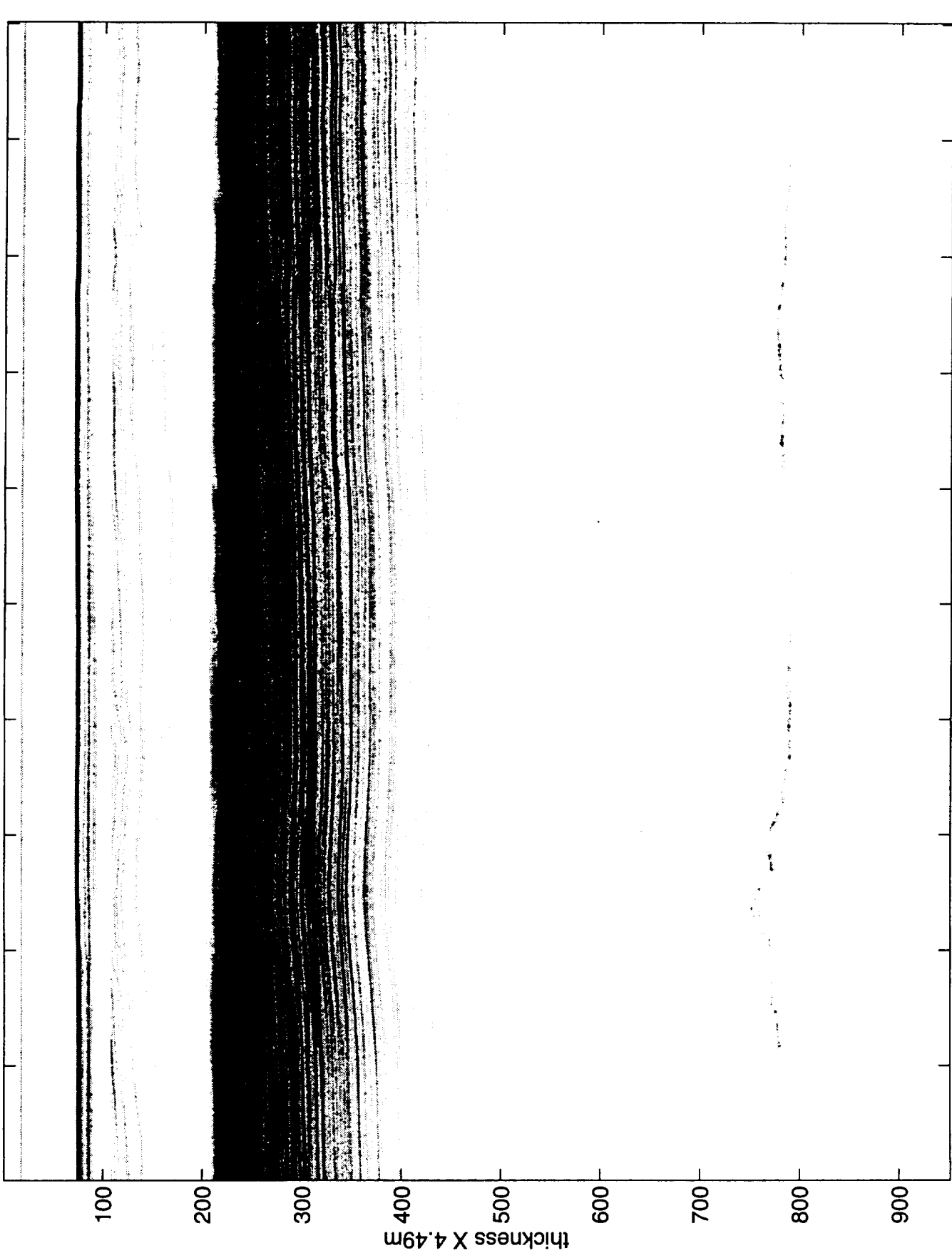
thickness X 4.49m

43.47W 72.05N
43.37W 72.1N
43.28W 72.16N
43.17W 72.2N
43.01W 72.23N
42.82W 72.23N
42.64W 72.22N
42.46W 72.02N
42.27W 72.19N
42.07W 72.18N

run_5l_5.1 [0-1000] thickness

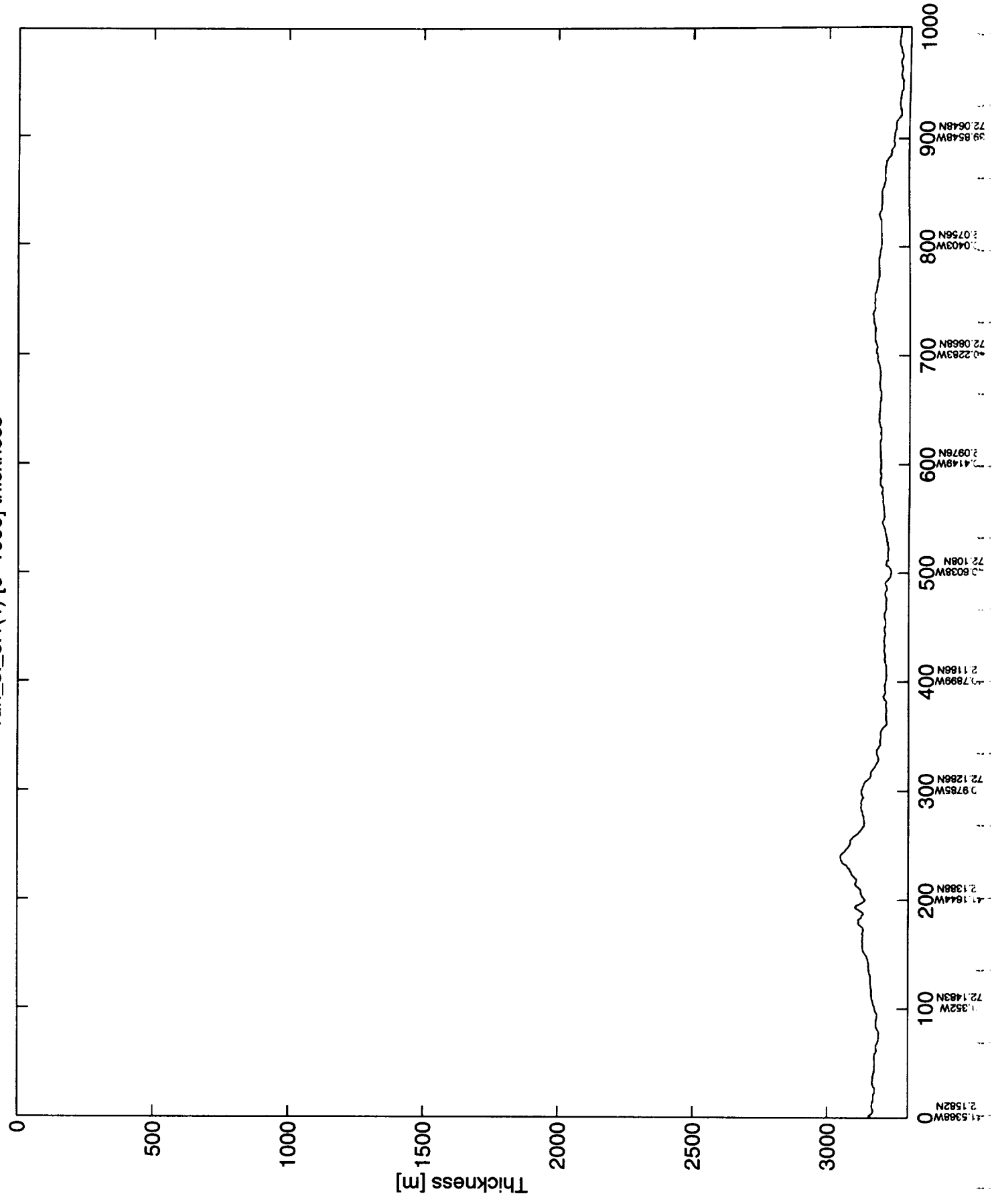


r_5l_6.11 [0-1000]

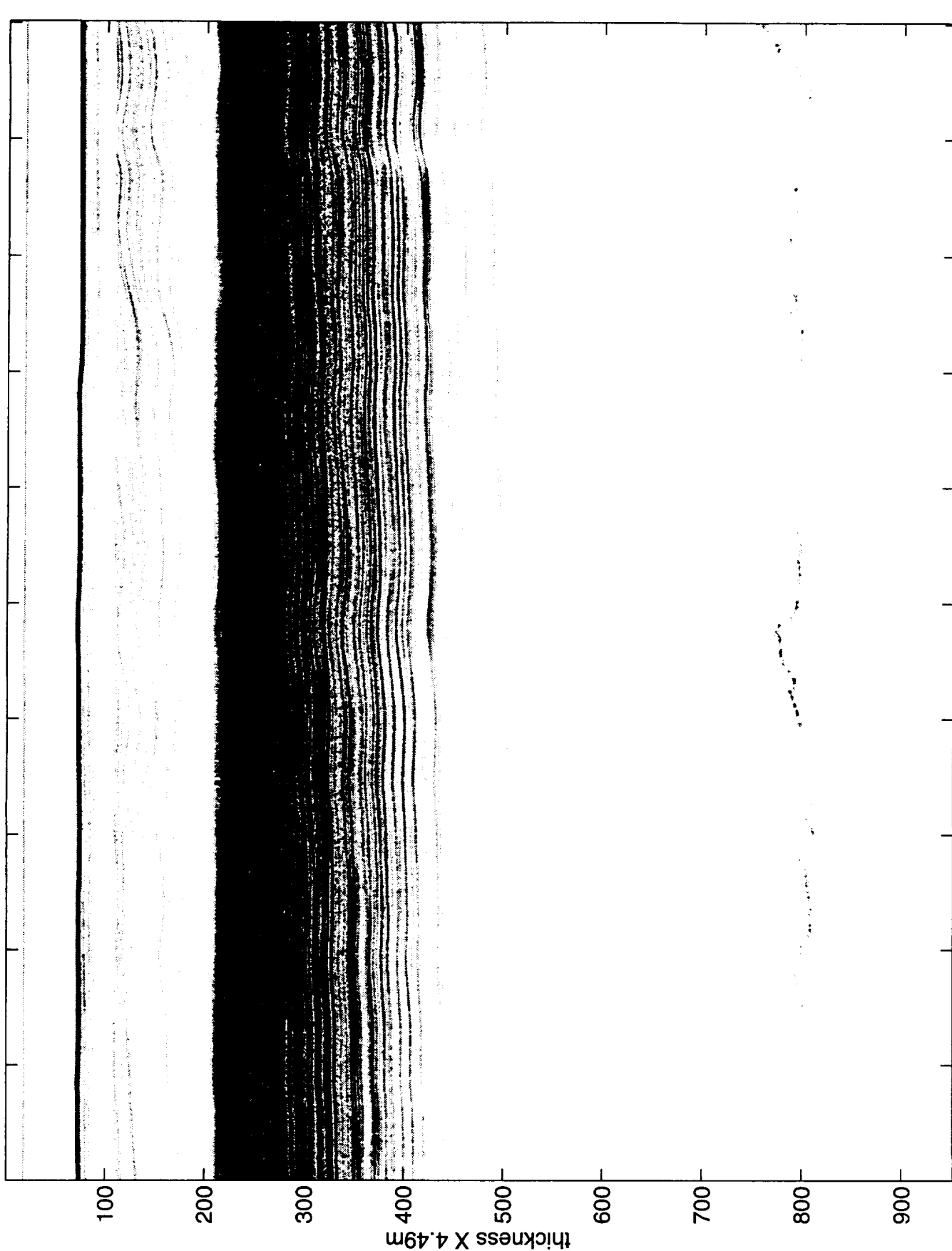


41.54W 72.16N
41.55W 72.15N
41.17W 72.14N
40.98W 2.975N
40.79W 72.12N
40.61W 72.11N
40.42W 72.1N
40.23W 72.09N
40.04W 72.08N
39.86W 72.07N
39.67W 72.05N

run_5L_6.1(1) [0-1000] thickness

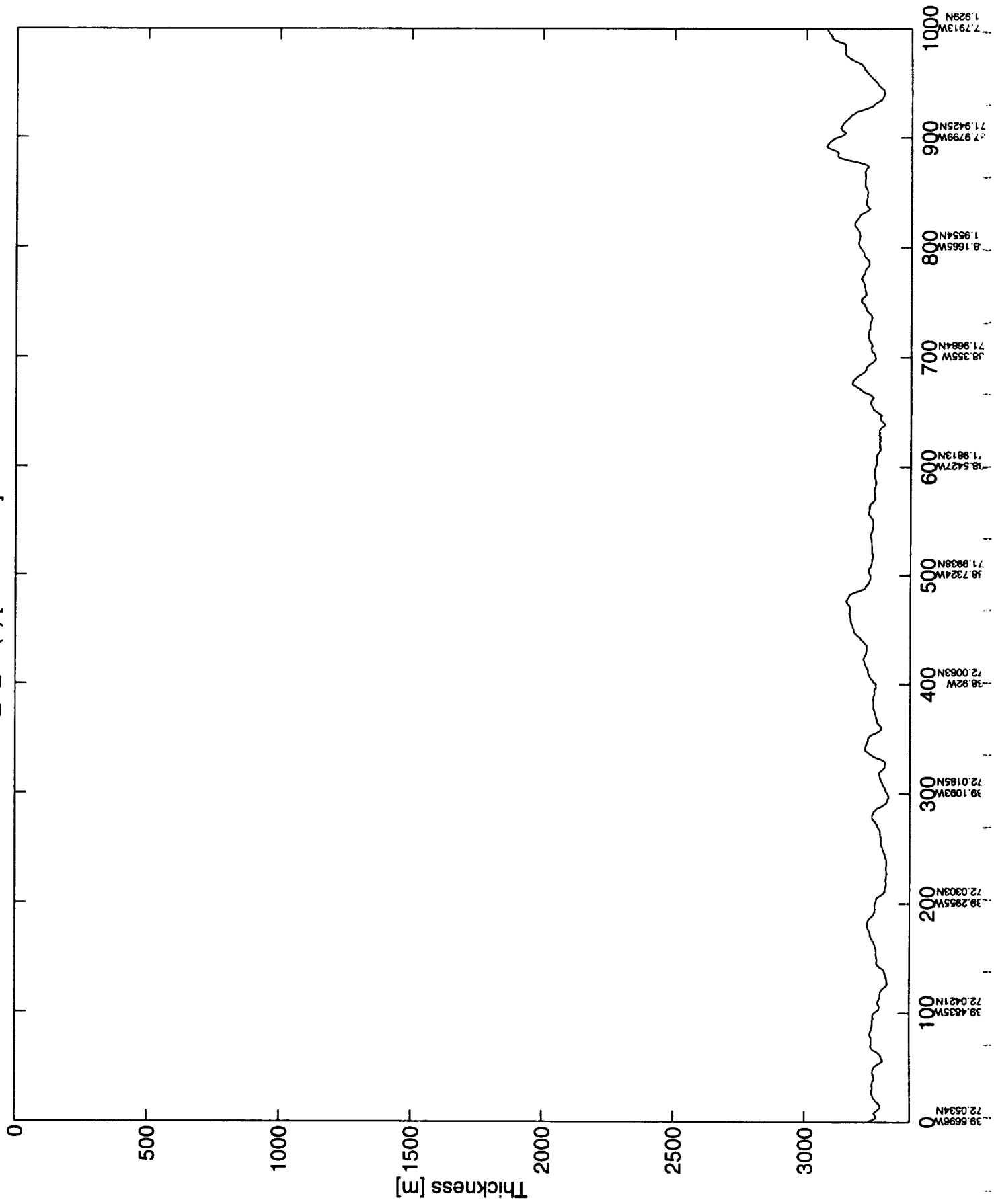


r_5l_6.12 [1000-2000]

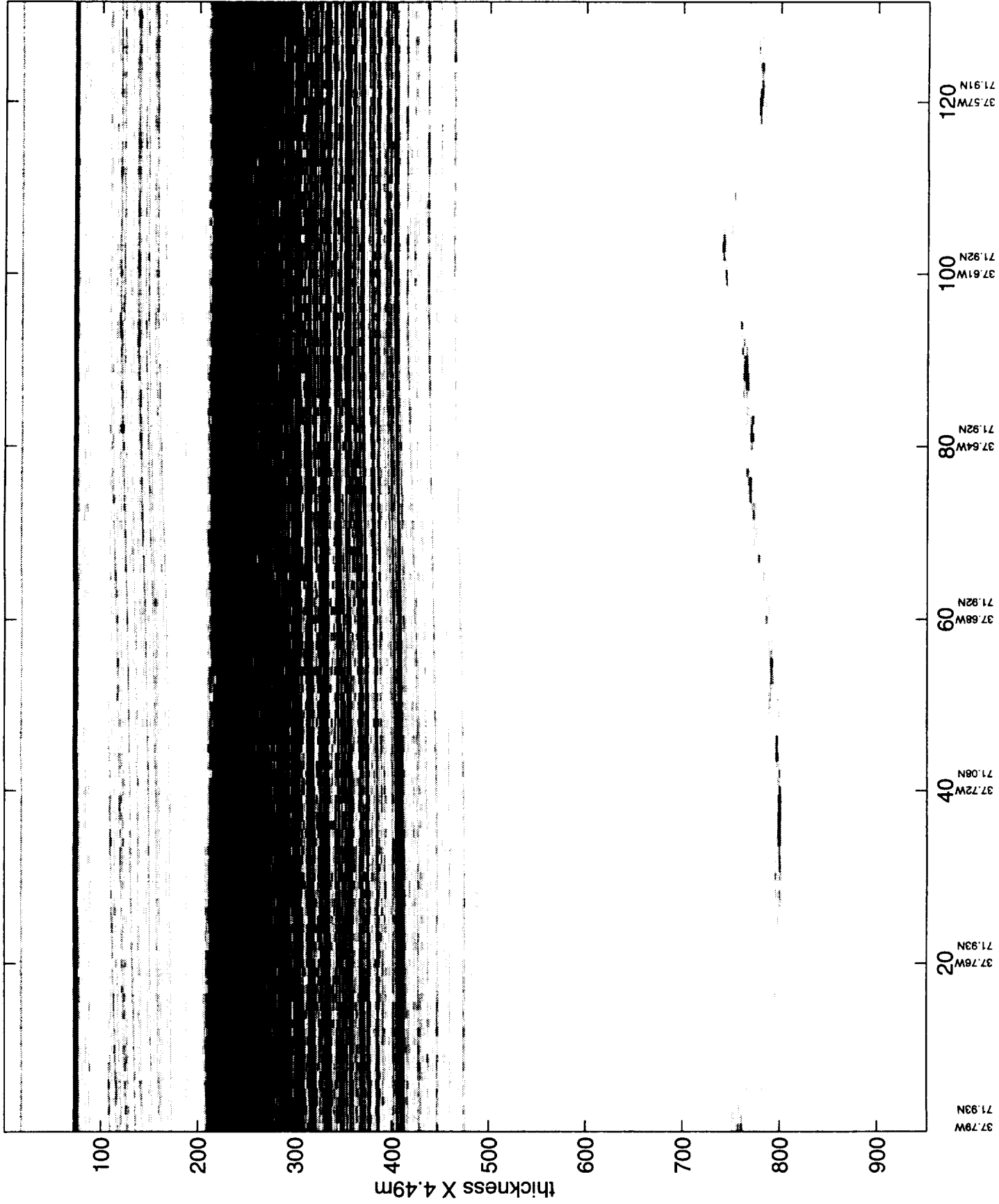


37.93N
37.98W
71.94N
38.17W
71.96N
38.36W
71.97N
38.54W
71.98N
38.73W
71.99N
72.01N
38.92W
72.02N
39.11W
72.02N
72.03N
39.3W
72.03N
72.04N
39.49W
72.05N
39.67W
72.05N

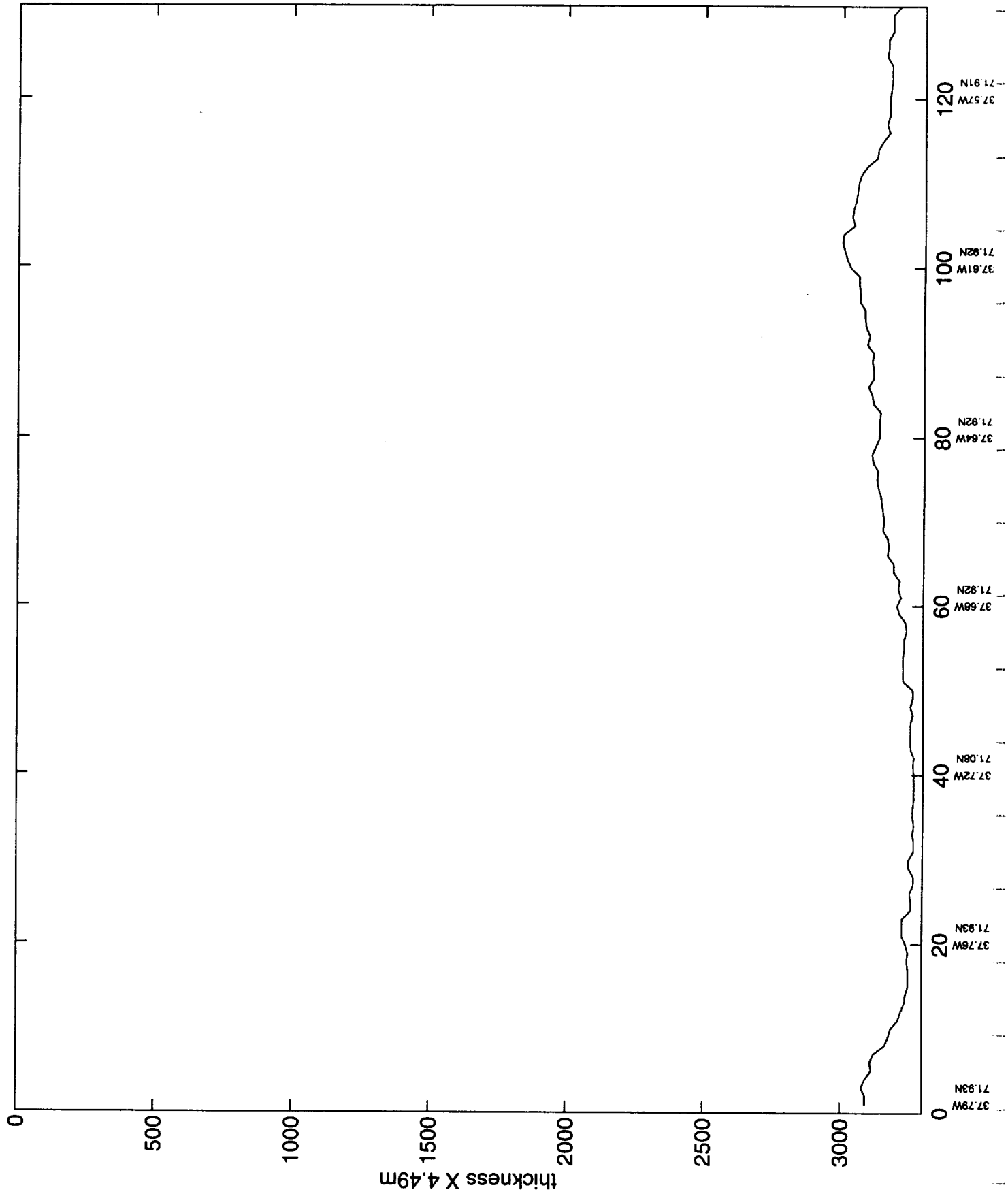
run_5l_6.1(2) [1000-2000] thickness



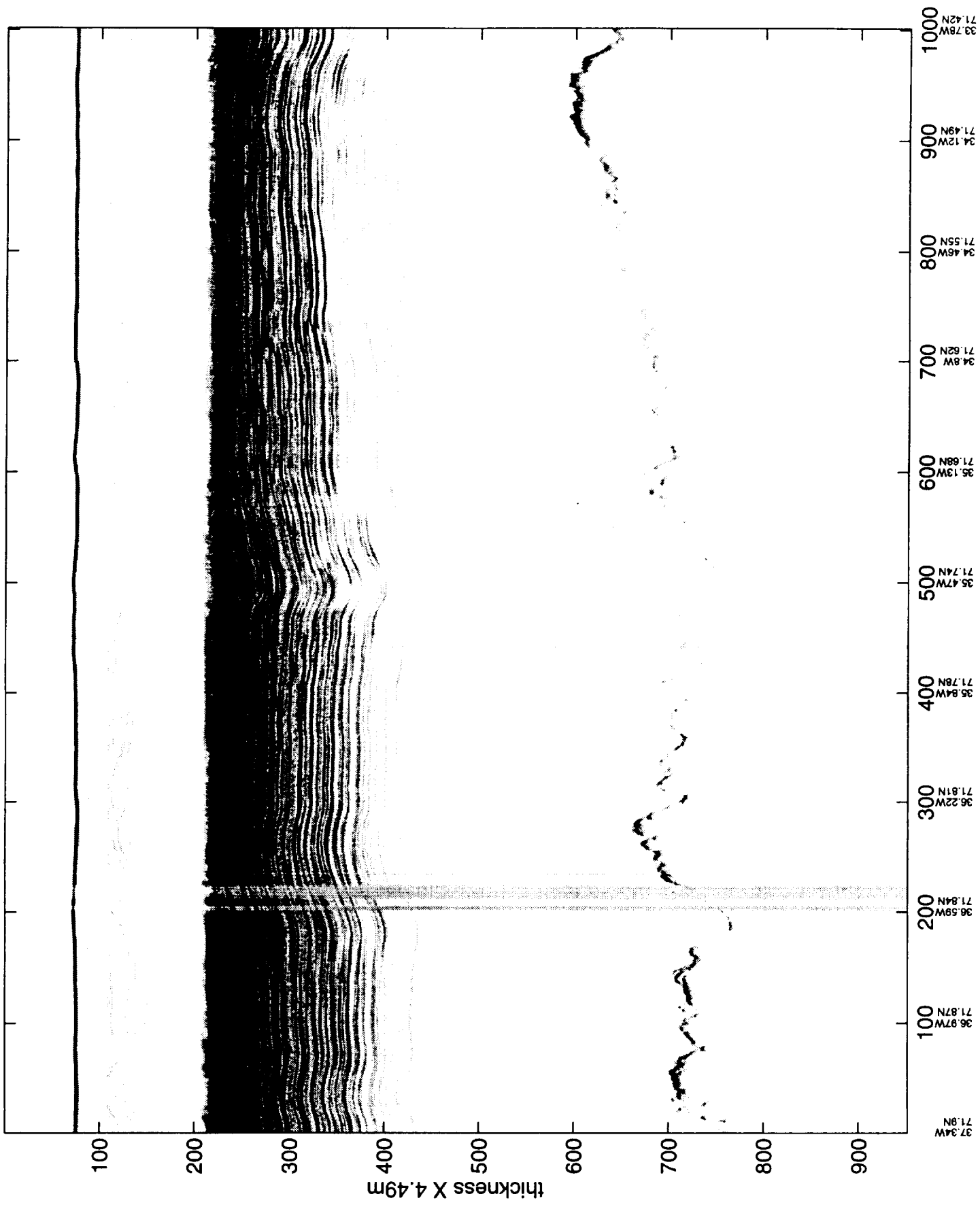
r_5l_6.13 [2000-2131]



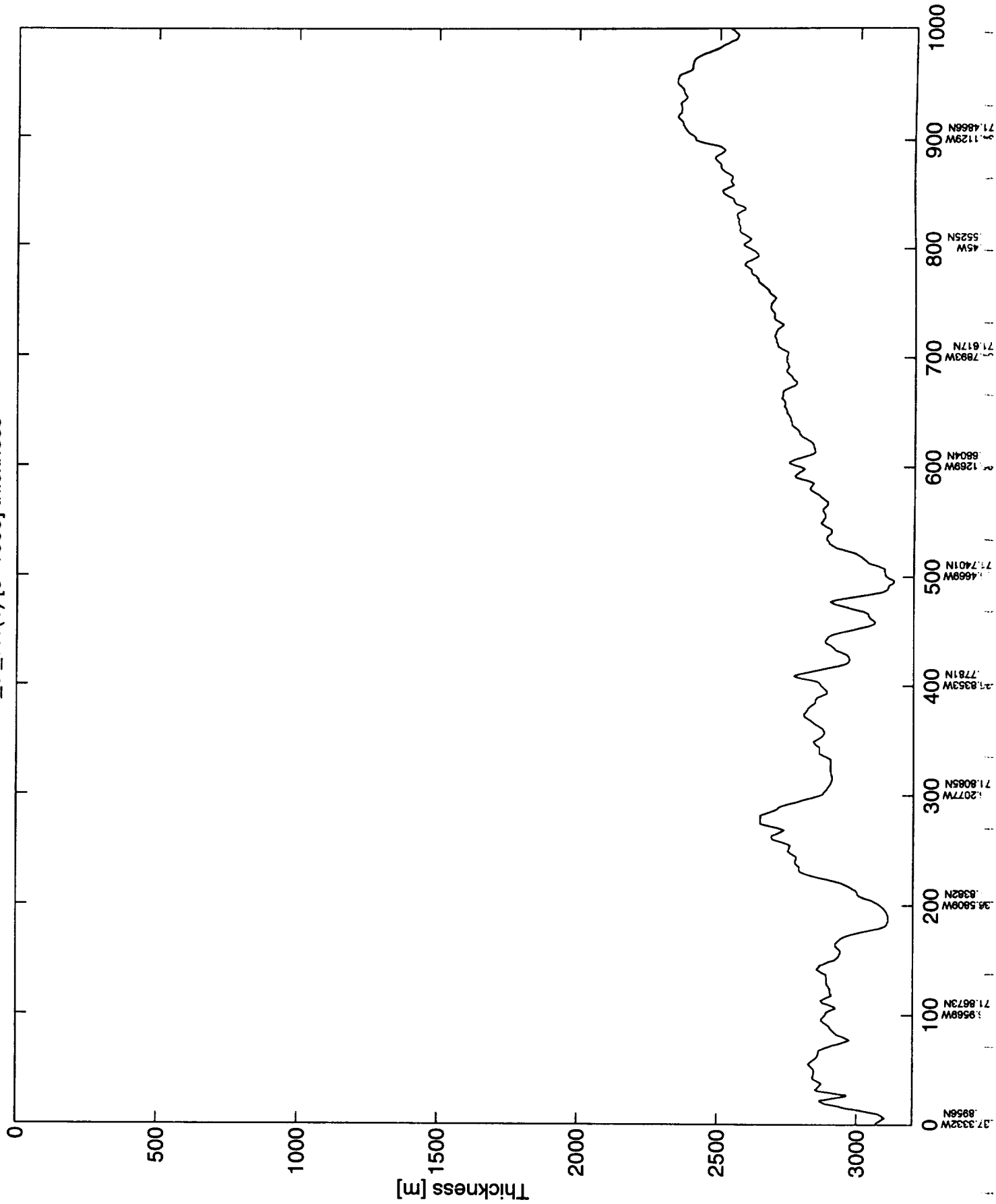
r_5l_6.13 [2000-2131] thickness



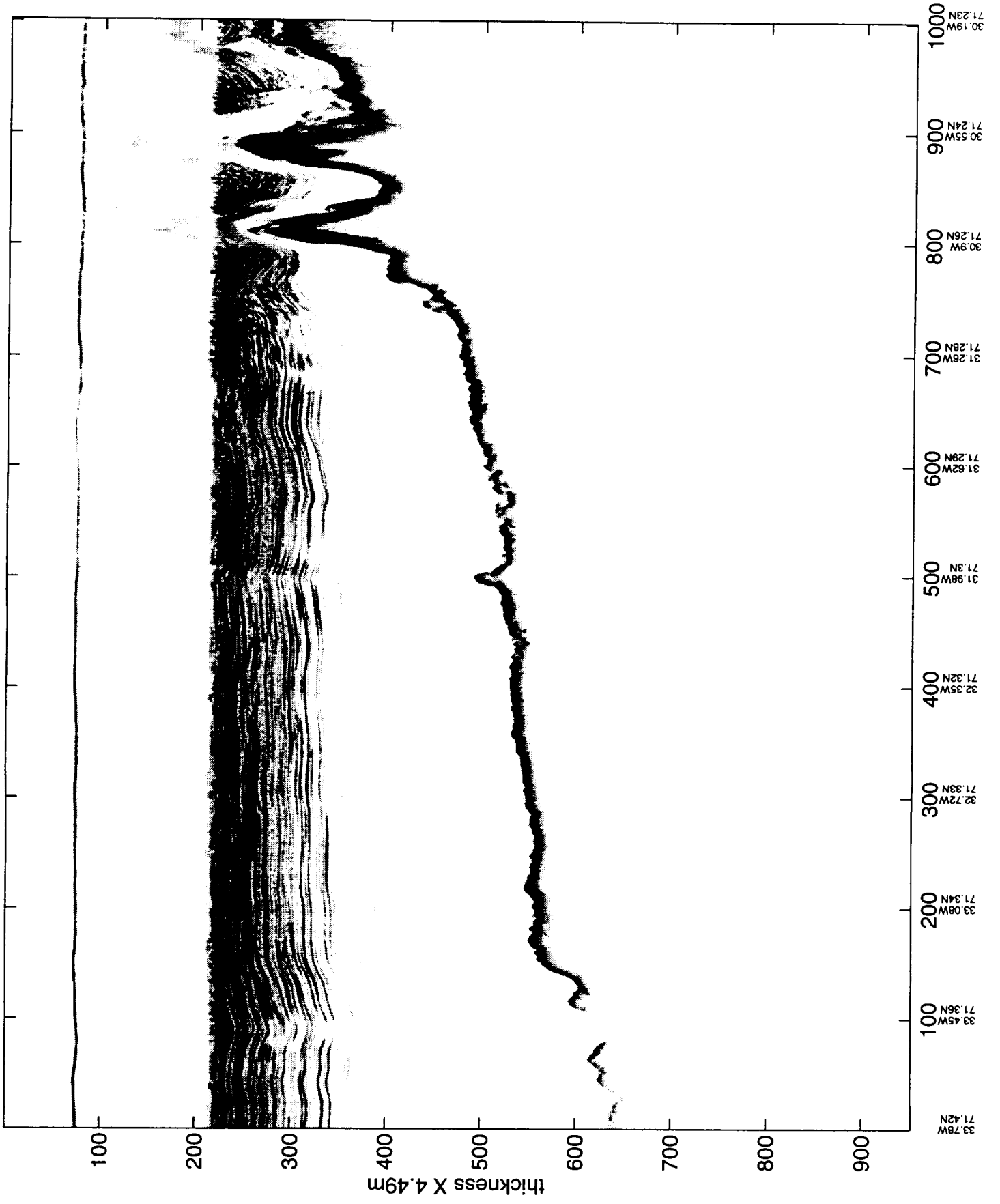
r_5L7.11 [0-1000]



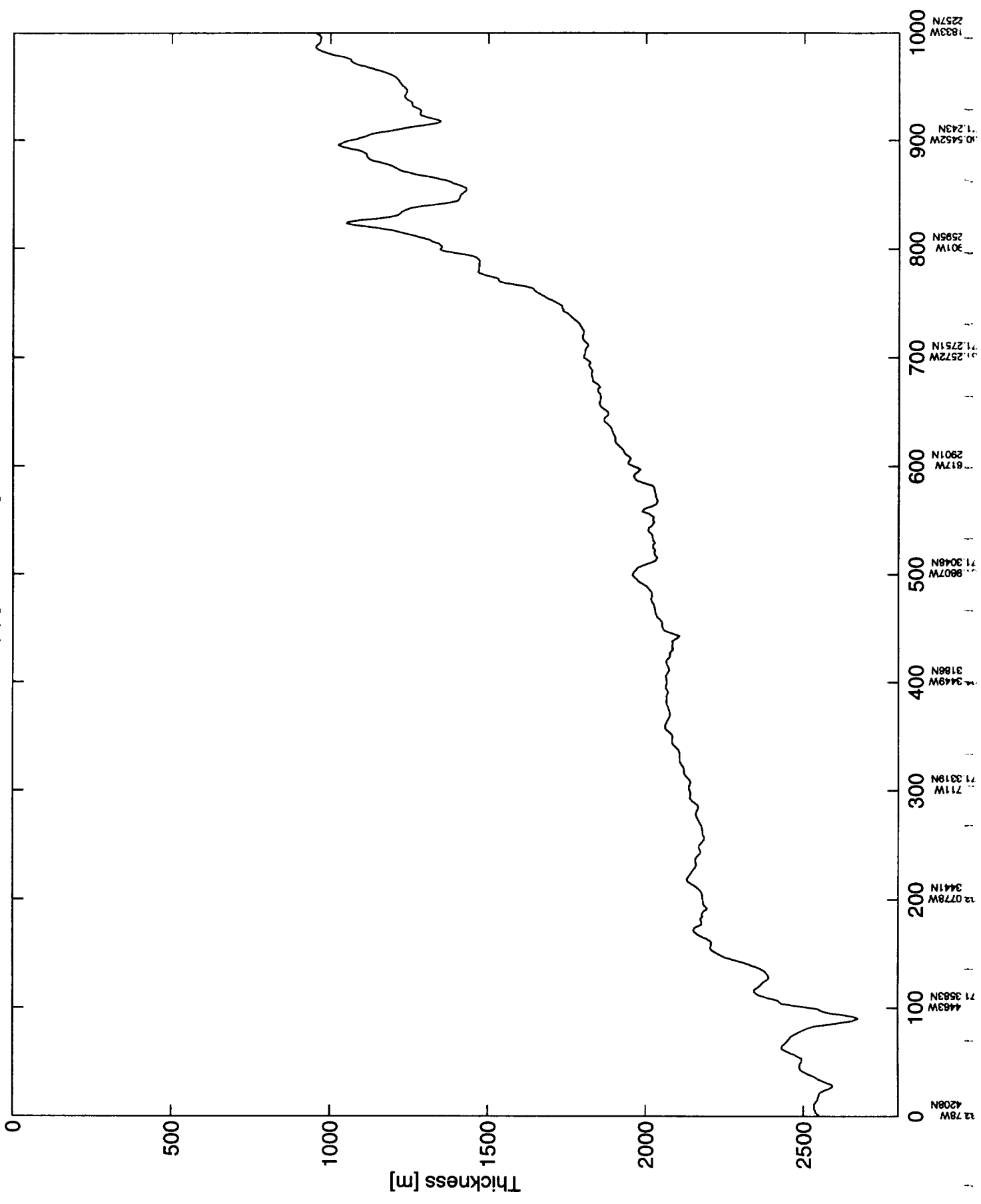
run_5L_7.1(1) [0-1000] thickness

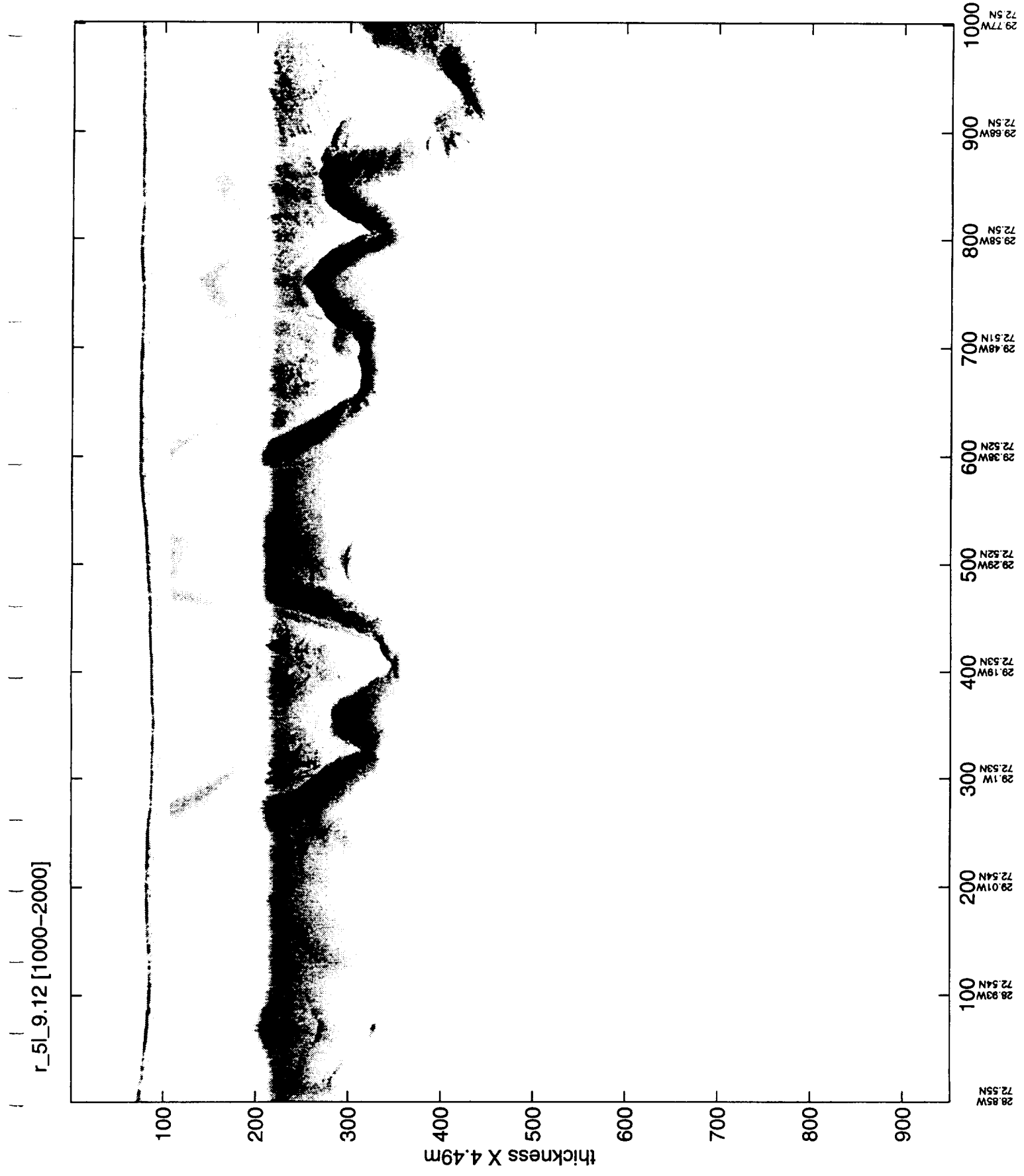


r_5l_7.12 [1000-2000]



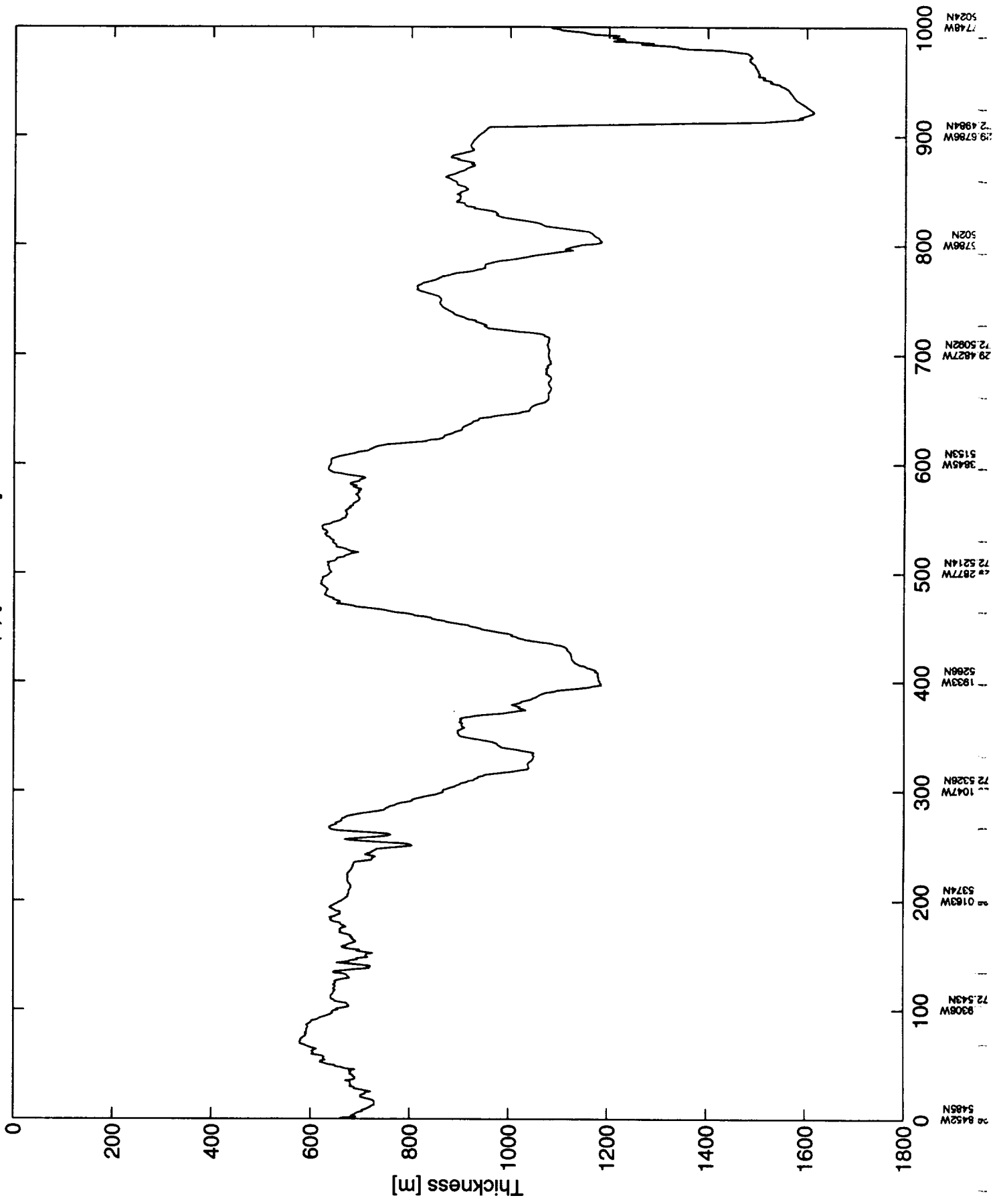
run_5l_7.1(2) [1000-2000] thickness



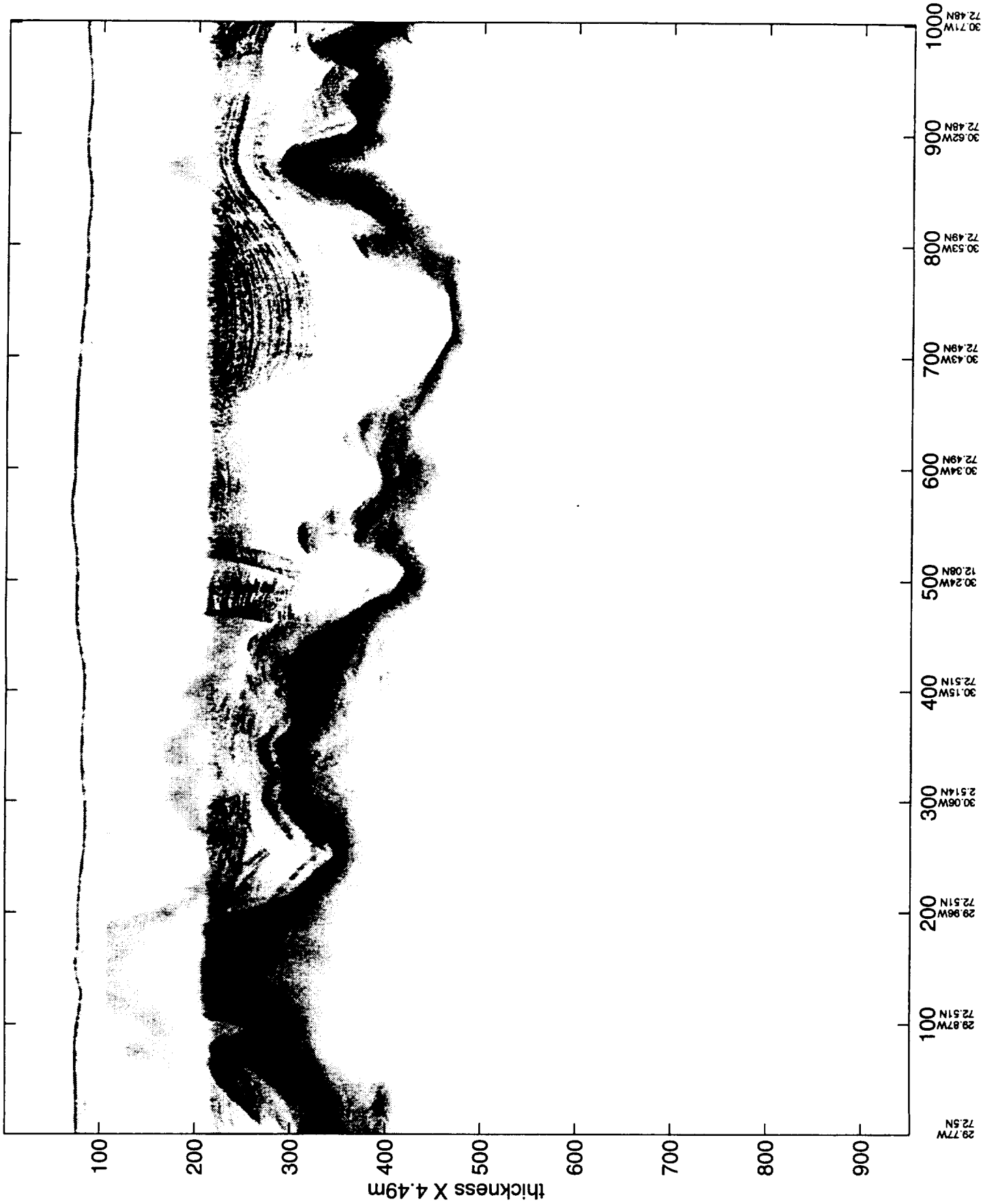


r_5|_9.12 [1000-2000]

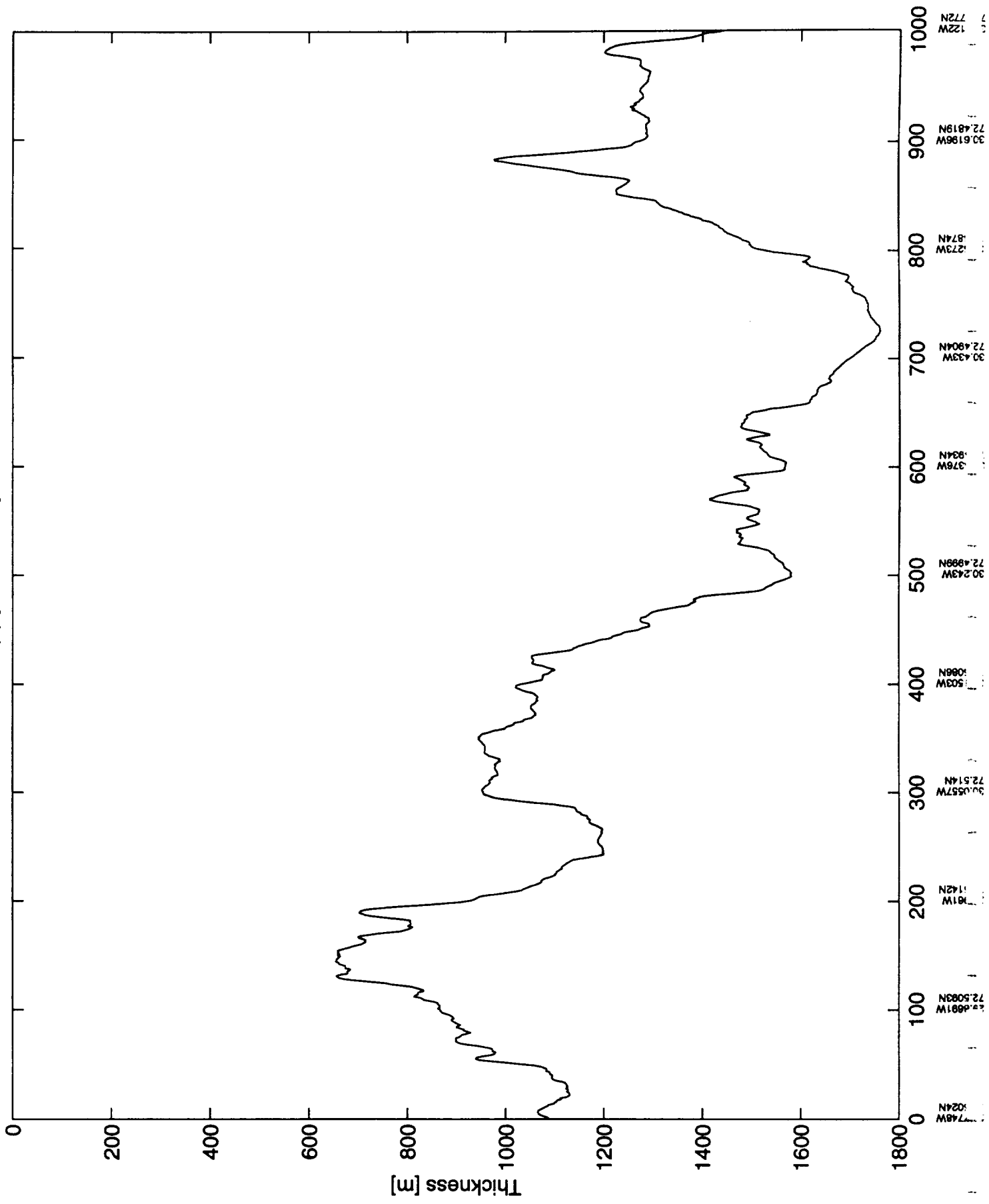
run_5l_9.1(2) [1000-2000] thickness



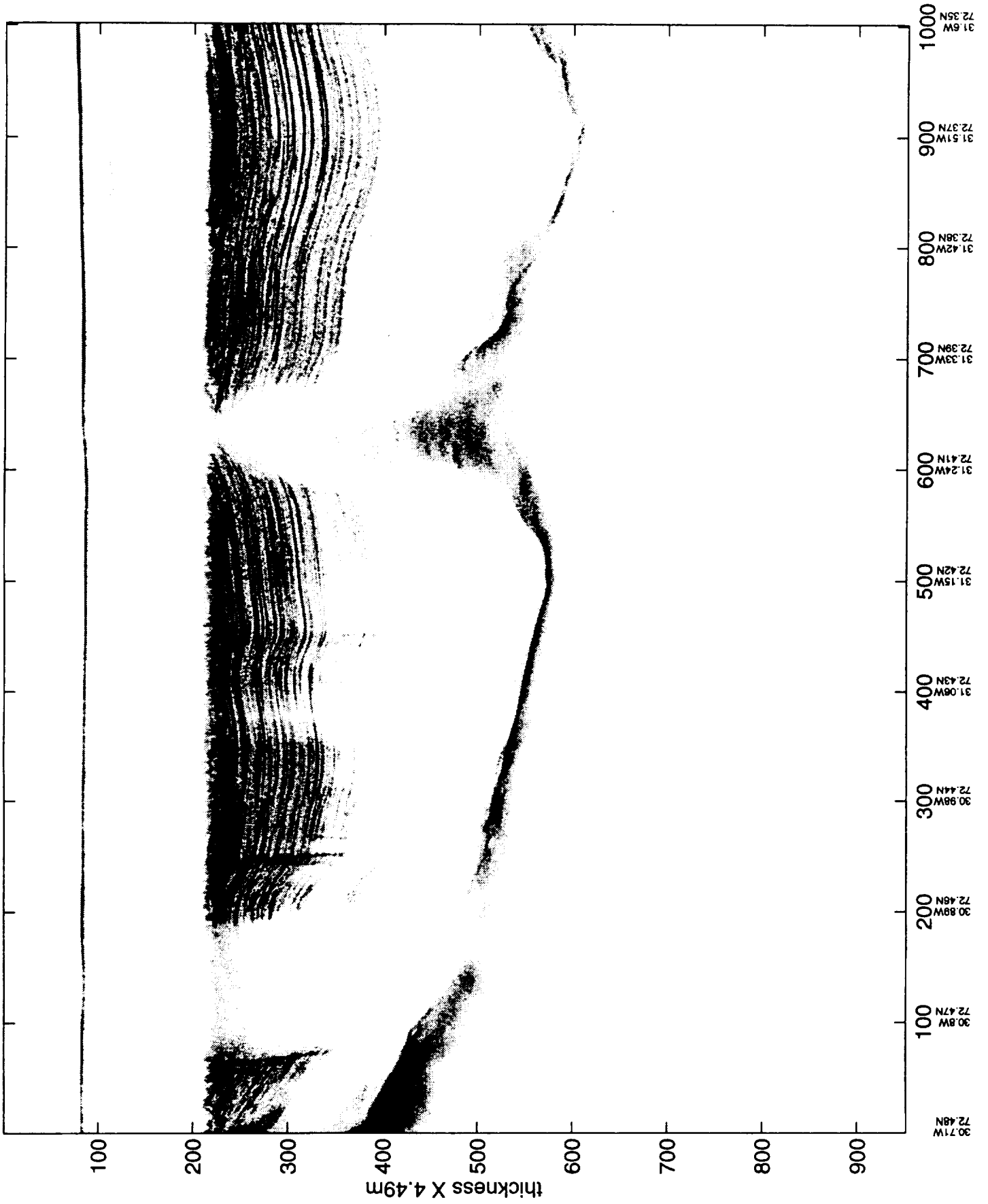
r_5l_9.13 [2000-3000]



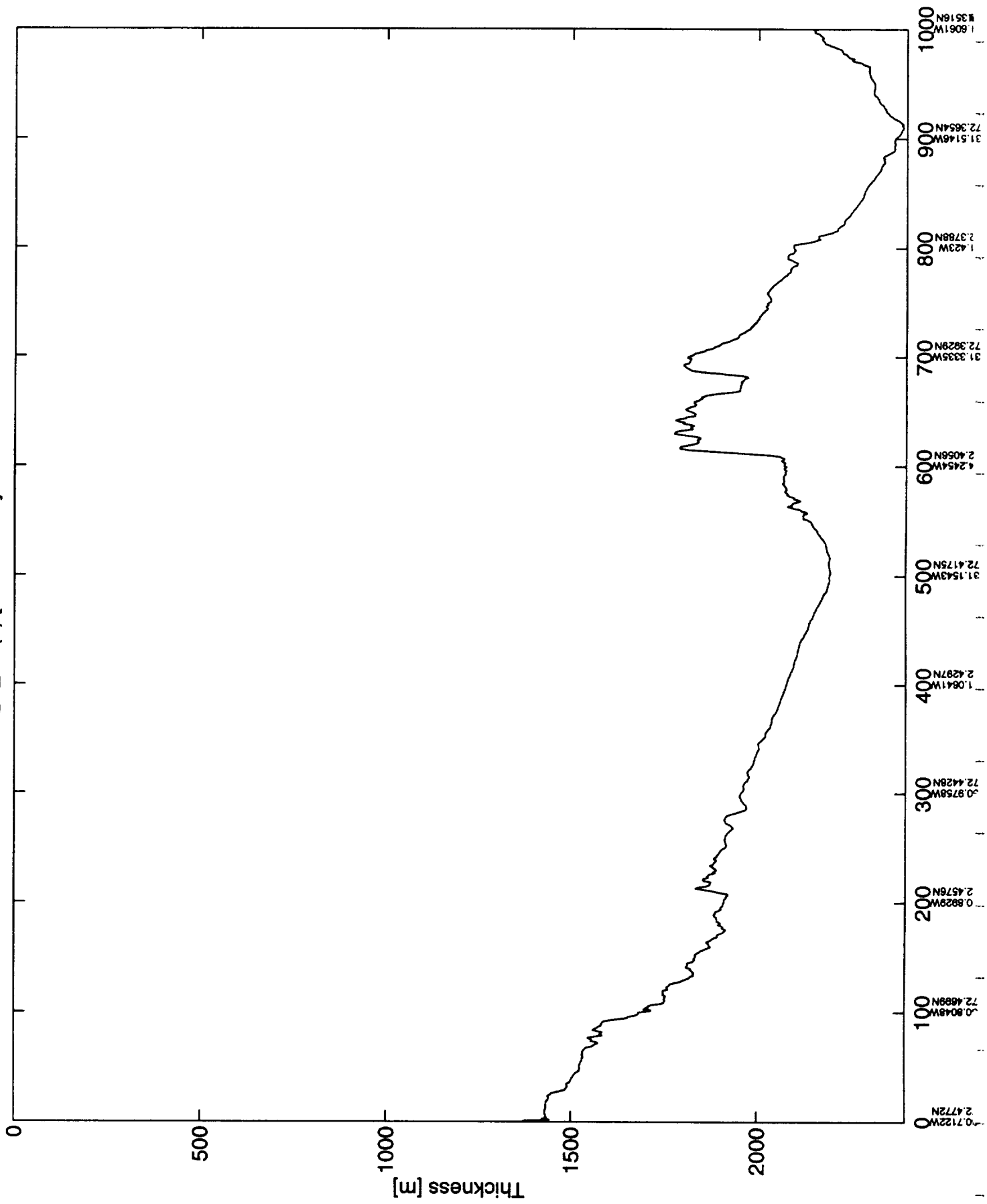
run_5l_9.1(3) [2000-3000] thickness



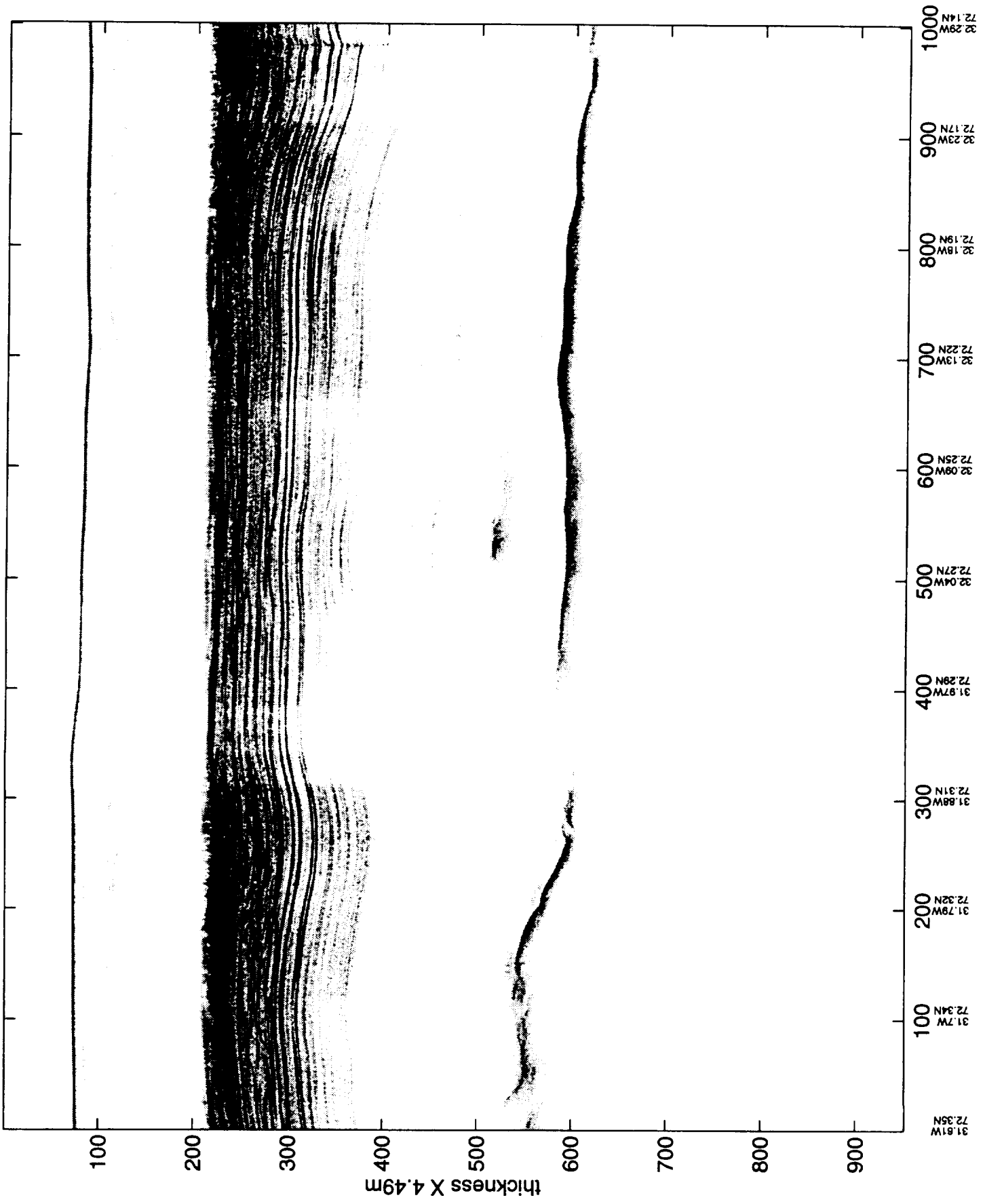
r_5l_9.14 [3000-4000]



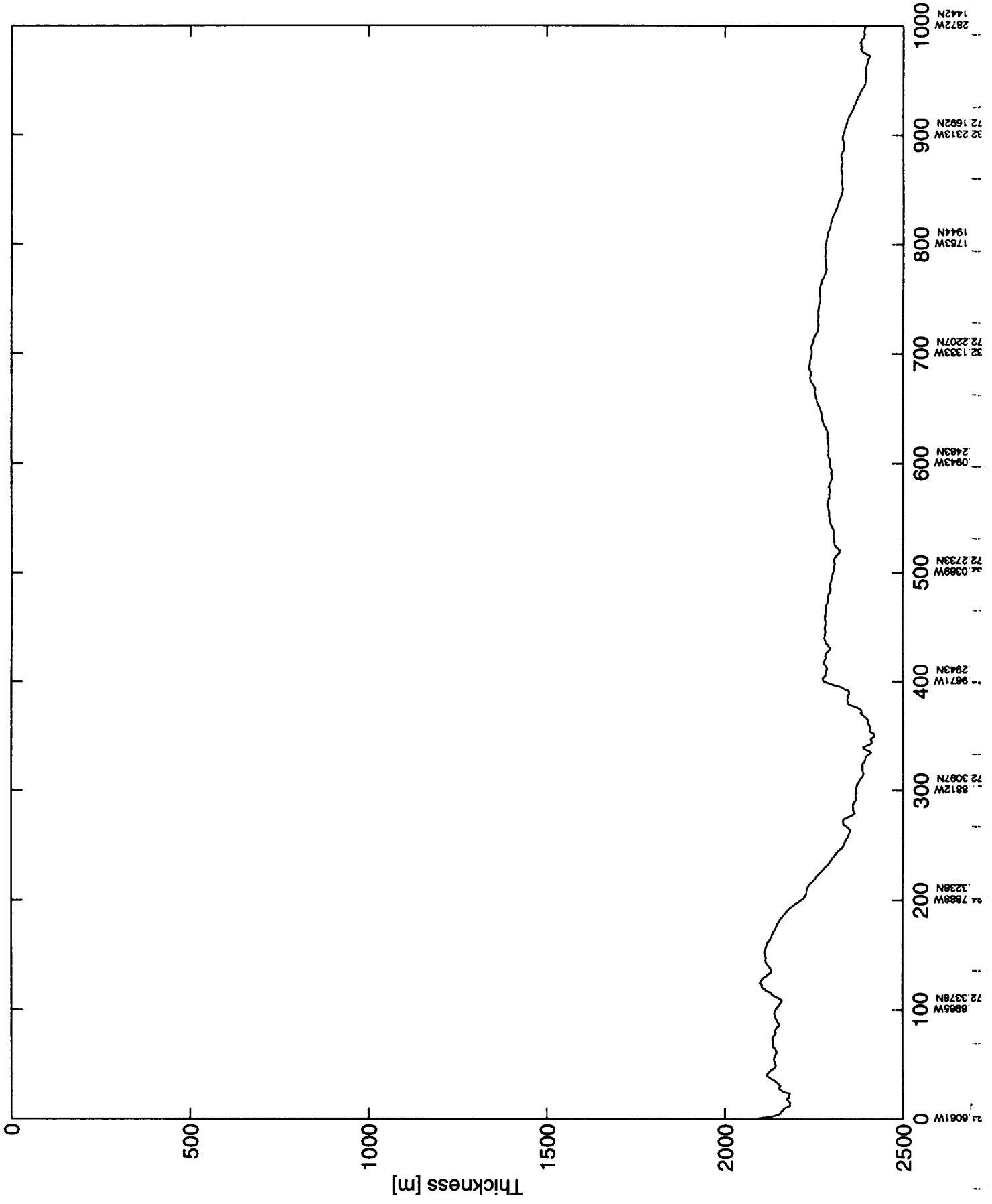
run_5L_9.1(4) [3000-4000] thickness



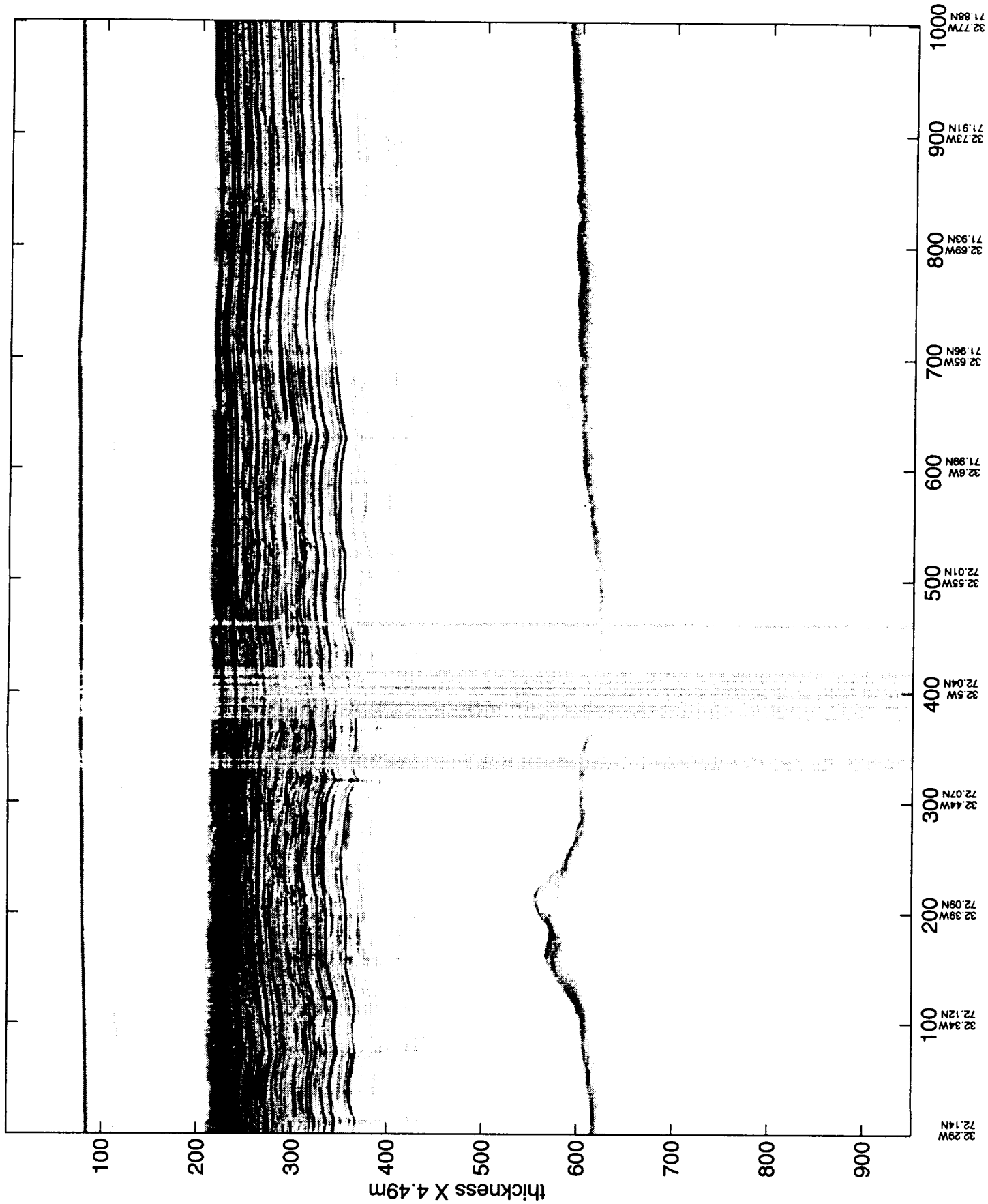
r_5l_9.15 [4000-5000]



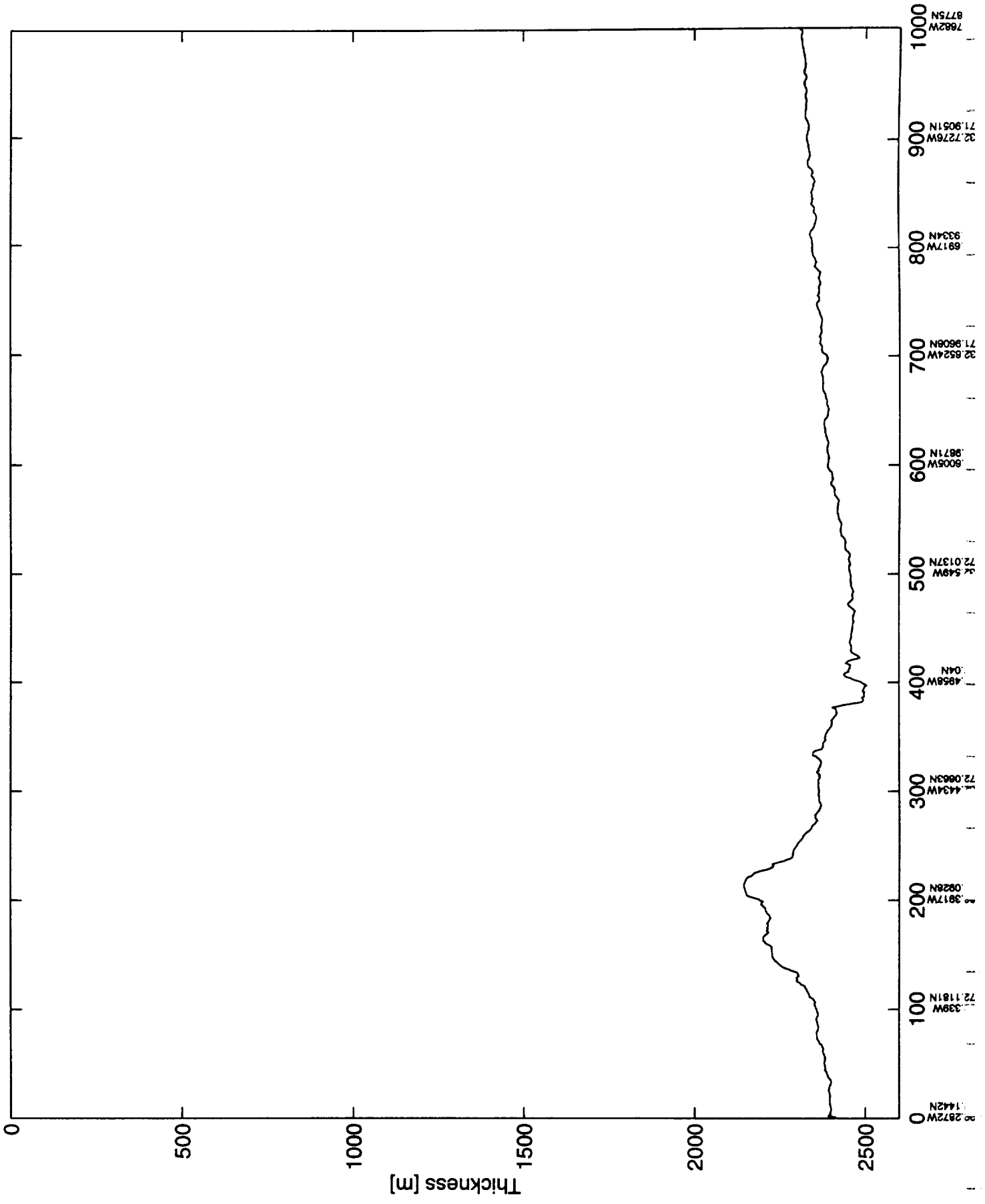
run_5|_9.1 (5) [4000-5000] thickness



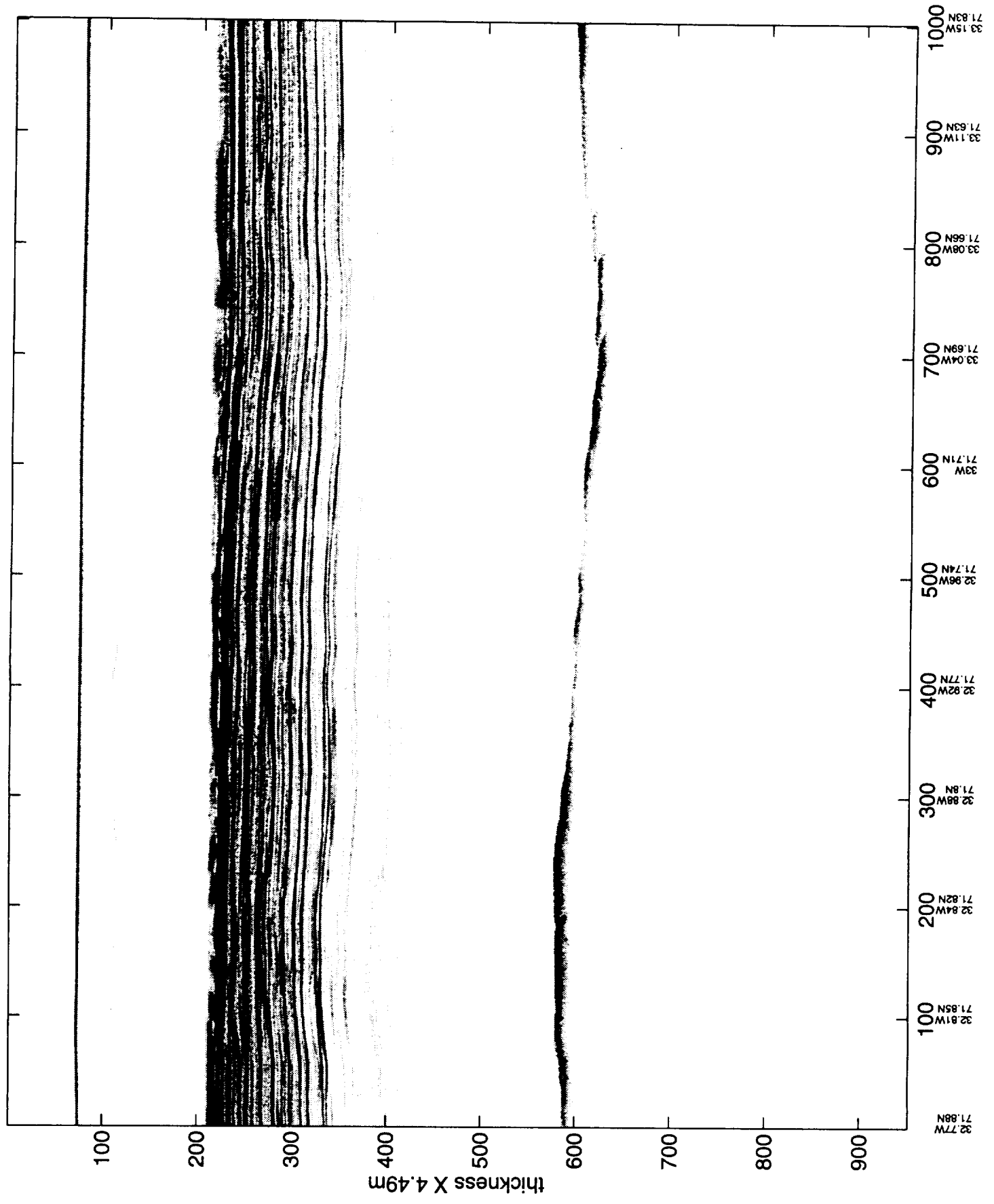
r_5l_9.16 [5000-6000]



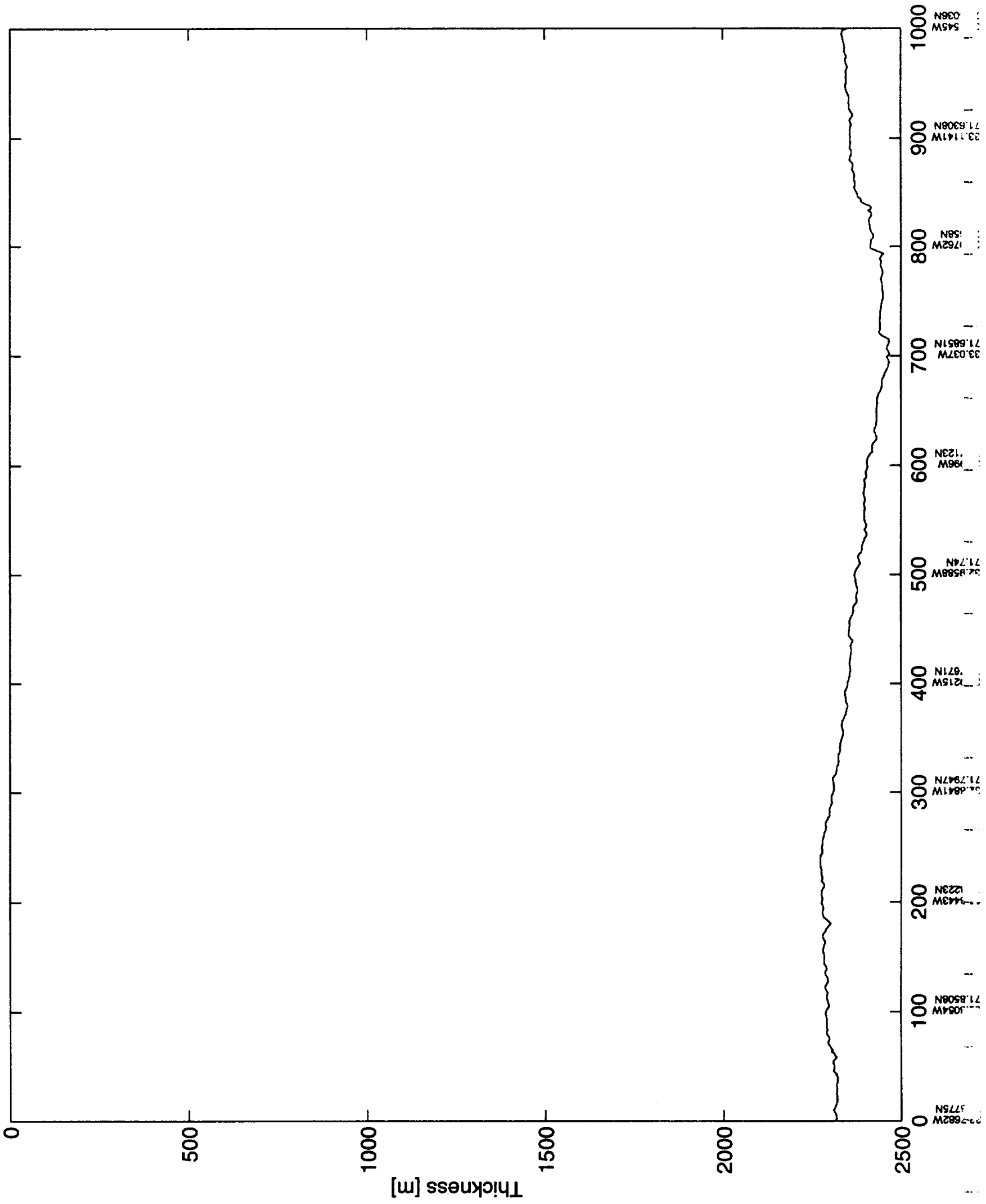
run_5l_9.1 (6) [5000-6000] thickness



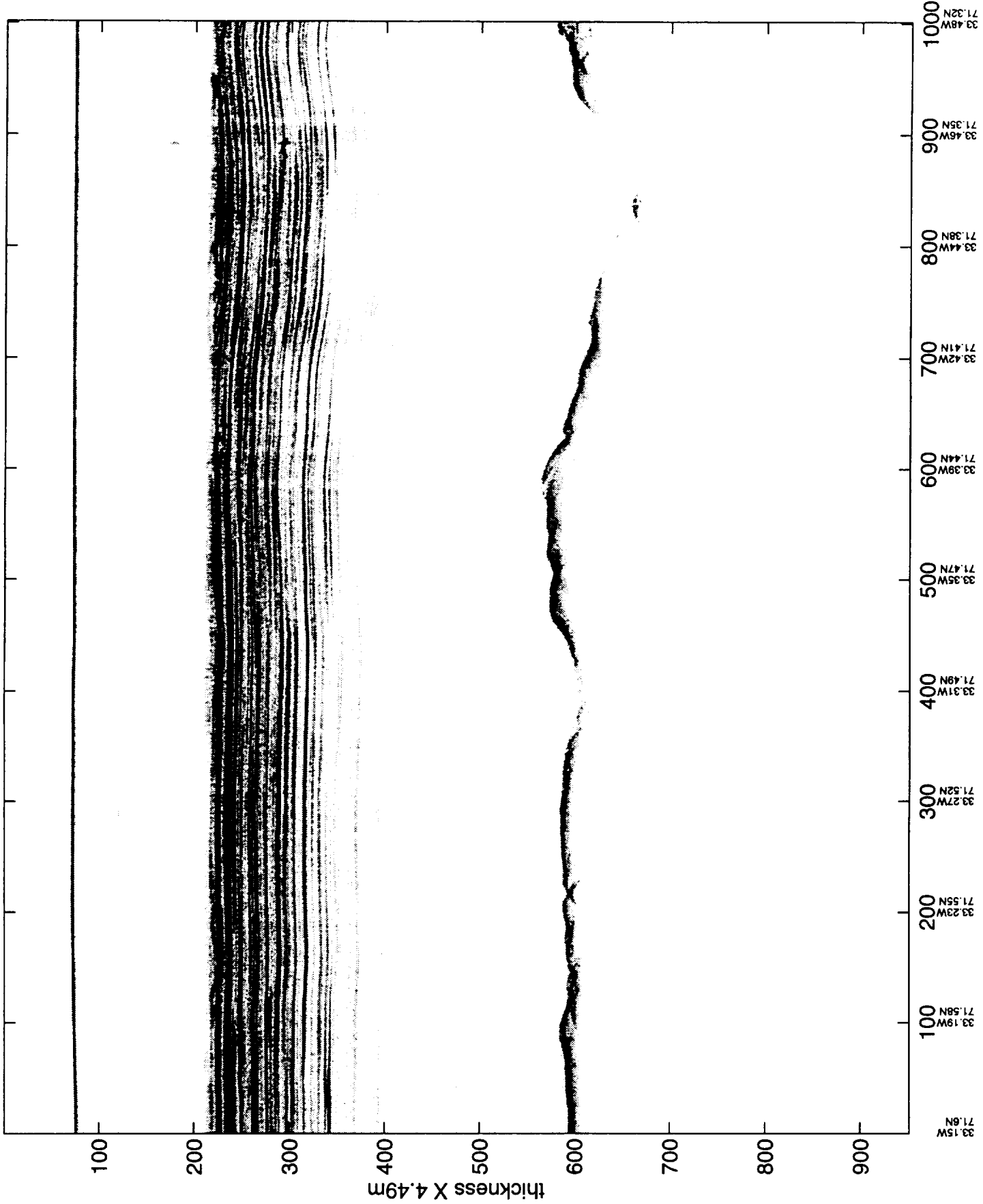
r_5l_9.17 [6000-7000]



run_5l_9.1 (7) [6000-7000] thickness

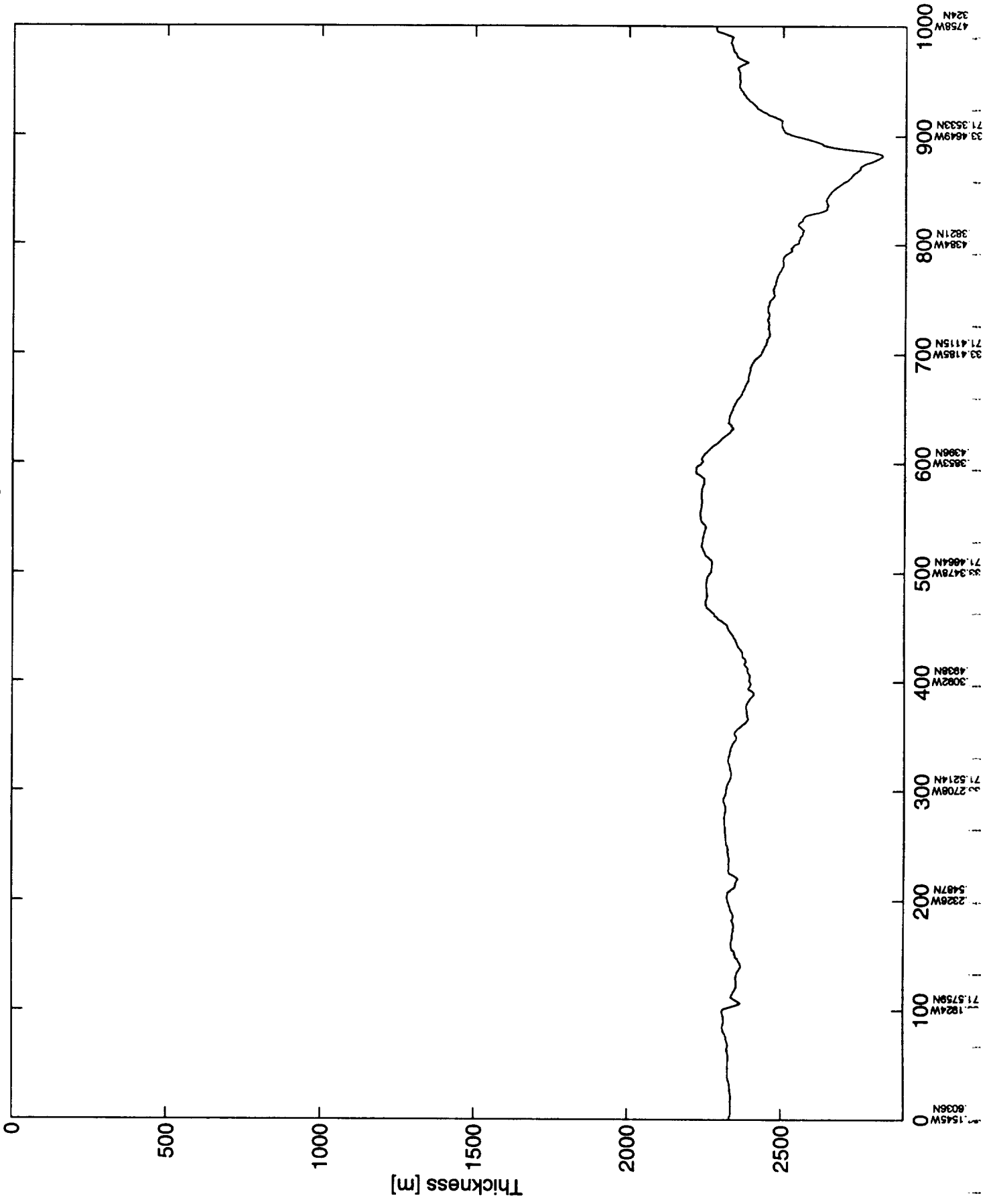


r_5l_9.18 [7000-8000]

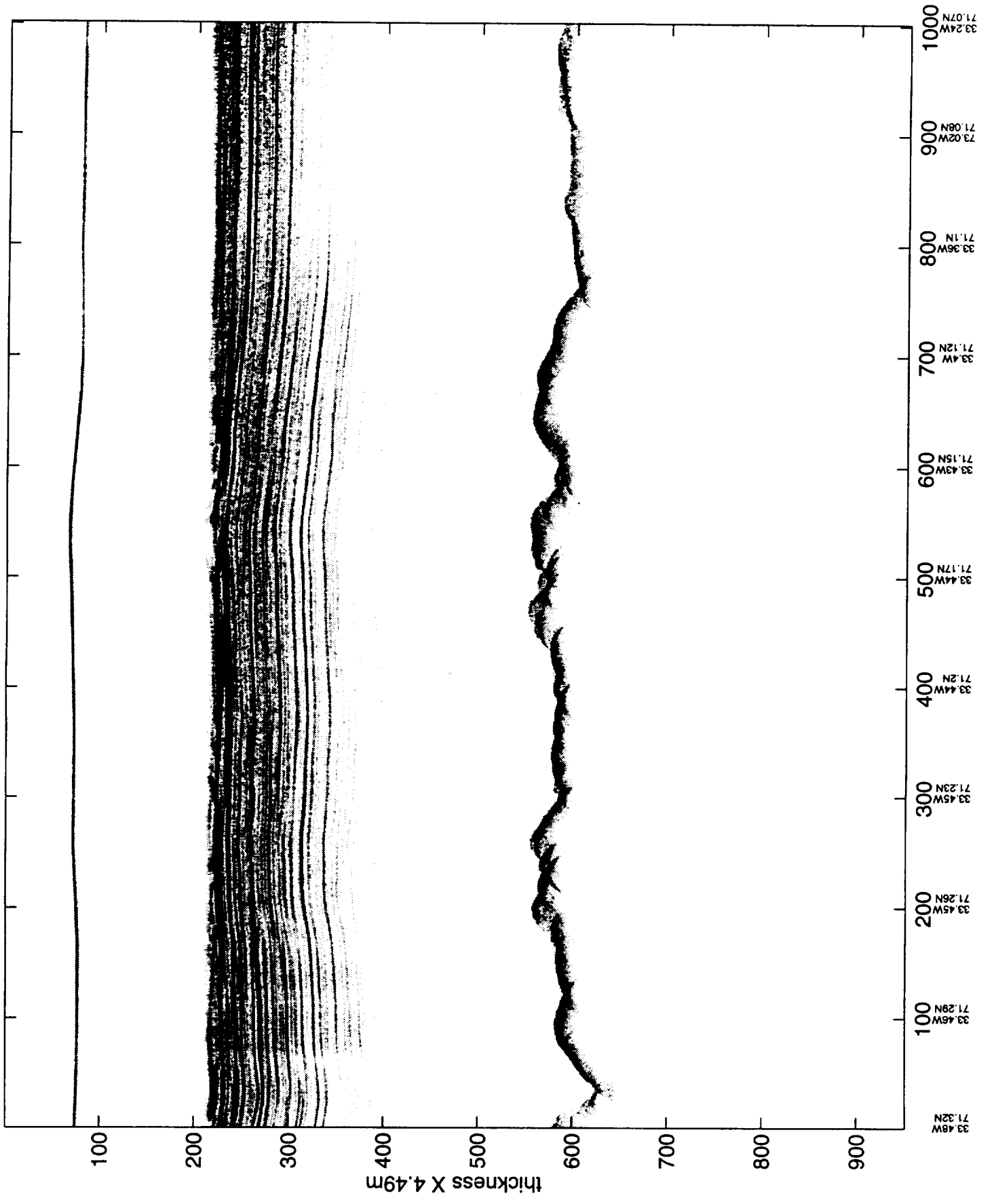


33.15W 71.6N
33.19W 71.58N
33.23W 71.55N
33.27W 71.52N
33.31W 71.49N
33.35W 71.47N
33.39W 71.44N
33.42W 71.41N
33.44W 71.38N
33.46W 71.35N
33.48W 71.32N

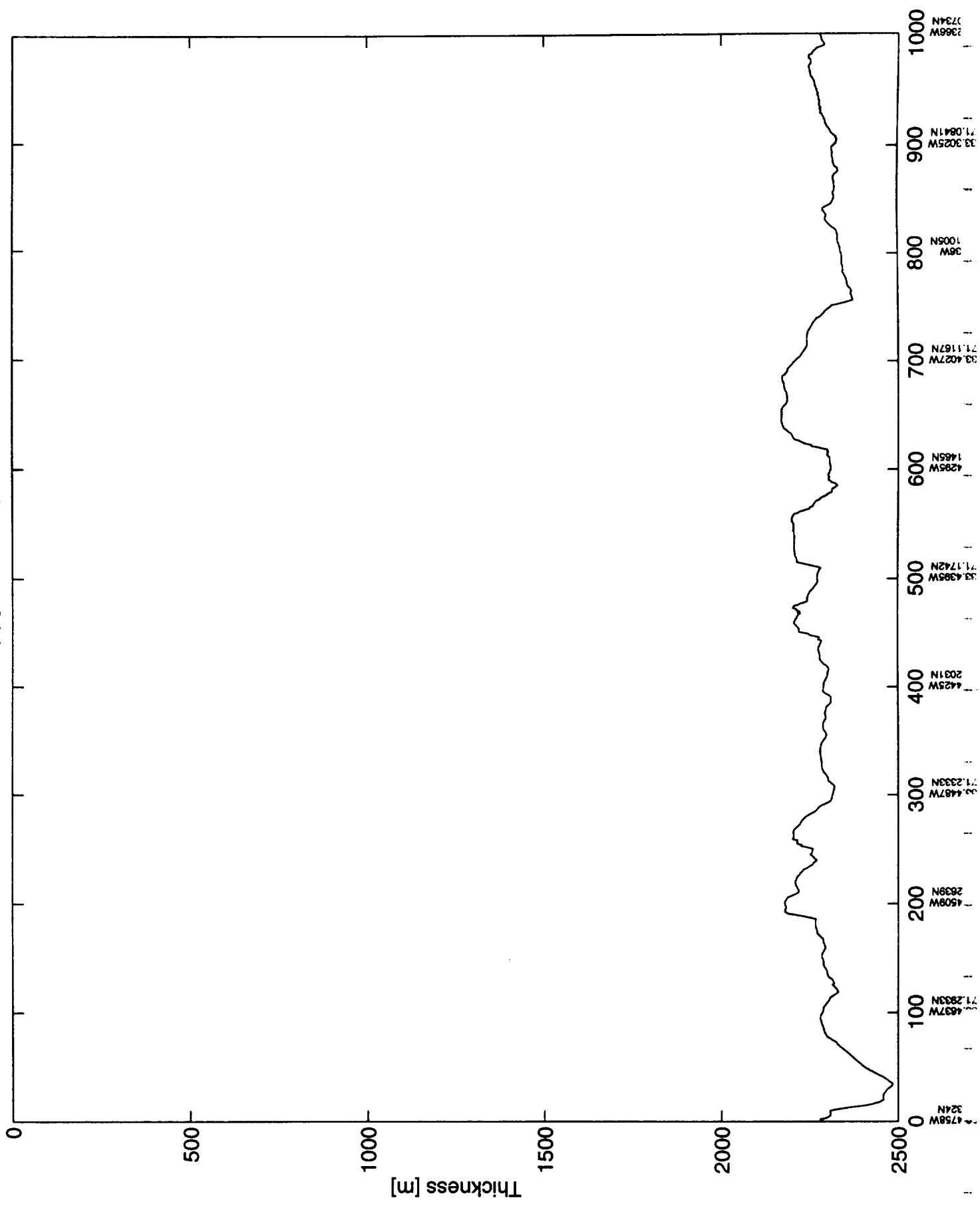
run_5l_9.1 (8) [7000-8000] thickness



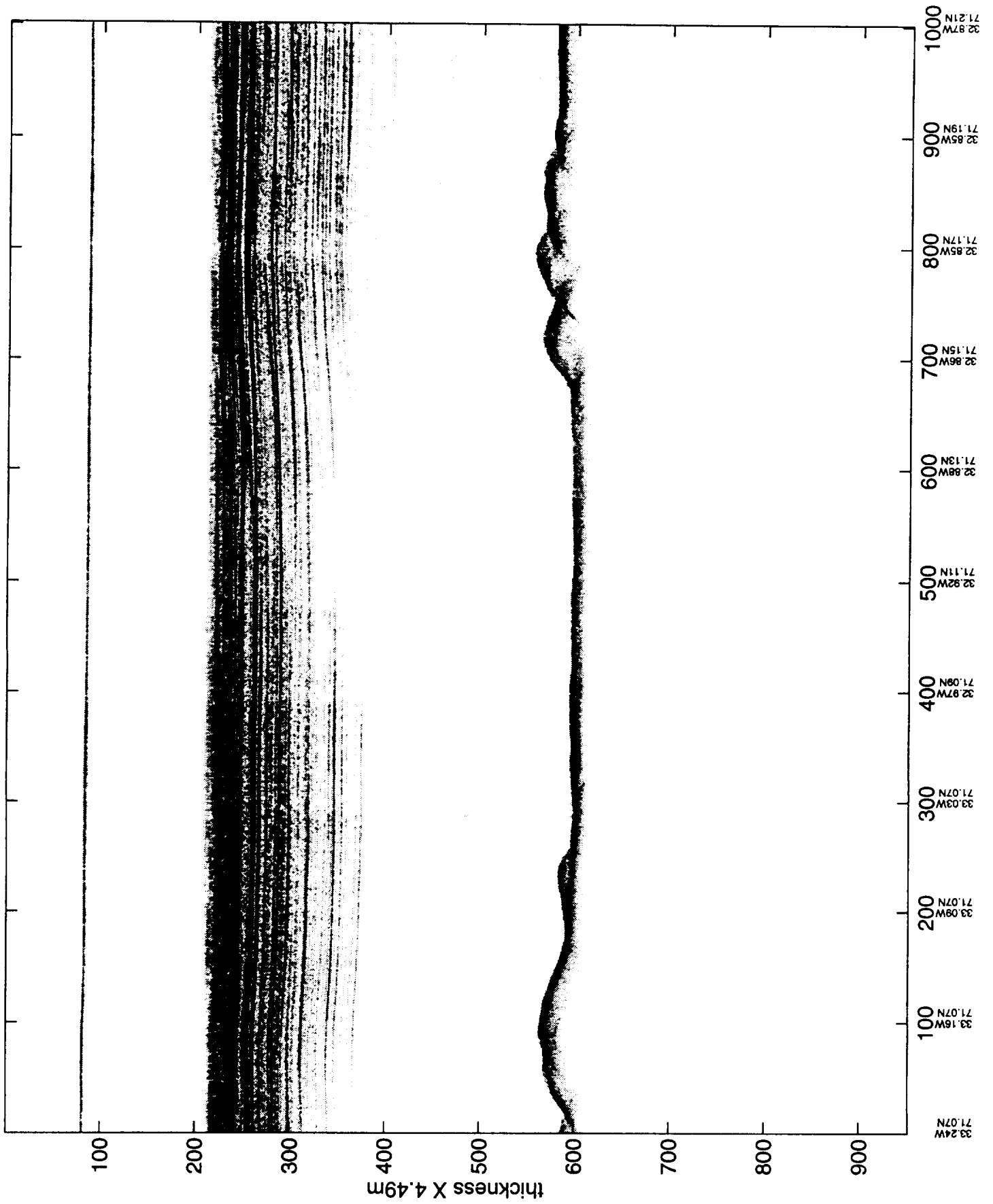
r_5l_9.19 [8000-9000]



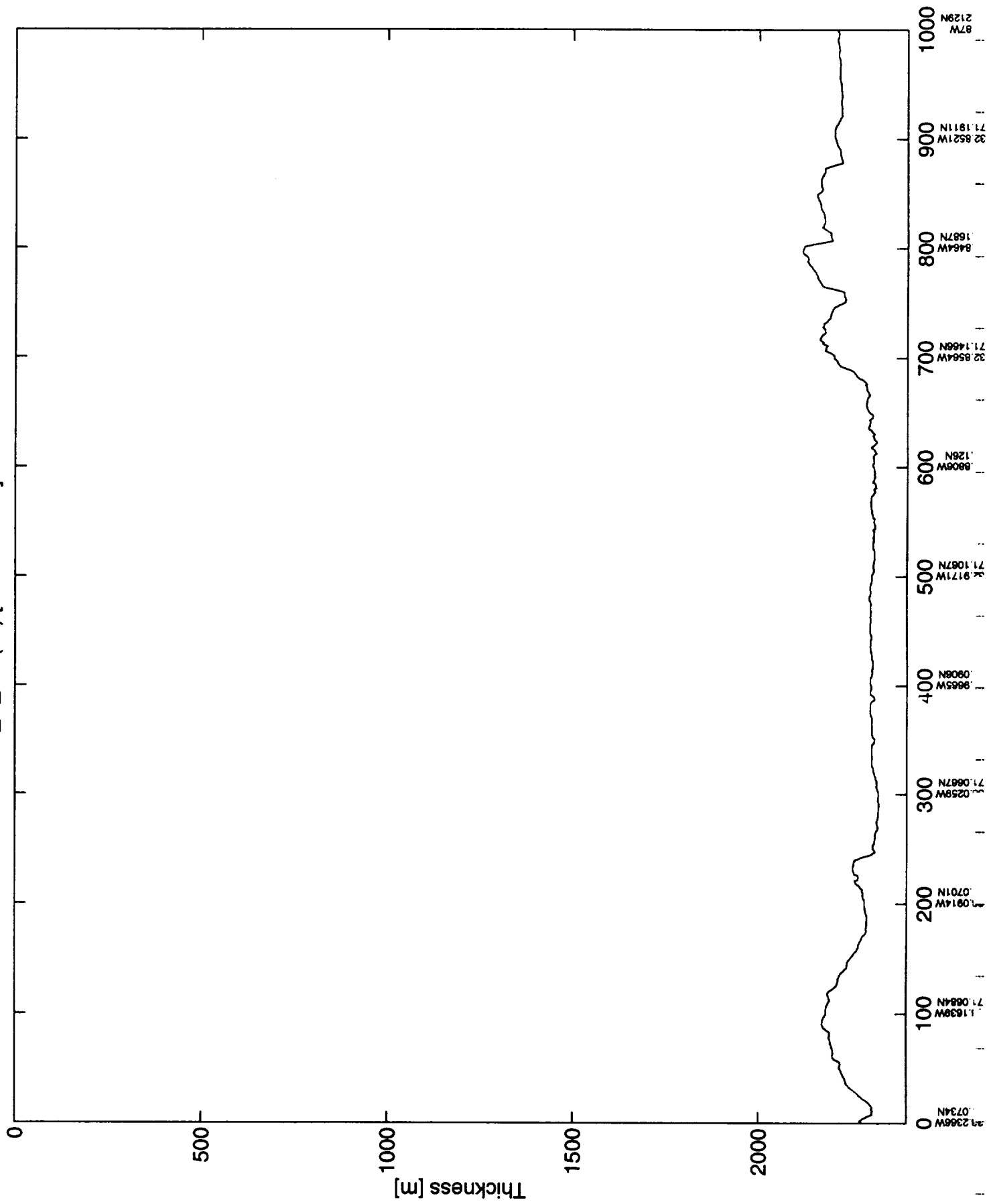
run_5l_9.1 (9) [8000-9000] thickness



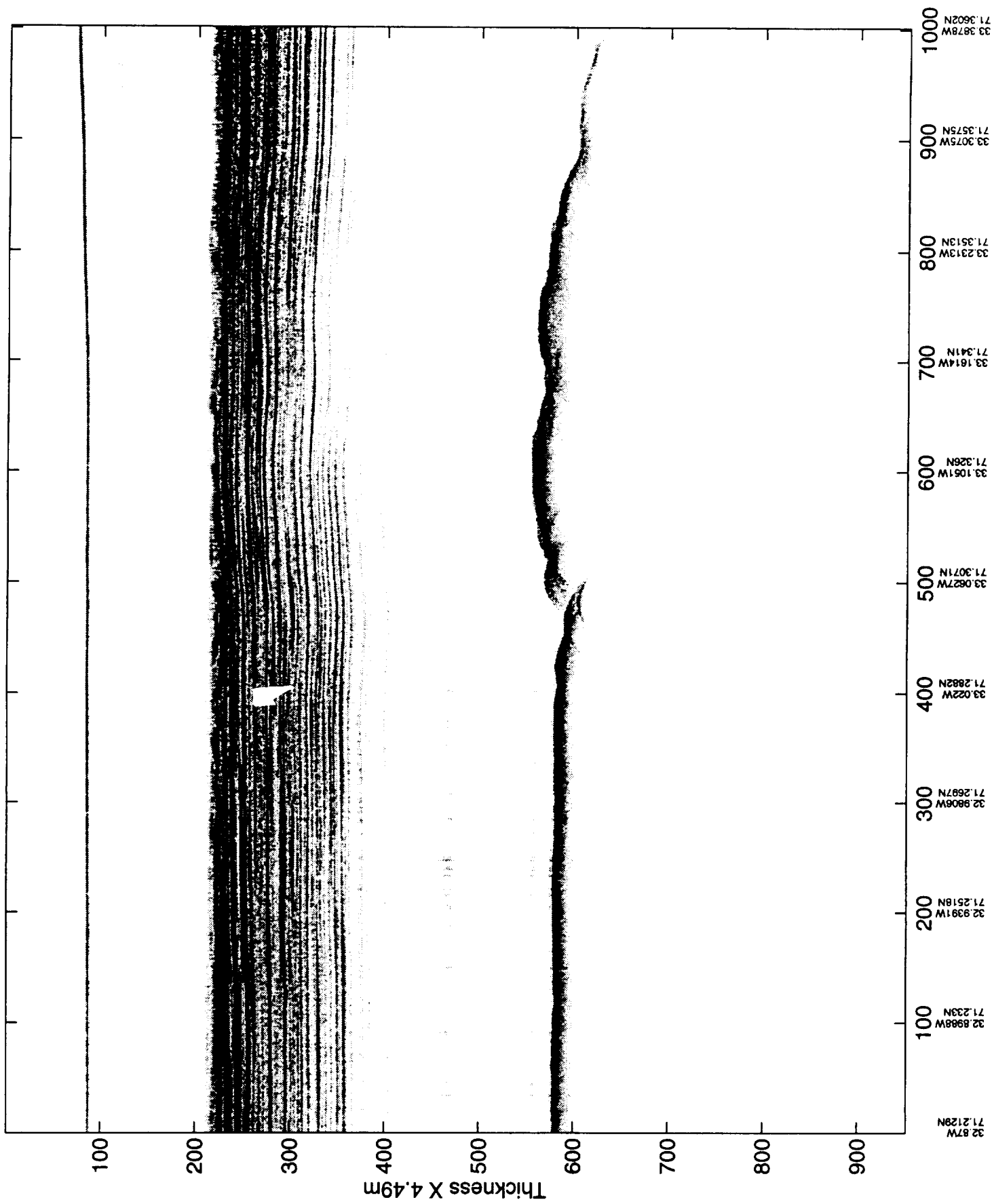
r_5|_9.110 [9000-10000]



run_5l_9.1 (10) [9000-10000] thickness

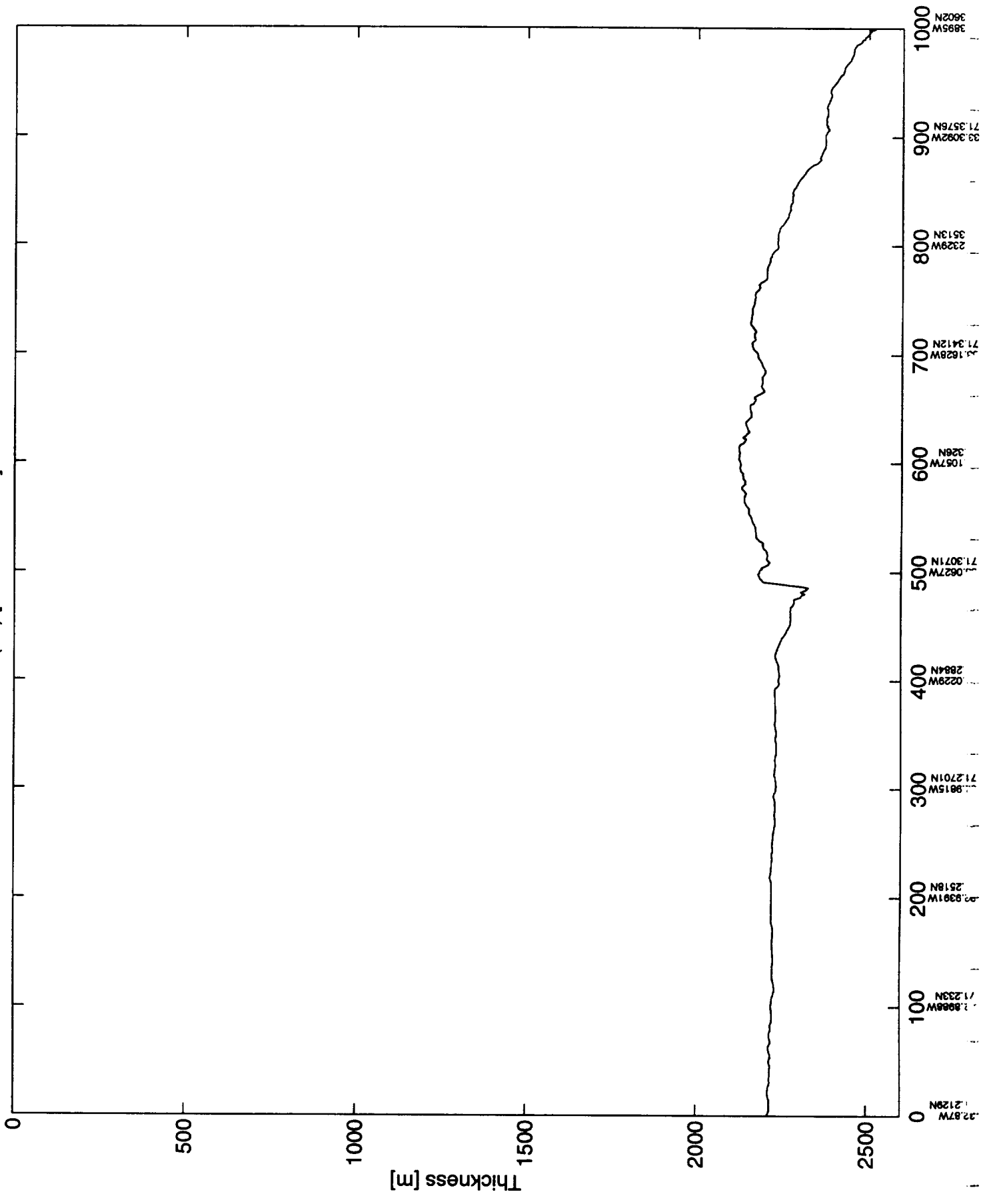


r_5l_9.111 [10000-11000]

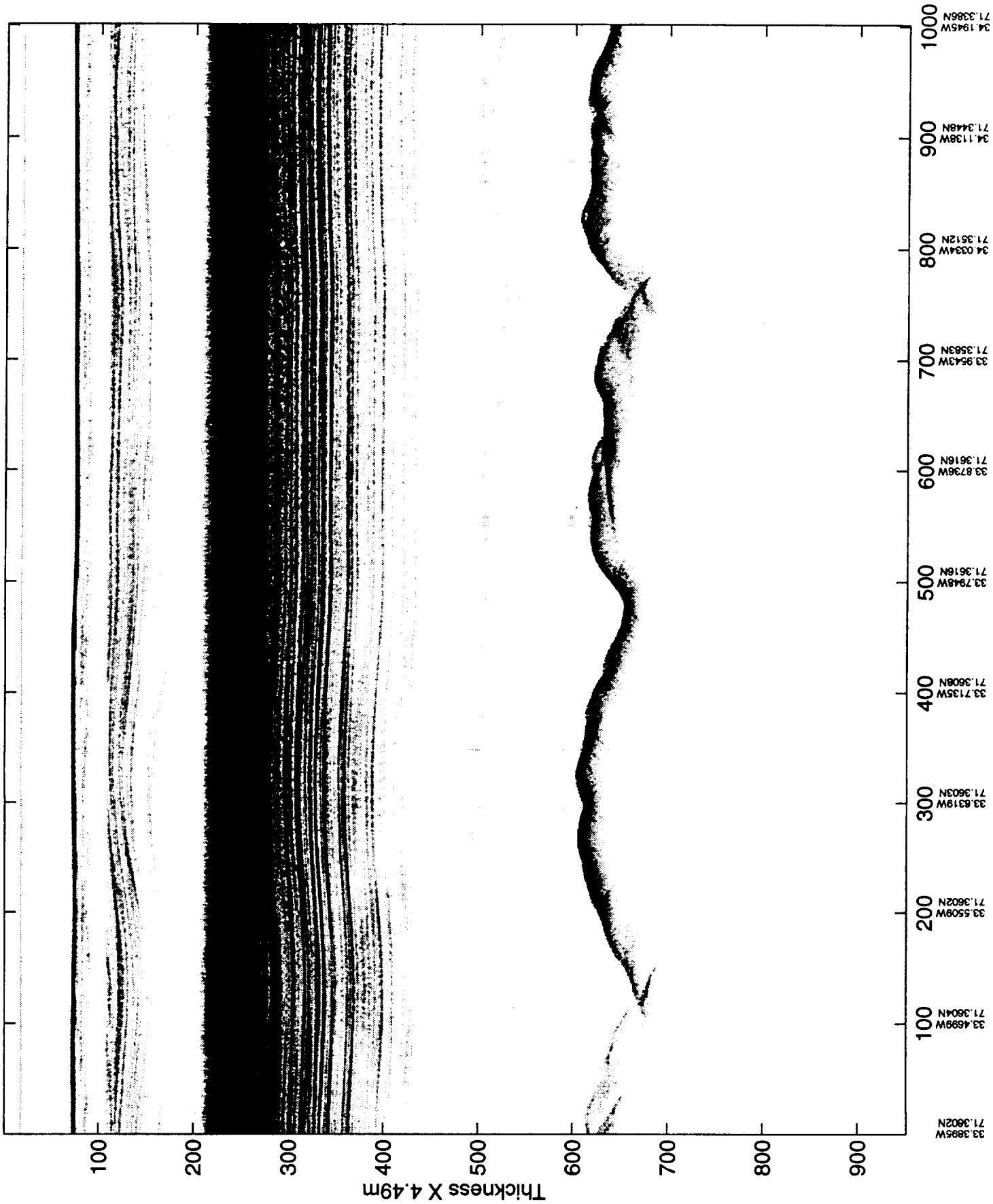


32.87W
71.2128N
32.8988W
71.233N
32.9391W
71.2518N
32.9806W
71.2697N
33.022W
71.2882N
33.0627W
71.3071N
33.1051W
71.326N
33.1614W
71.341N
33.2313W
71.3513N
33.3075W
71.3575N
33.3878W
71.3602N

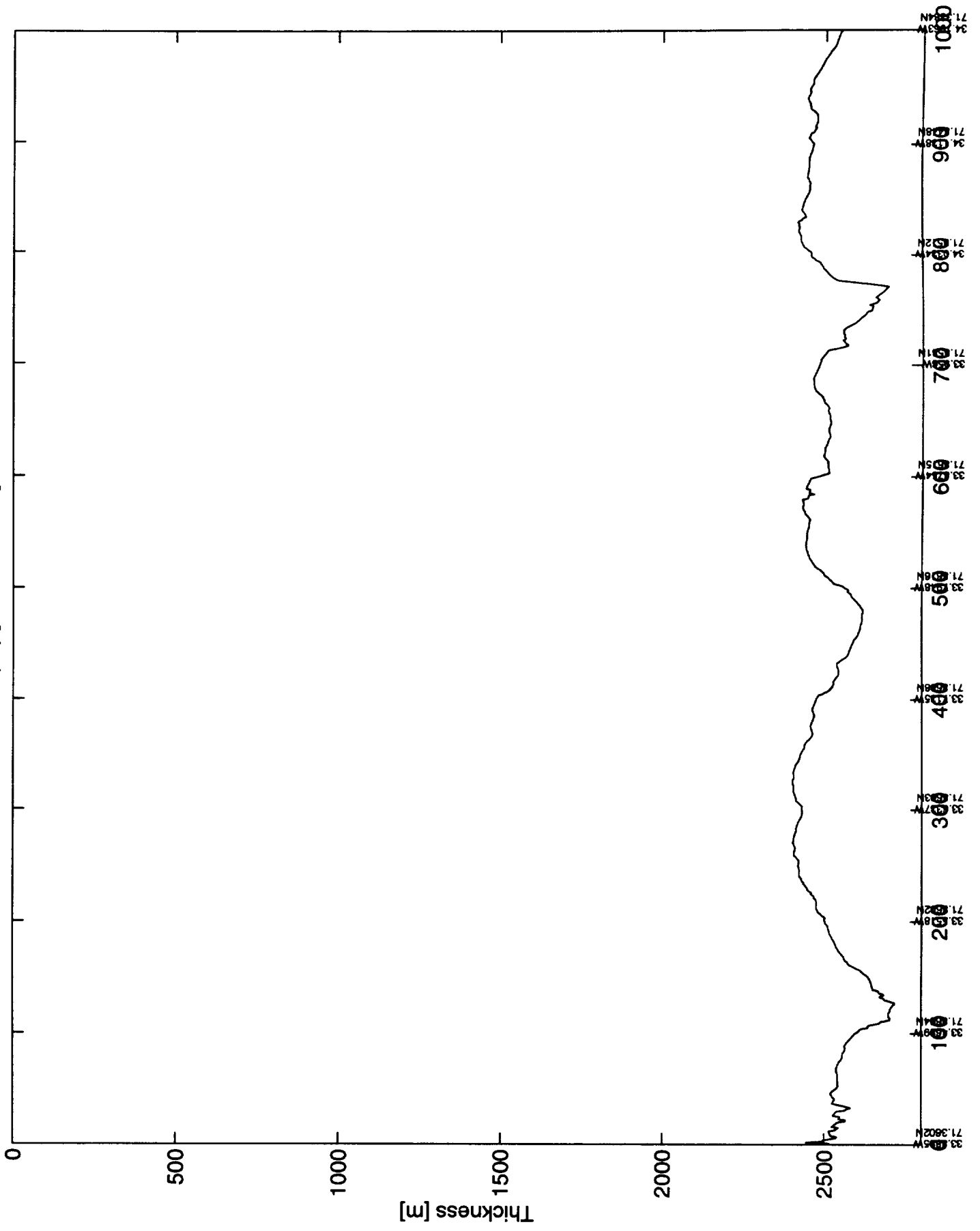
run_5l_9.1 (11) [10000-11000] thickness



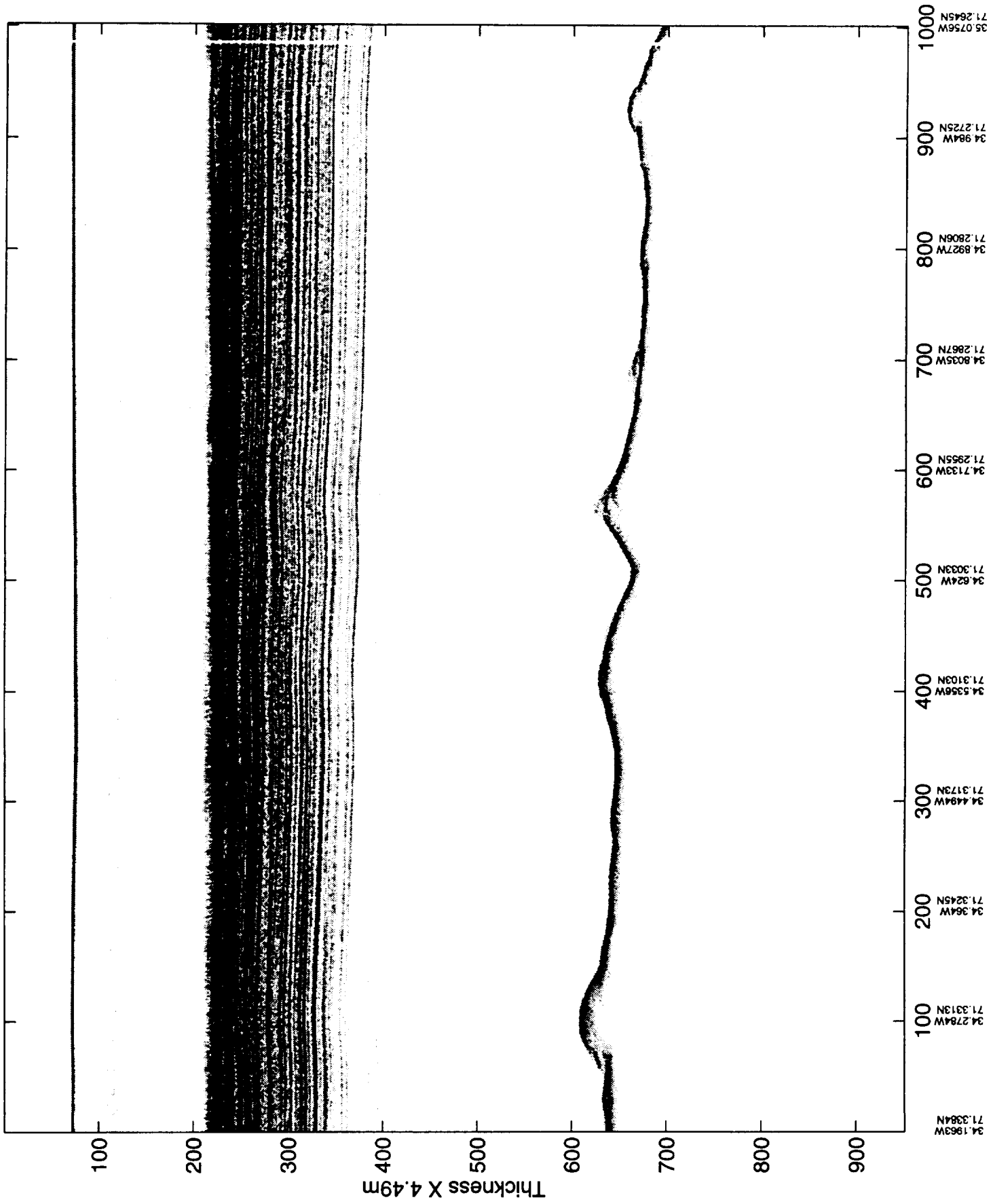
r_5l_9.112 [11000-12000]



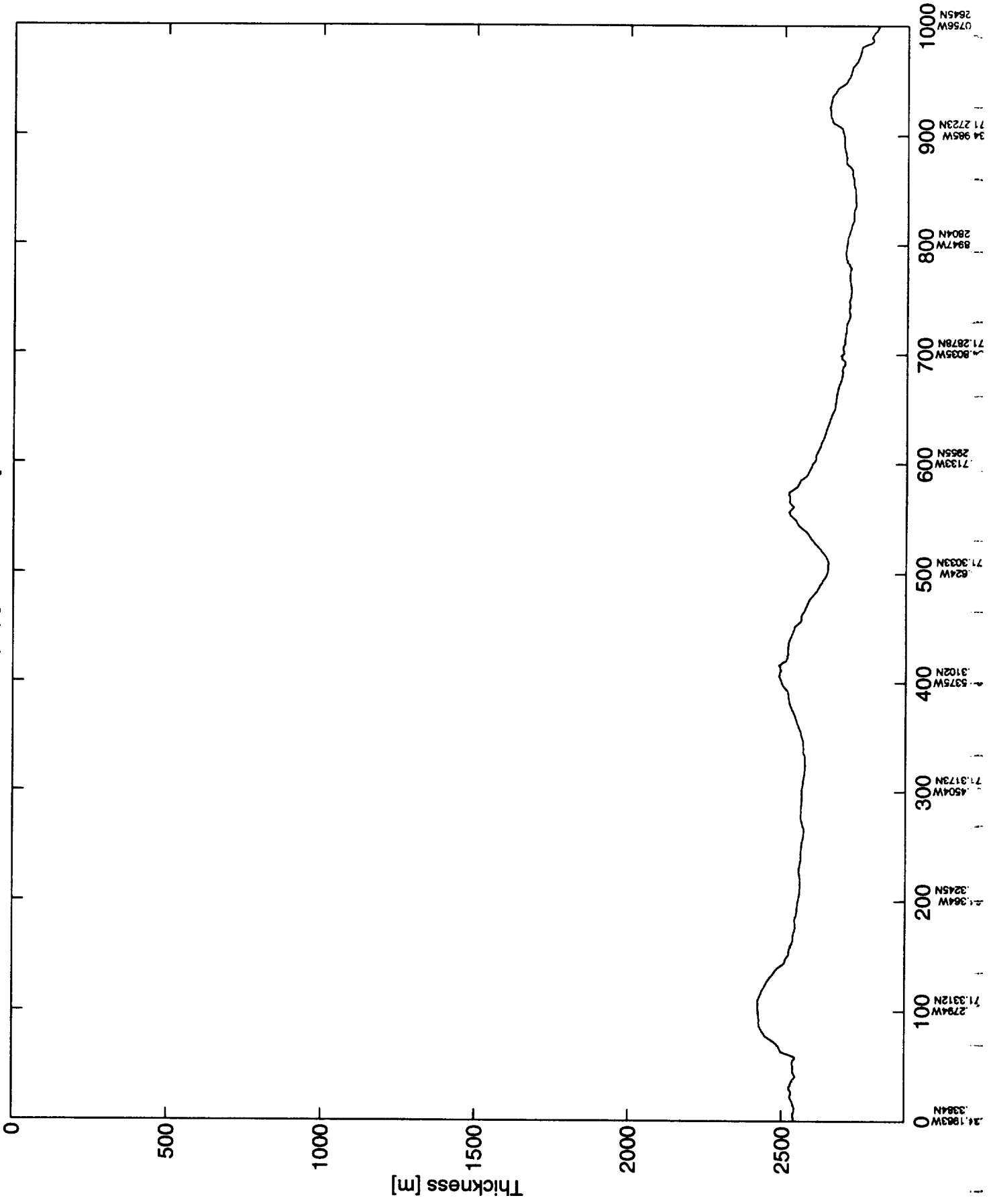
run_5l_9.1 (12) [11000-12000] thickness



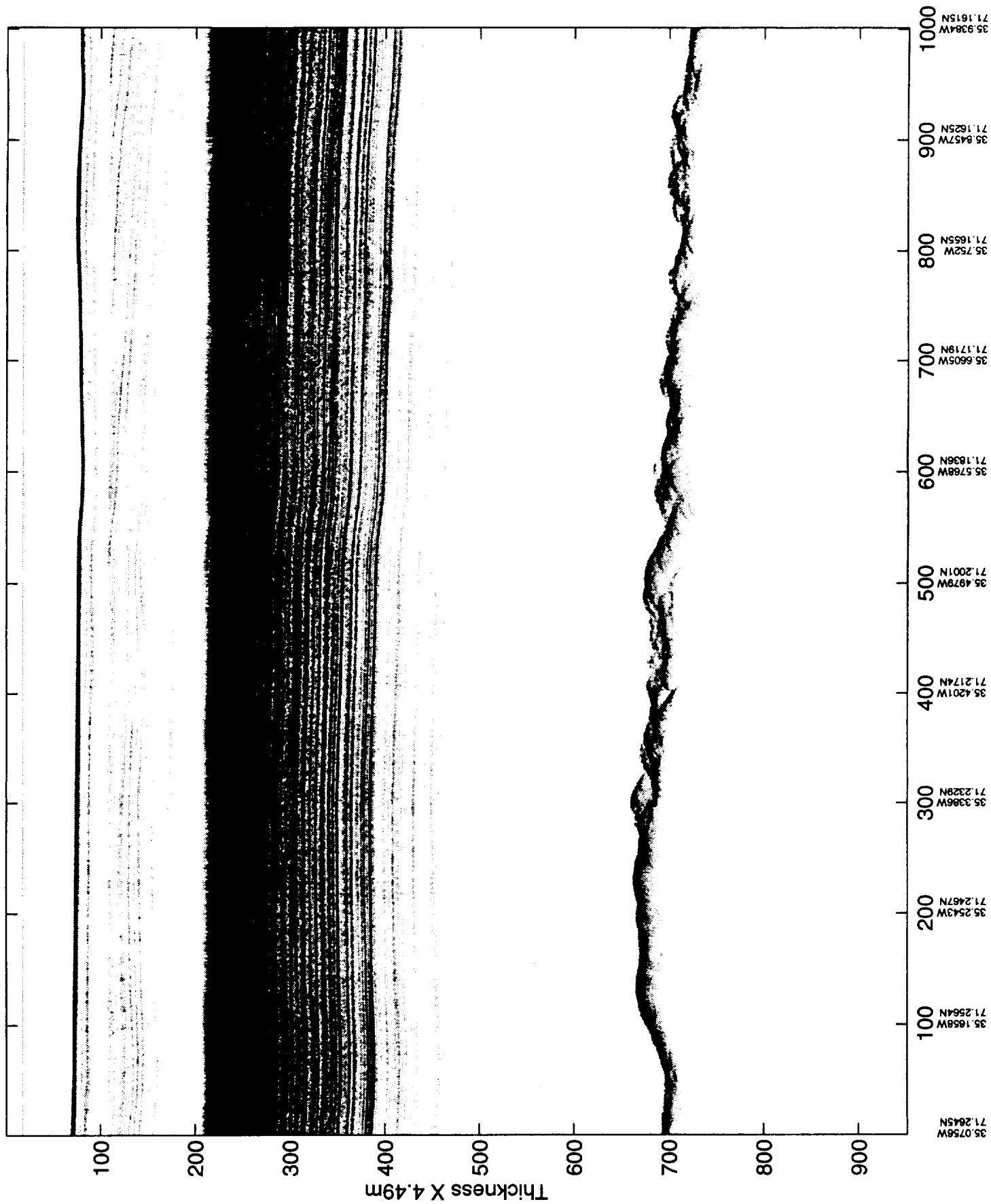
r_5l_9.113 [12000-13000]



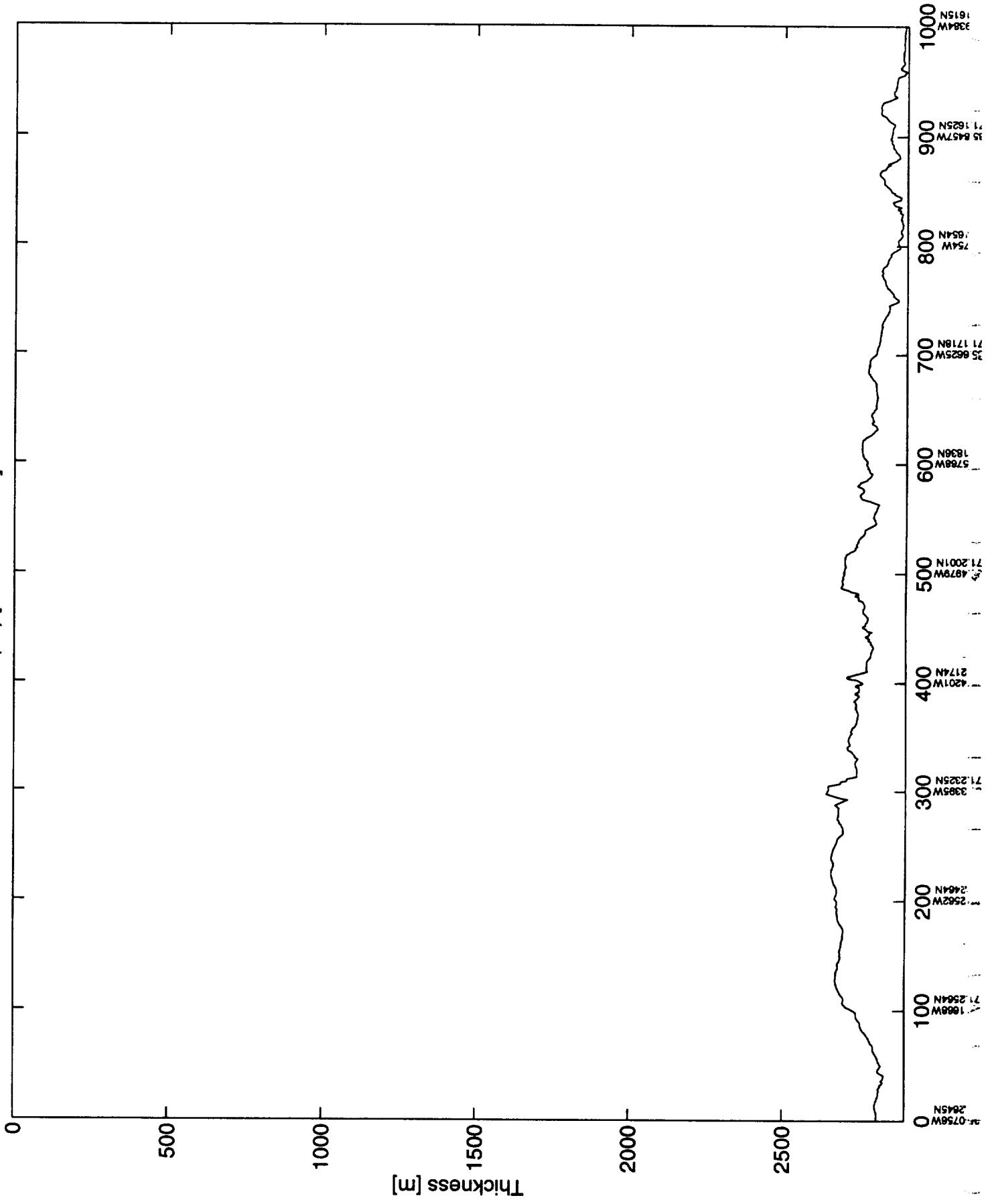
run_5l_9.1 (13) [12000-13000] thickness



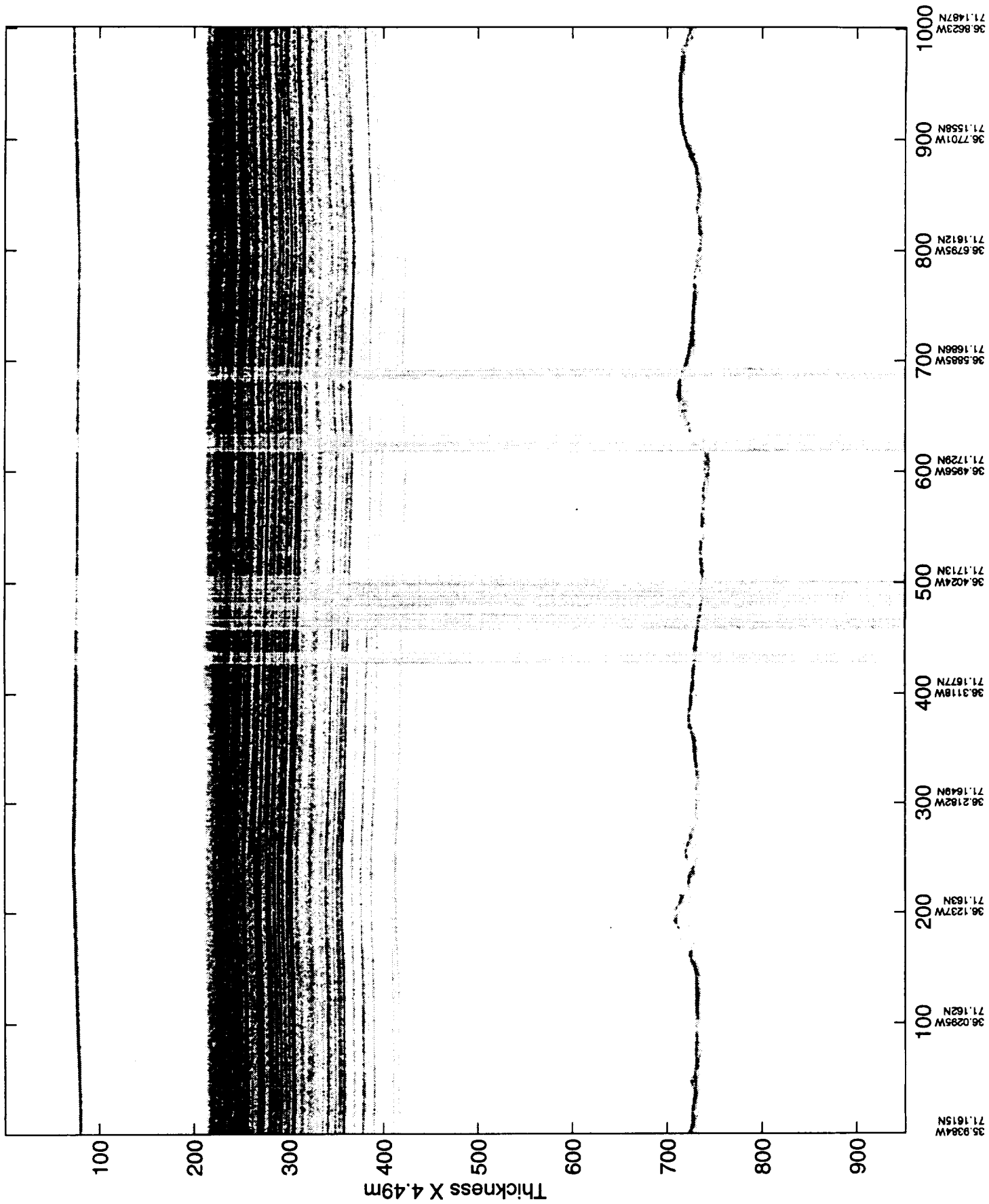
r_5l_9.114 [13000-14000]



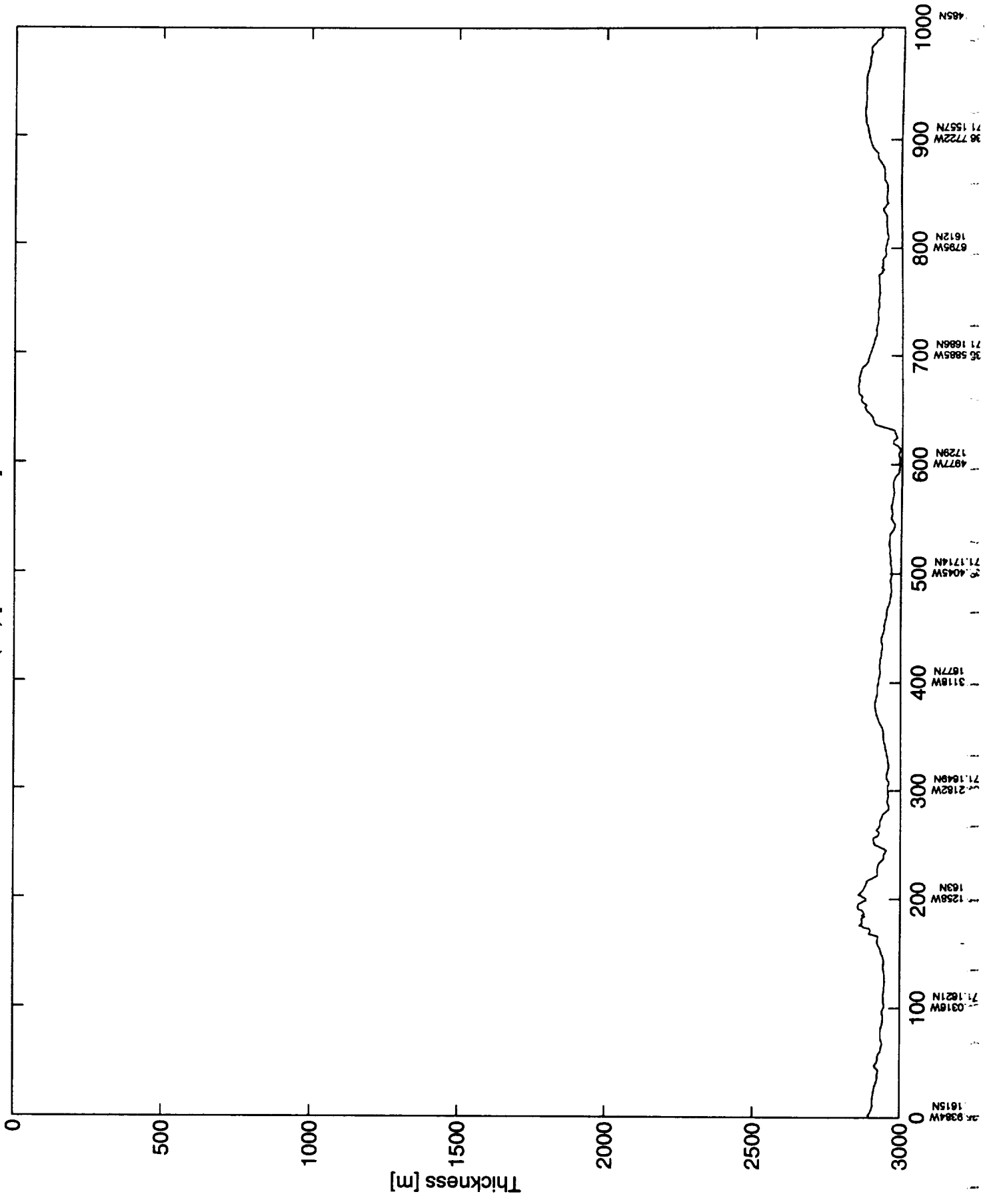
run_5l_9.1 (14) [13000-14000] thickness



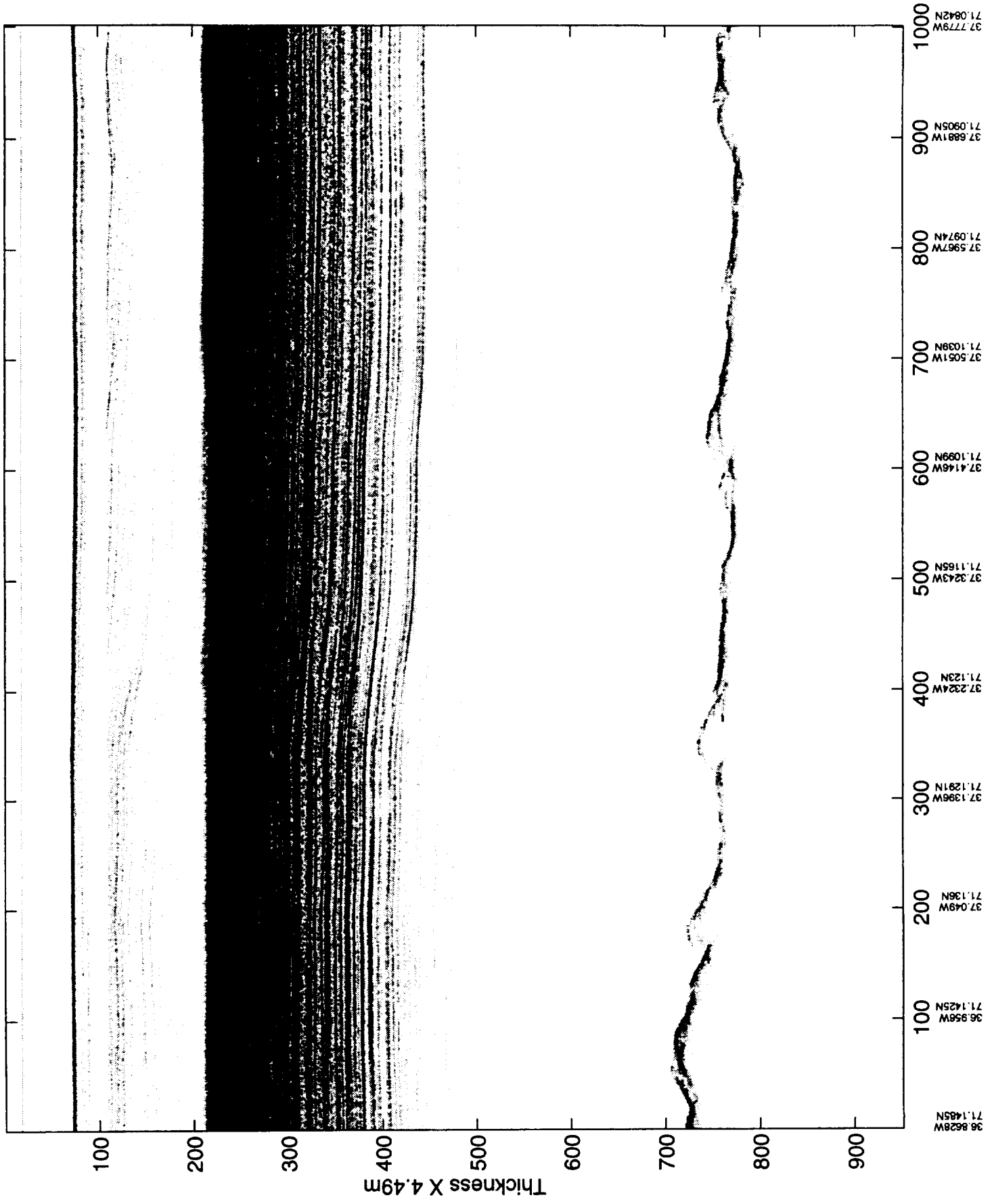
r_5l_9.115 [14000-15000]



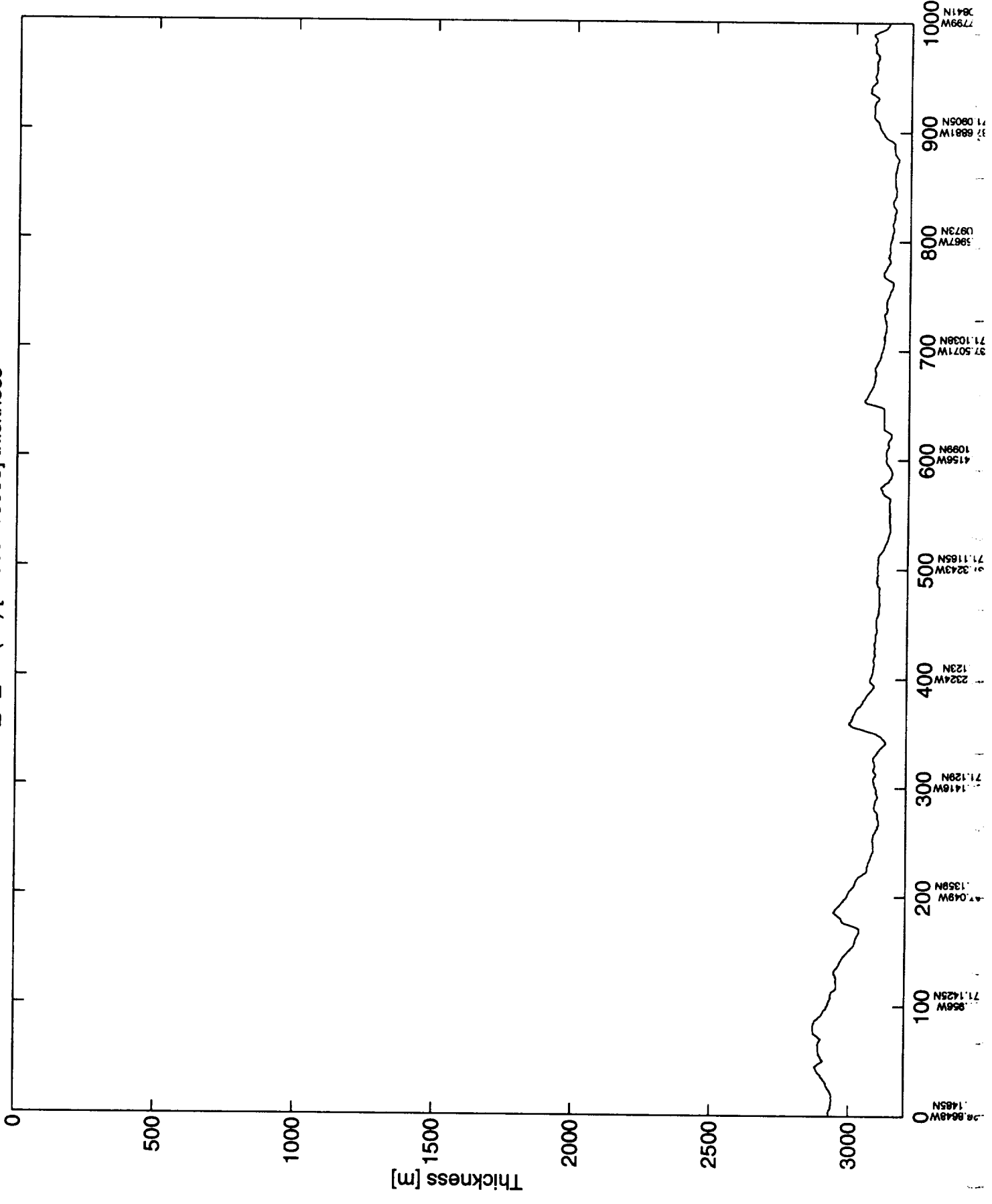
run_5l_9.1 (15) [14000-15000] thickness



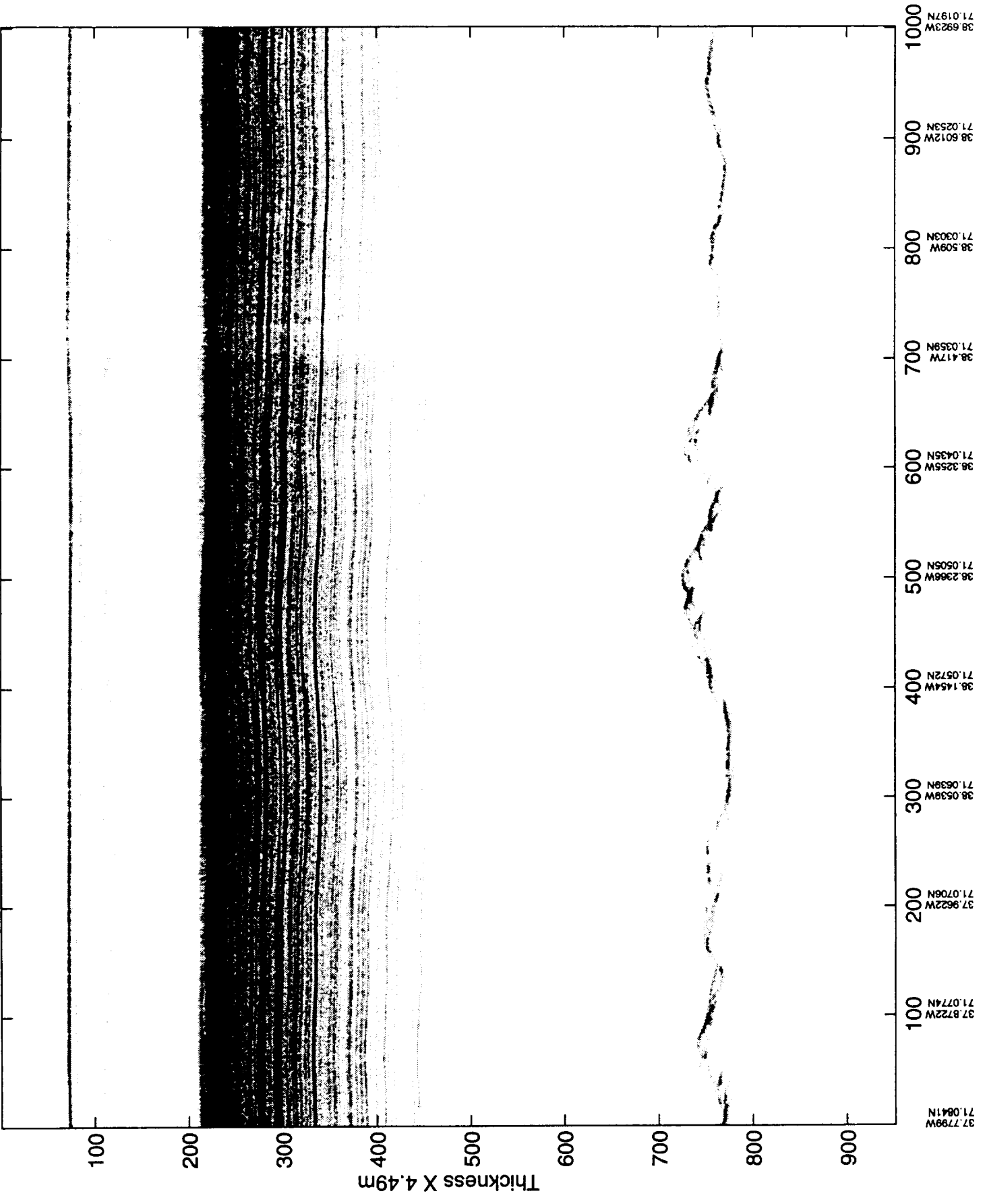
r_5l_9.116 [15000-16000]



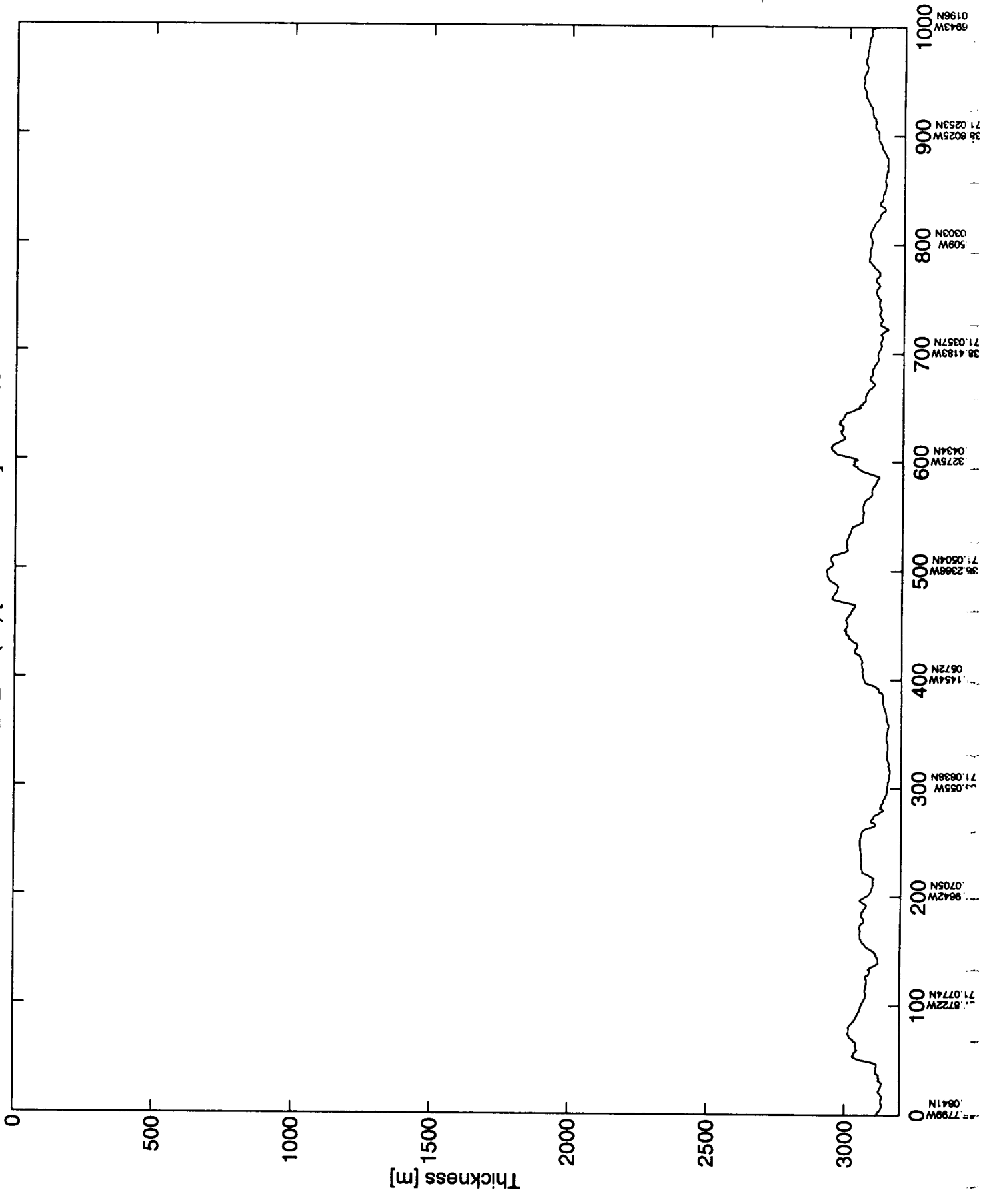
run_5l_9.1 (16) [15000-16000] thickness



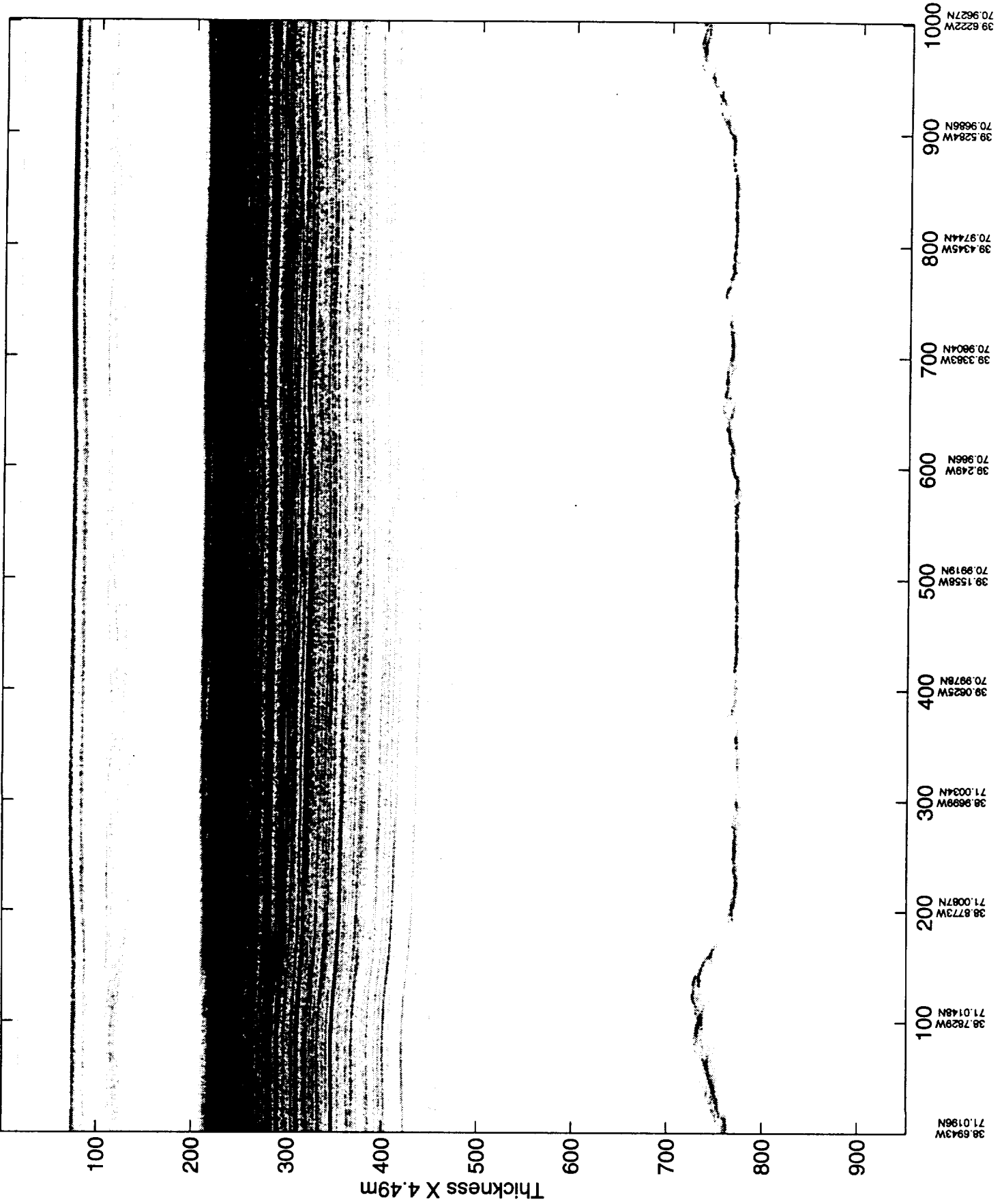
r_5l_9.117 [16000-17000]



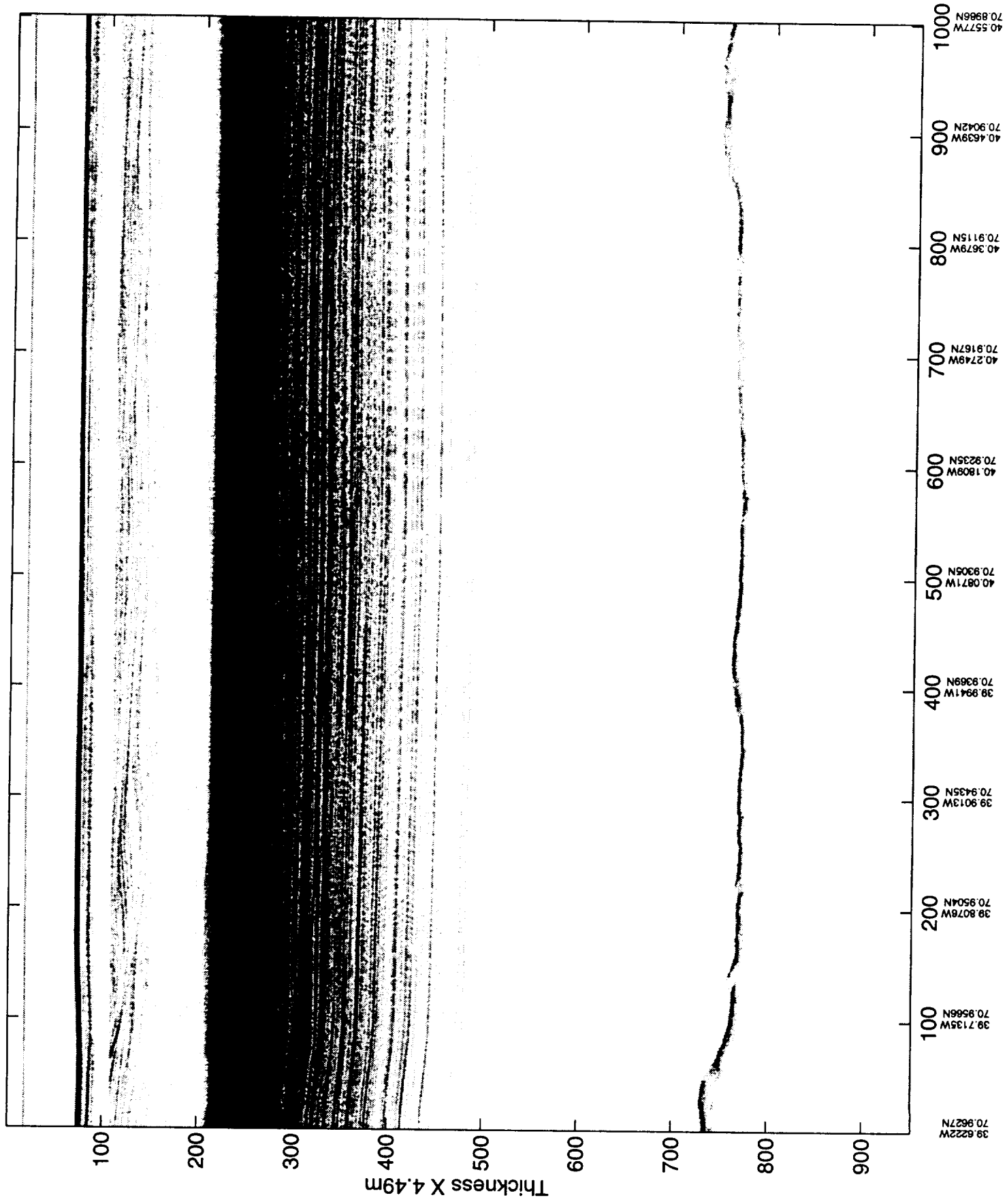
run_5l_9.1 (17) [16000-17000] thickness



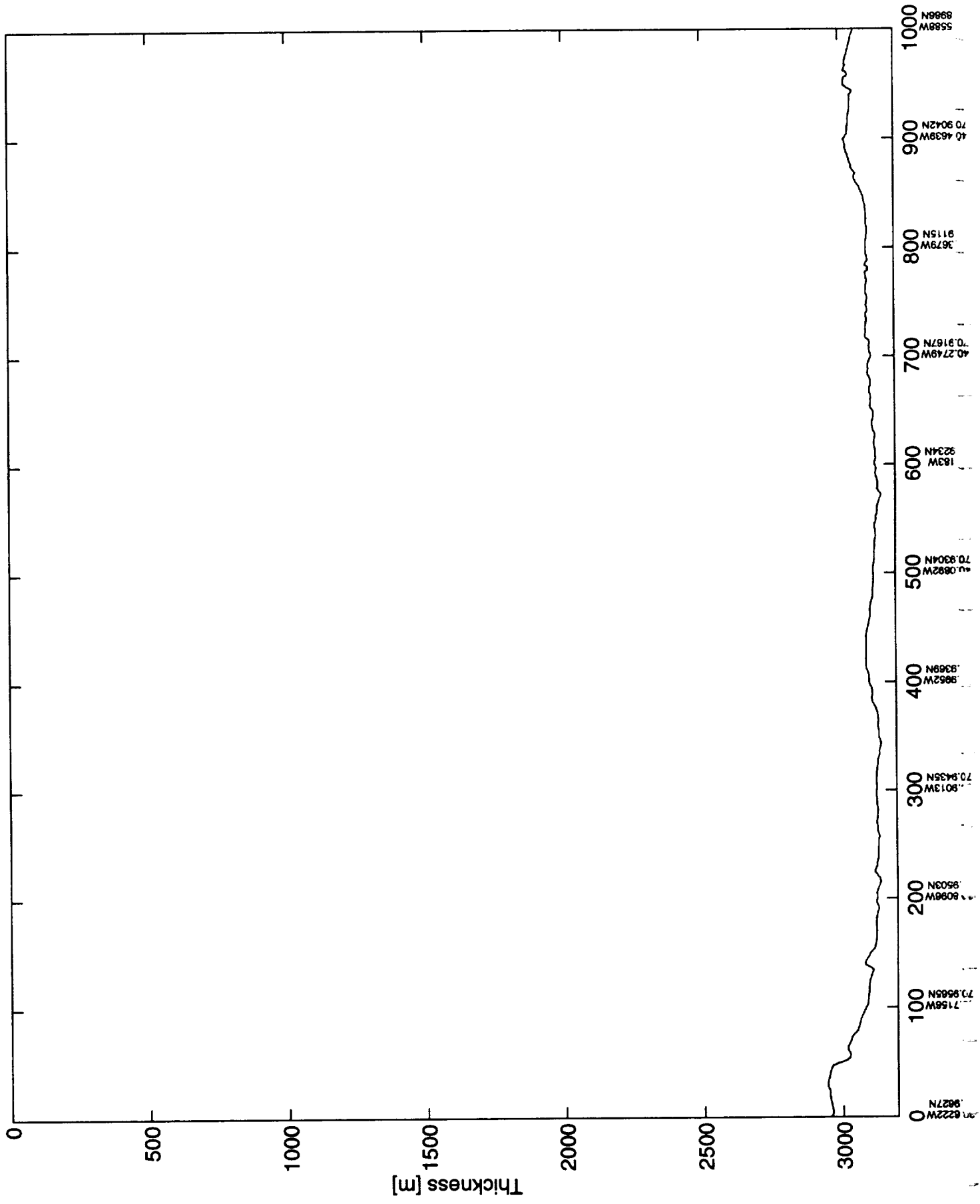
r_5l_9.118 [17000-18000]



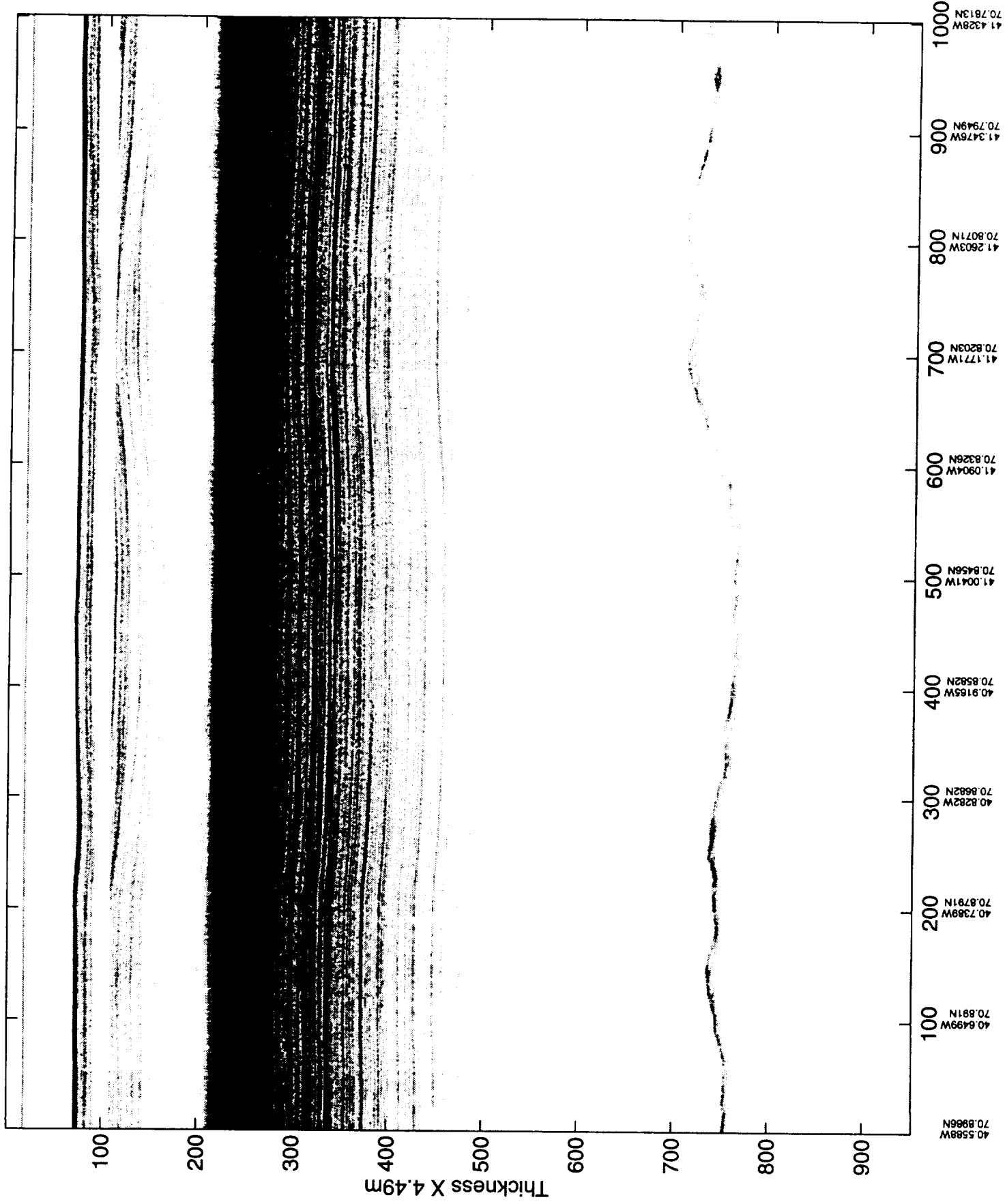
r_5[9.119 [18000-19000]]



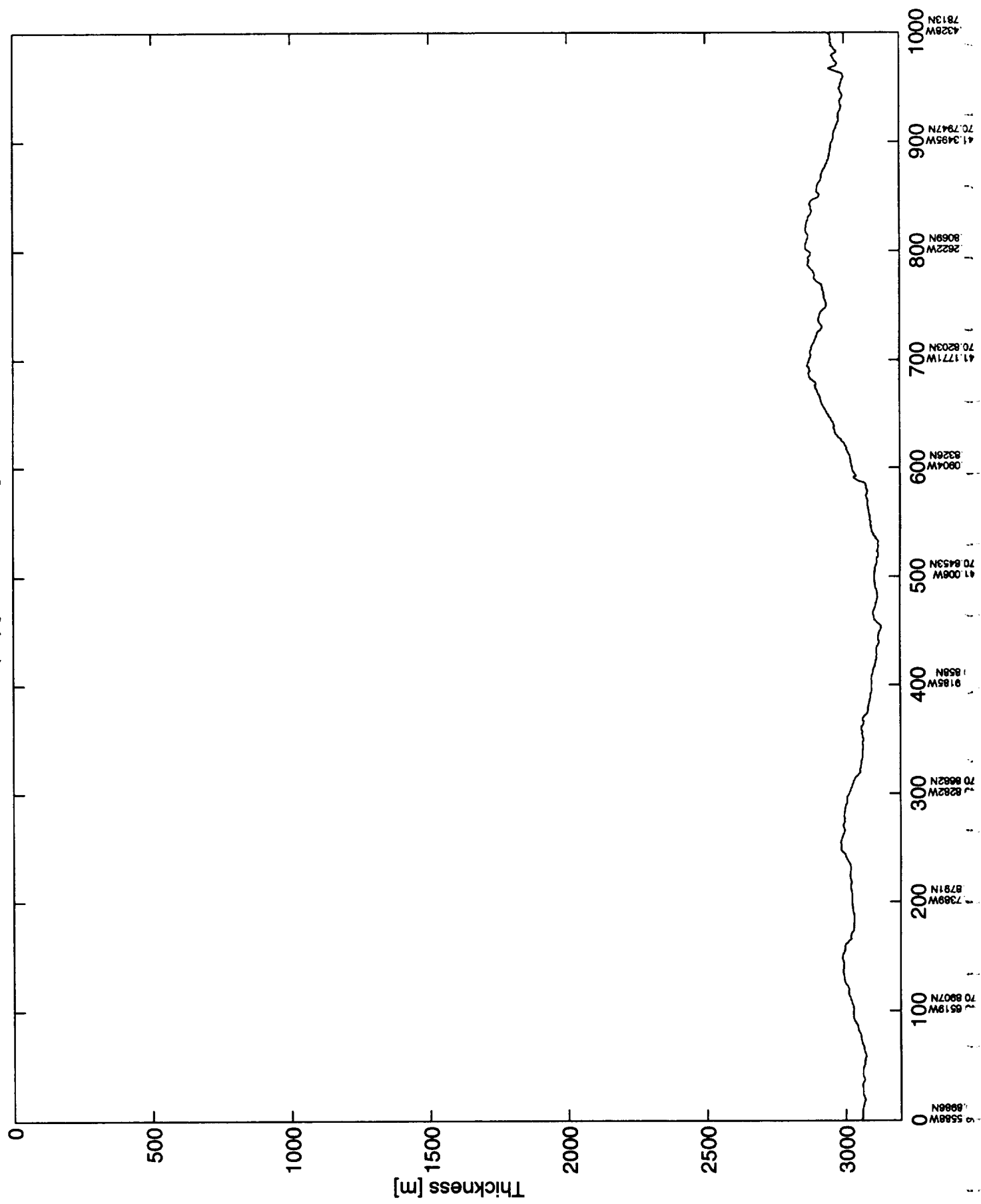
run_5l_9.1 (19) [18000-19000] thickness



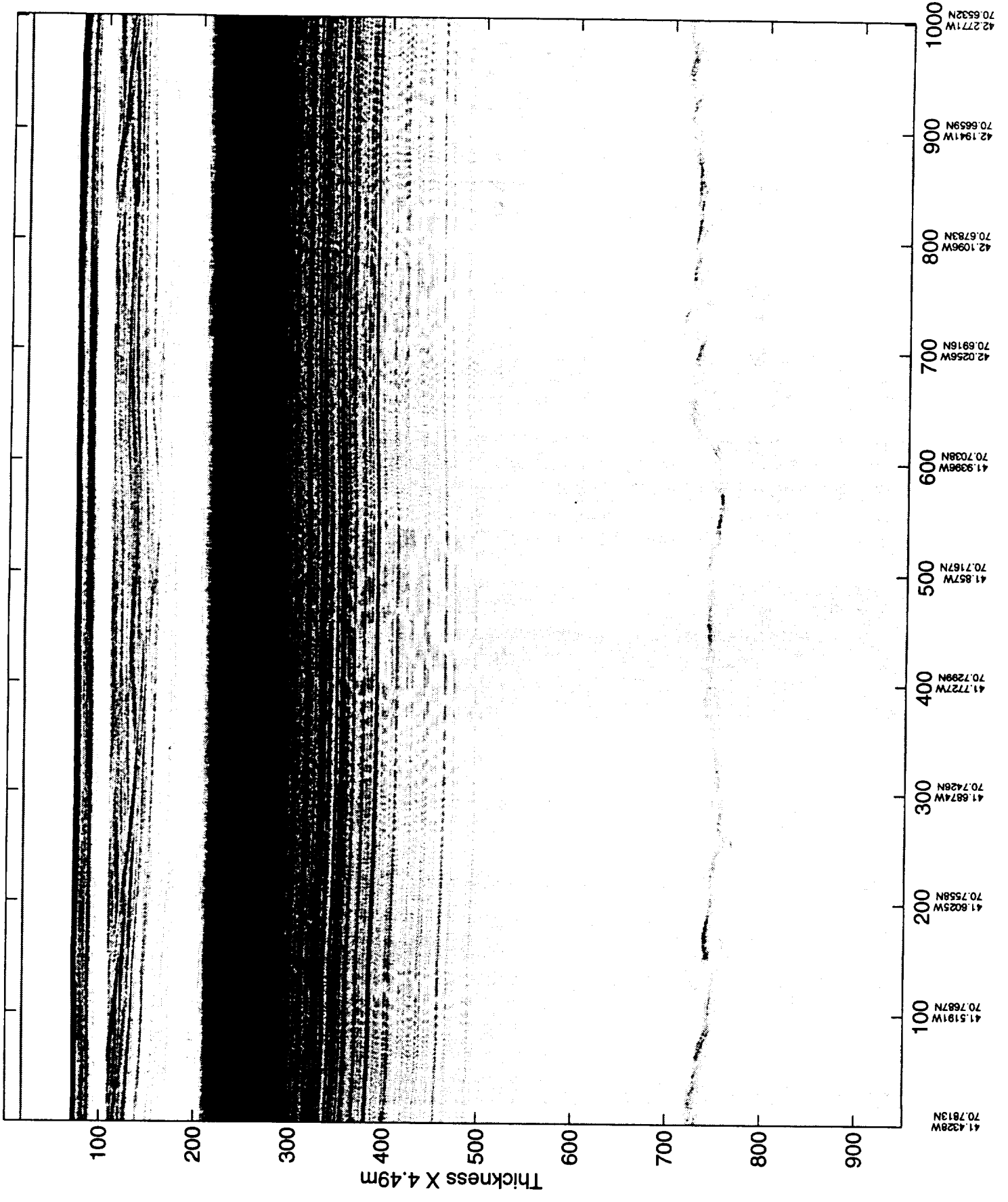
r_5l_9.120 [19000-20000]



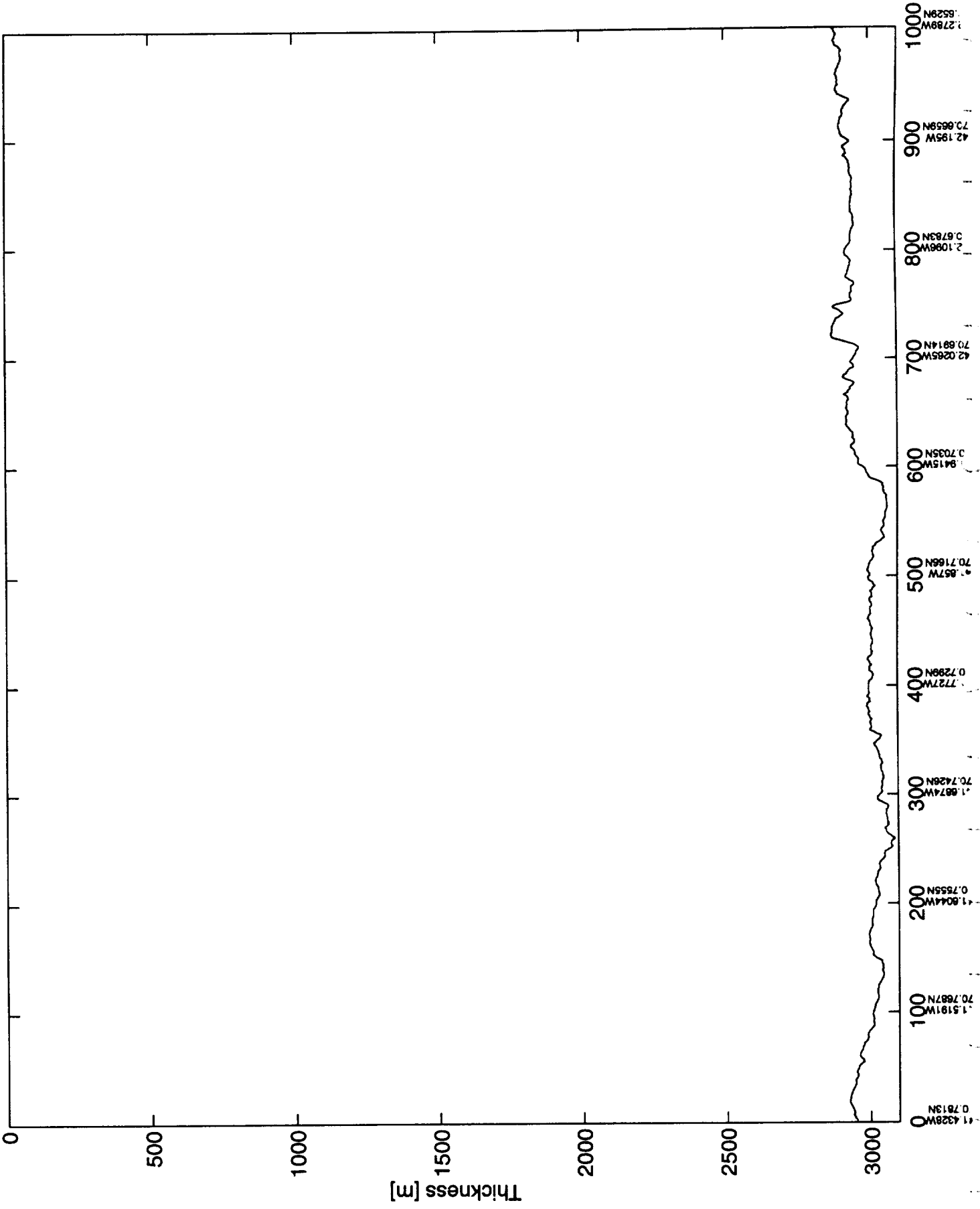
run_5l_9.1 (20) [19000-20000] thickness



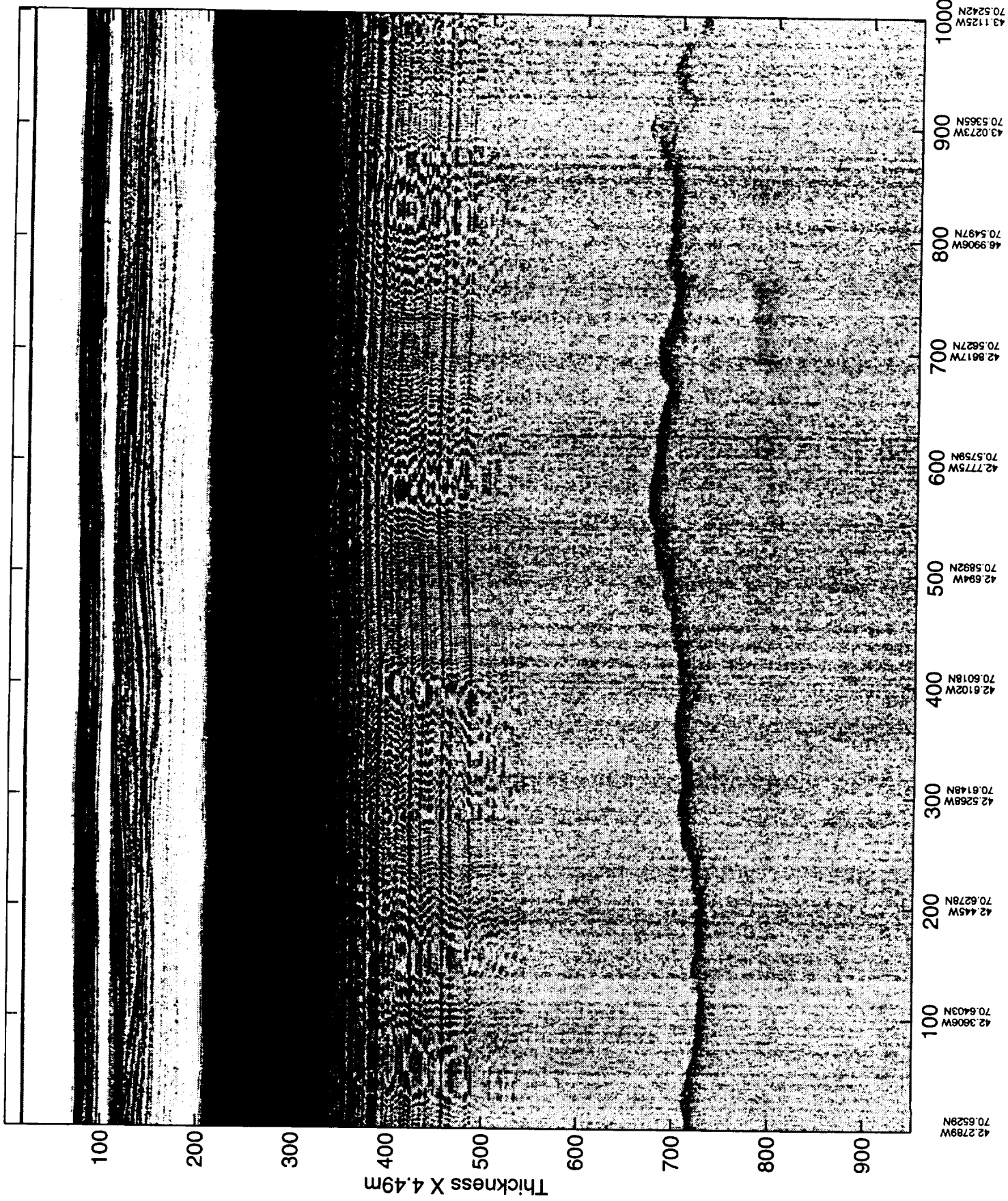
r_5l_9.121 [20000-21000]



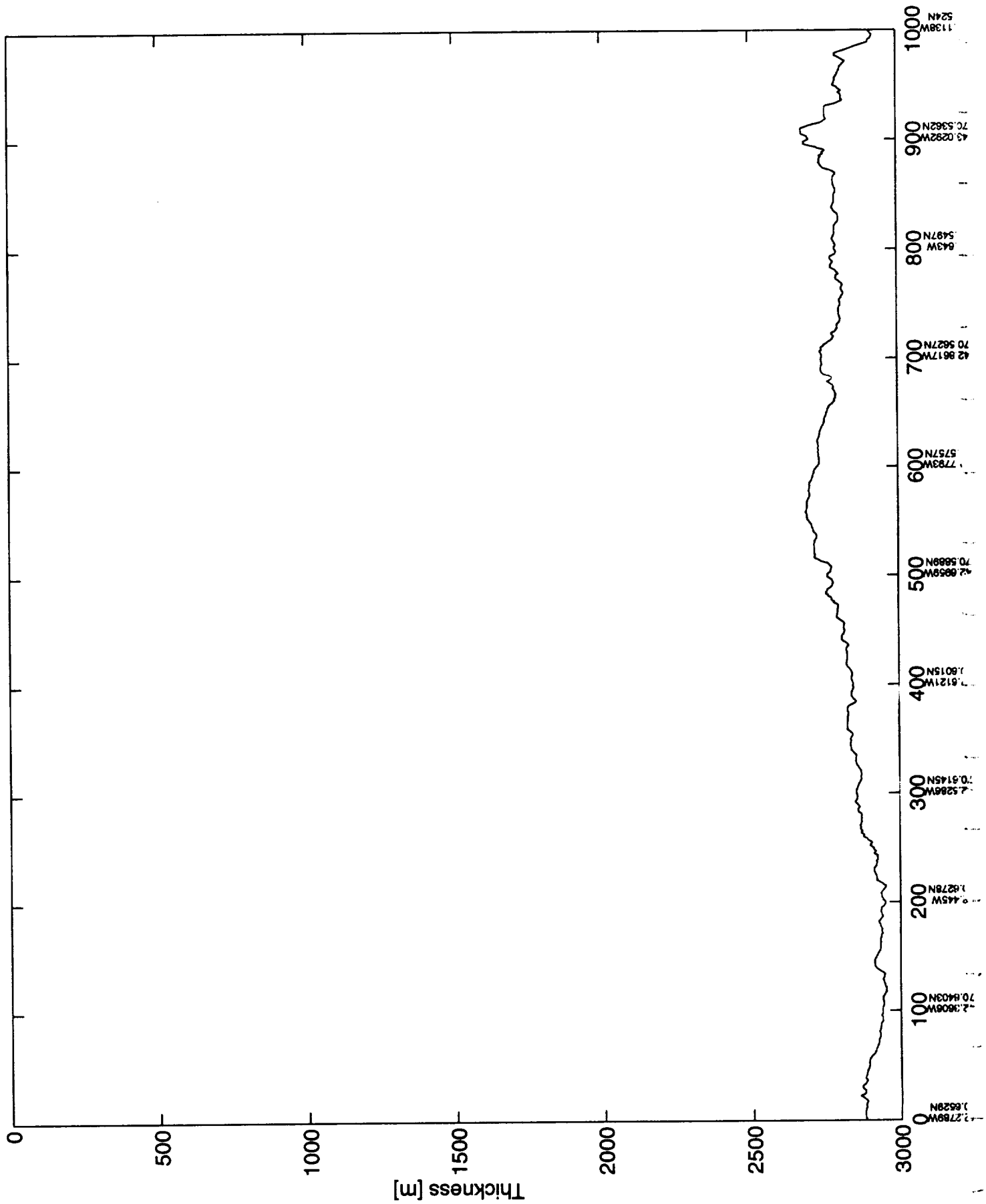
run_5l_9.1 (21) [20000-21000] thickness



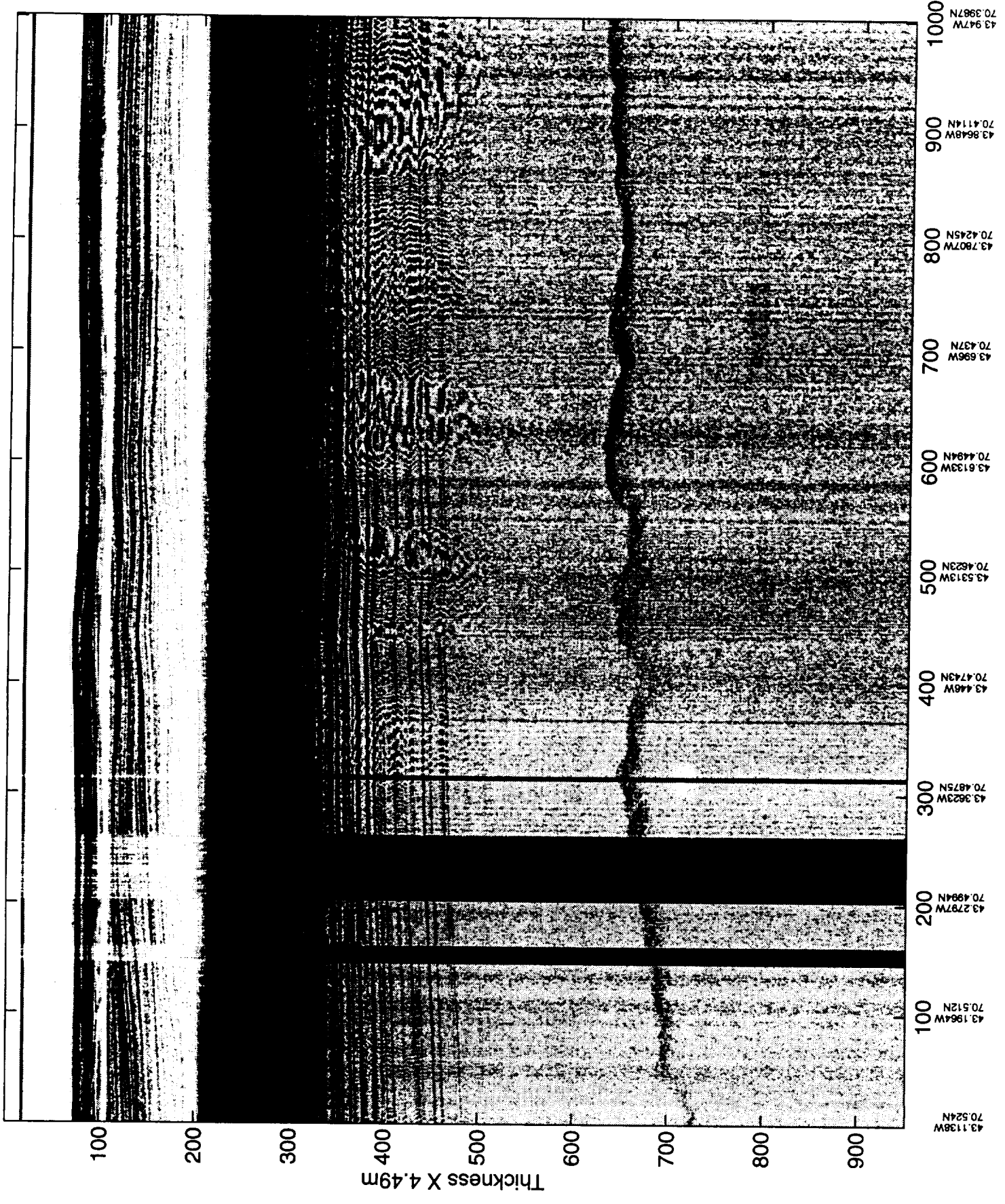
r_5l_9.122 [21000-22000]



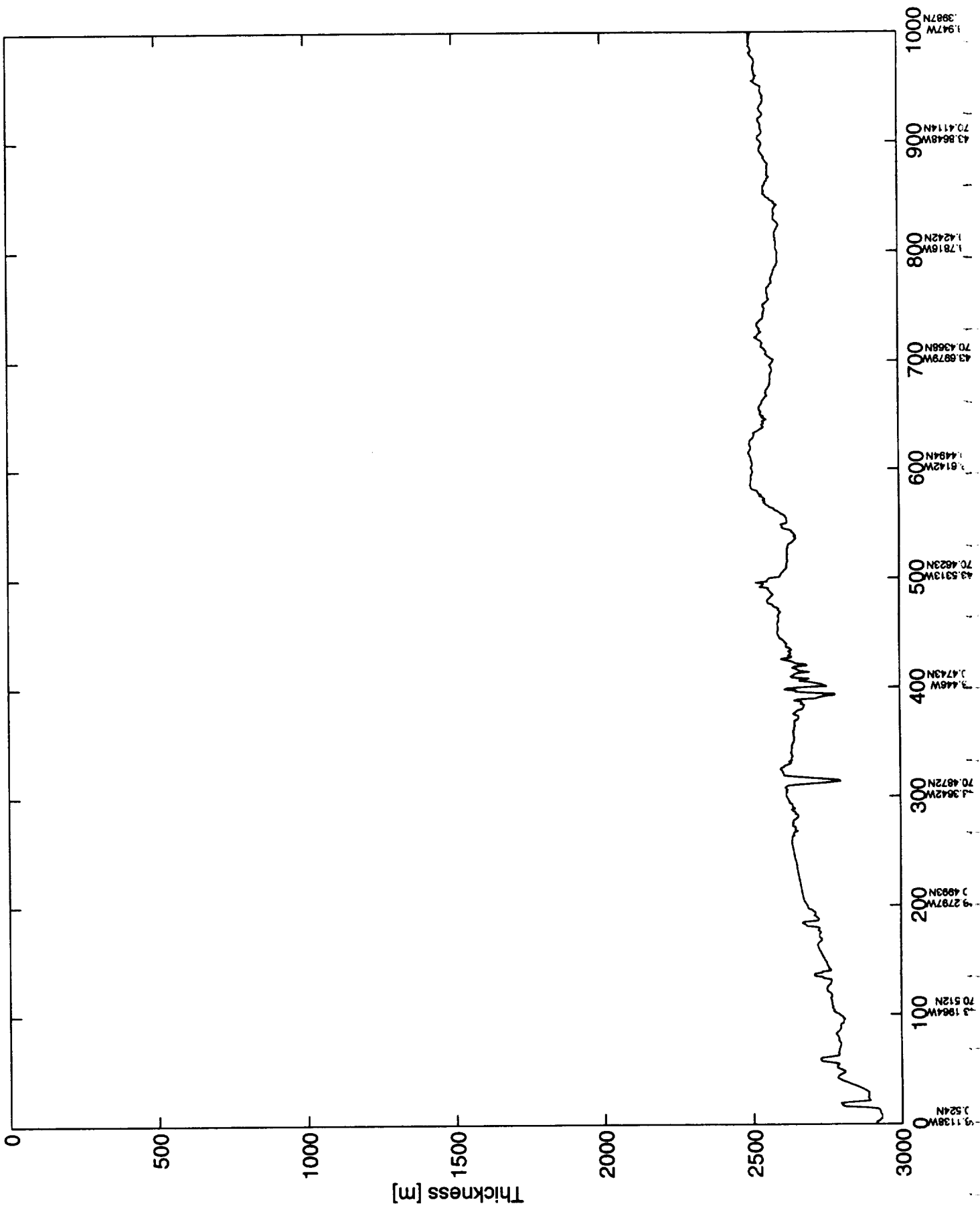
run_5l_9.1 (22) [21000-22000] thickness



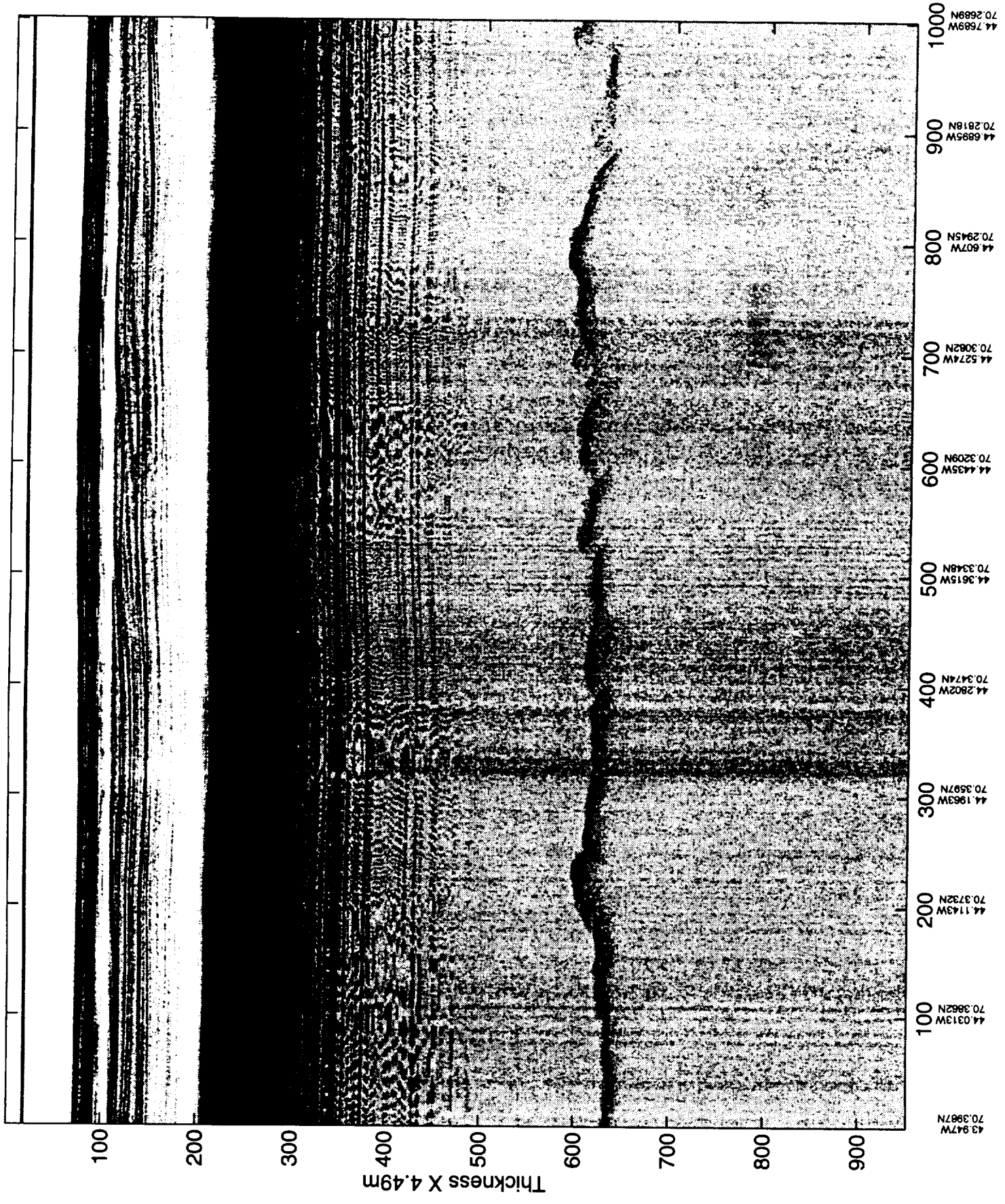
r_5l_9.123 [22000-23000]



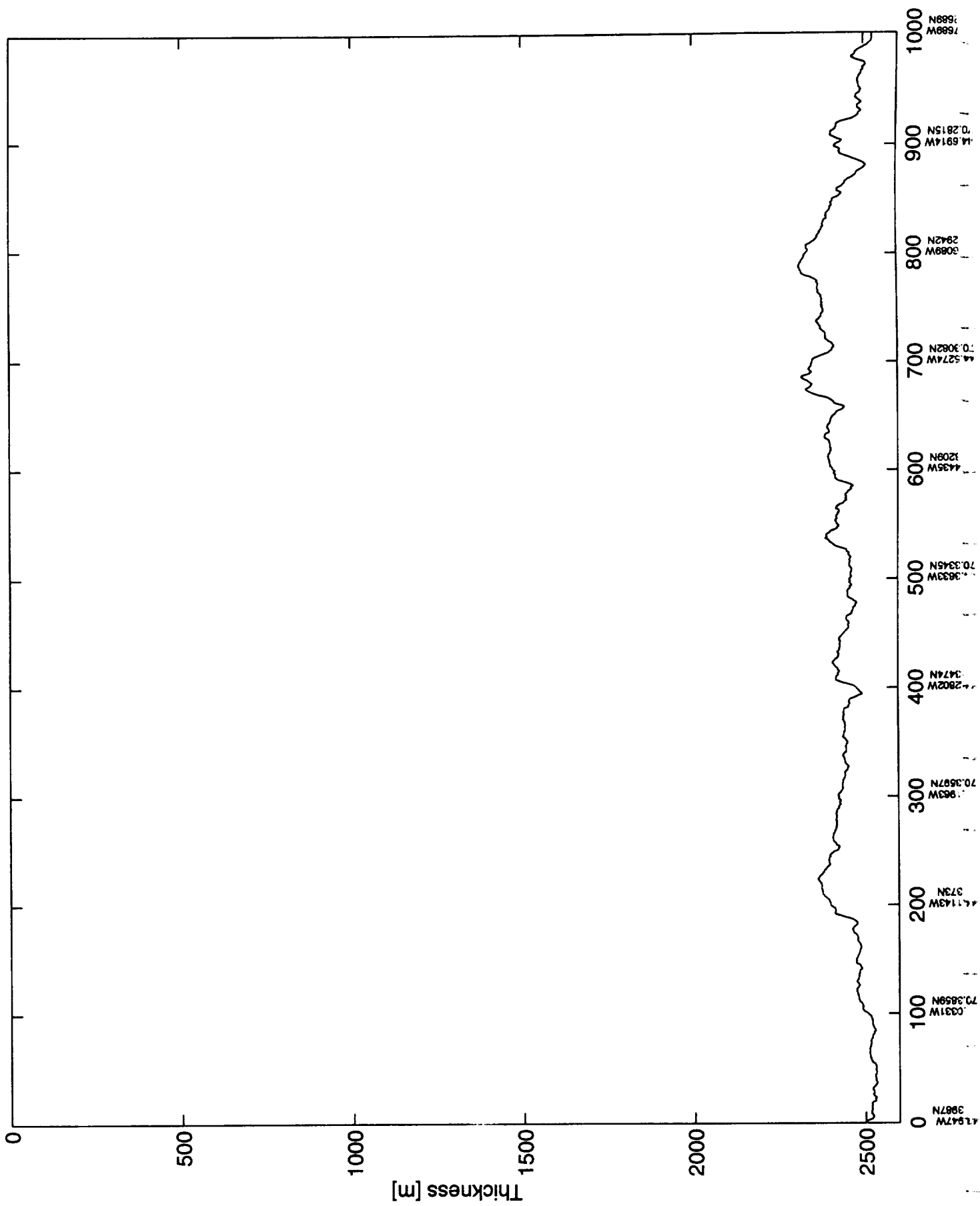
run_5l_9.1 (23) [22000-23000] thickness



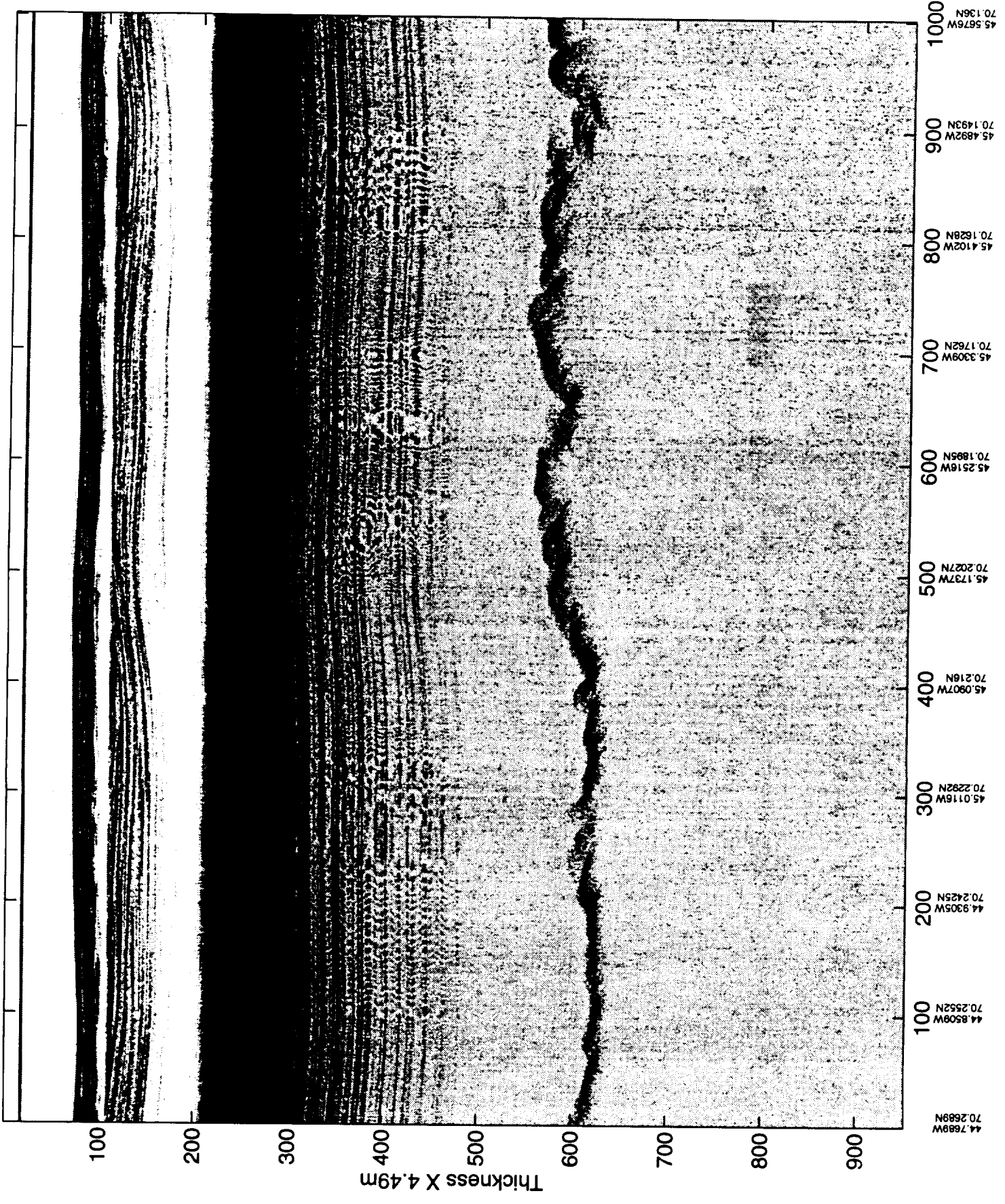
r_5l_9.124 [23000-24000]



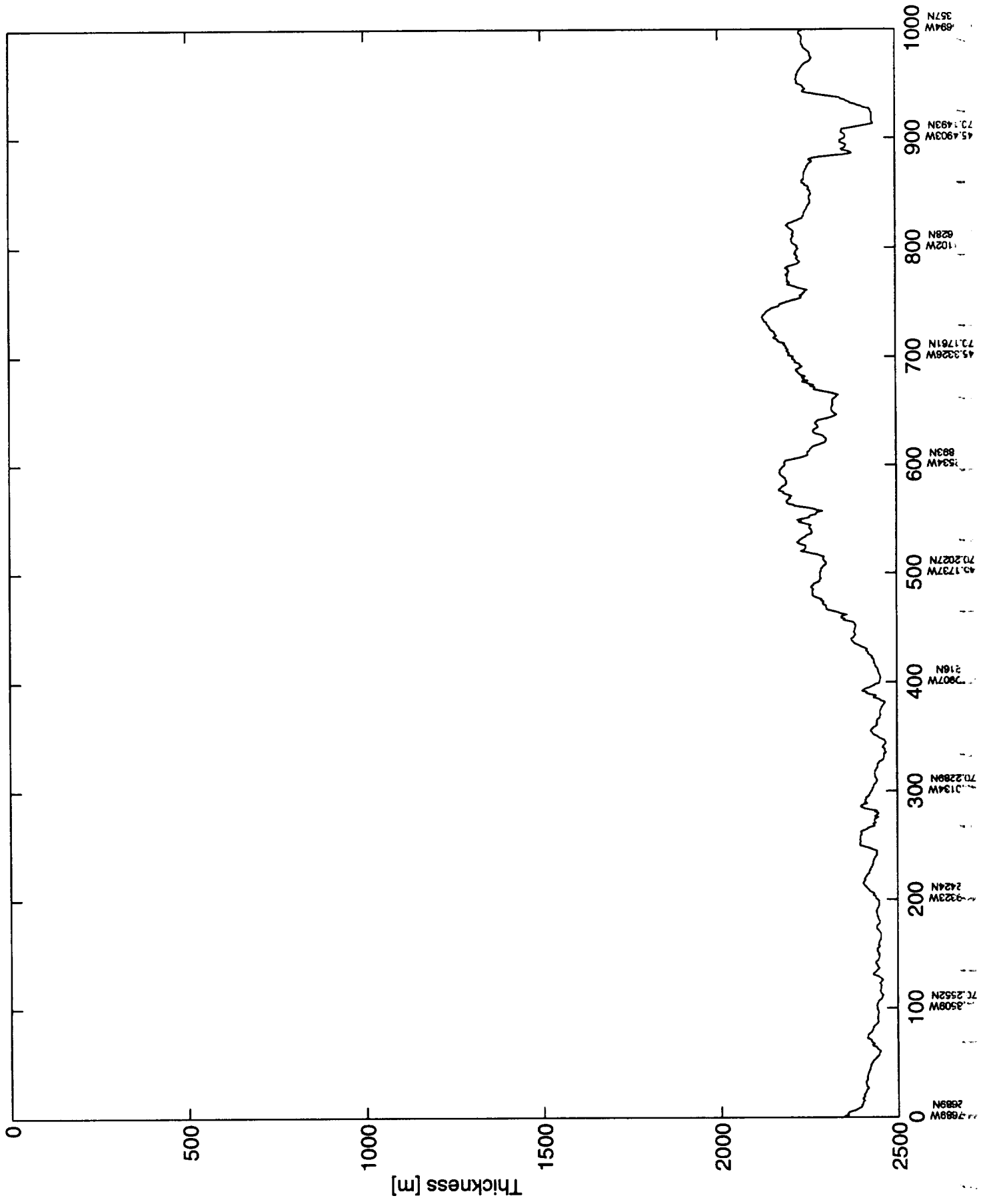
run_5l_9.1 (24) [23000-24000] thickness



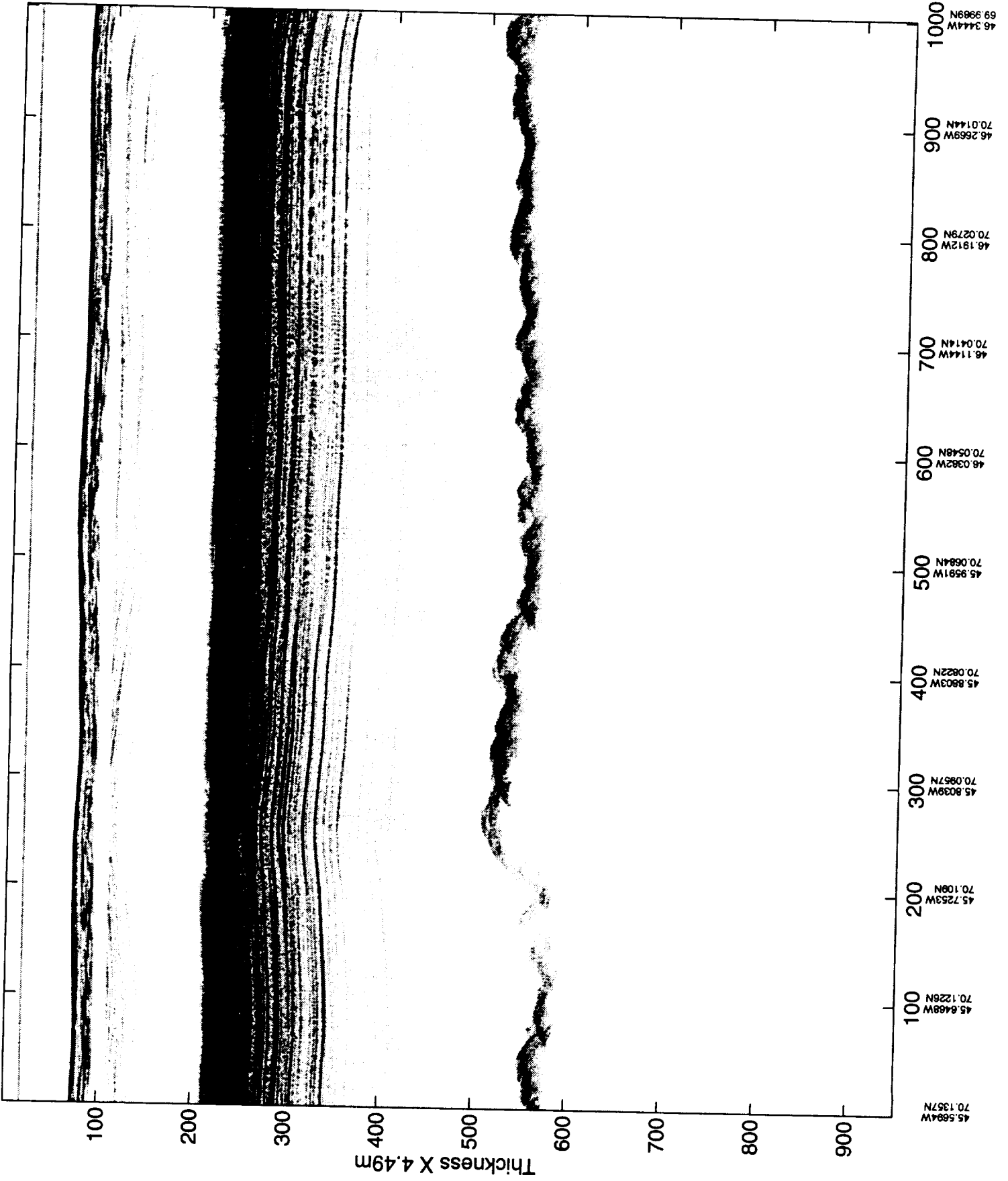
r_5|_9.125 [24000-25000]



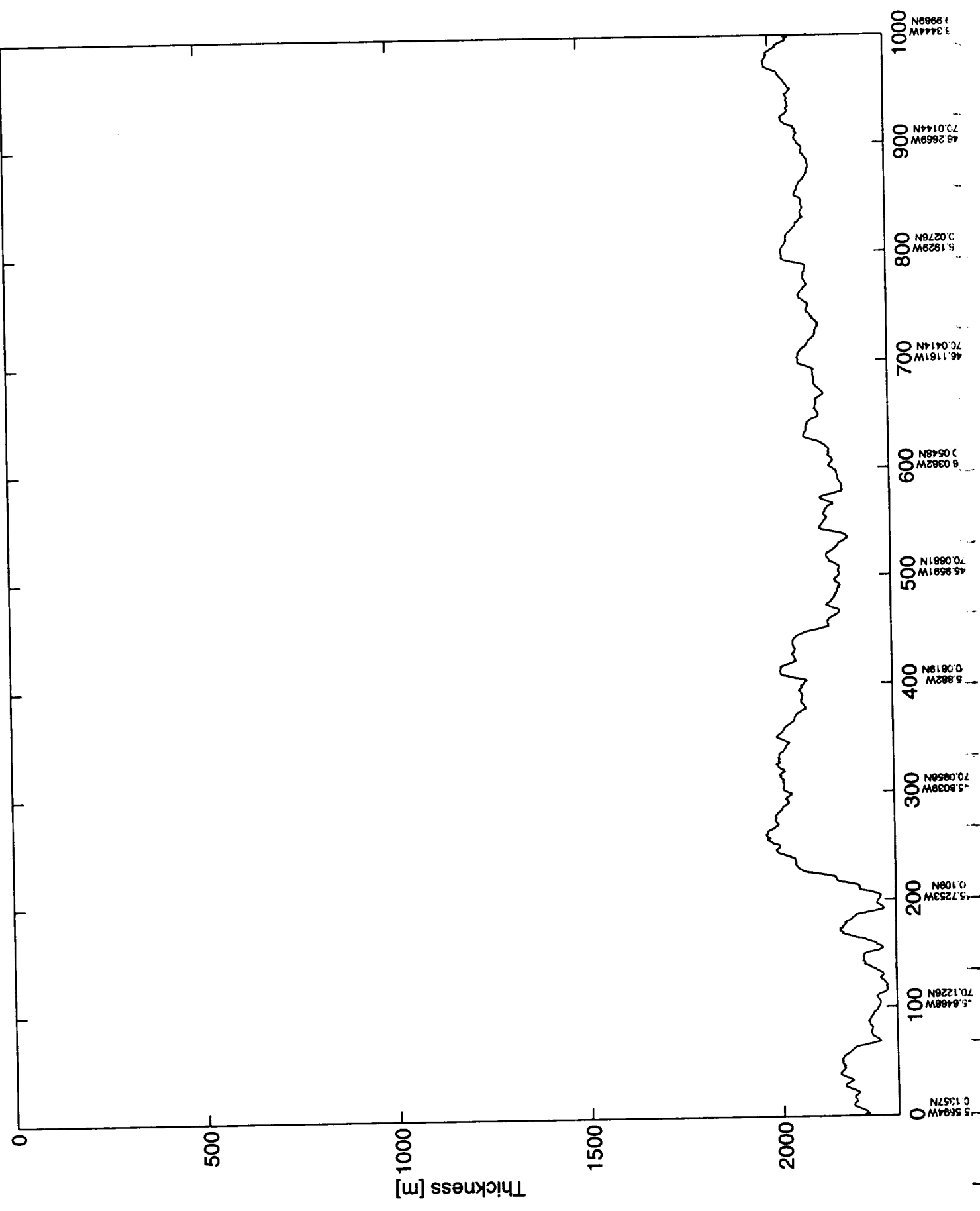
run_5l_9.1 (25) [24000-25000] thickness



r_5l_9.126 [25000-26000]



run_5l_9.1 (26) [25000-26000] thickness



r_5l_9.127 [26000-26298]



100

200

300

400

500

600

700

800

900

Thickness X 4.9m

250

200

150

100

50

69.9609N
46.528W

69.9685N
46.4908W

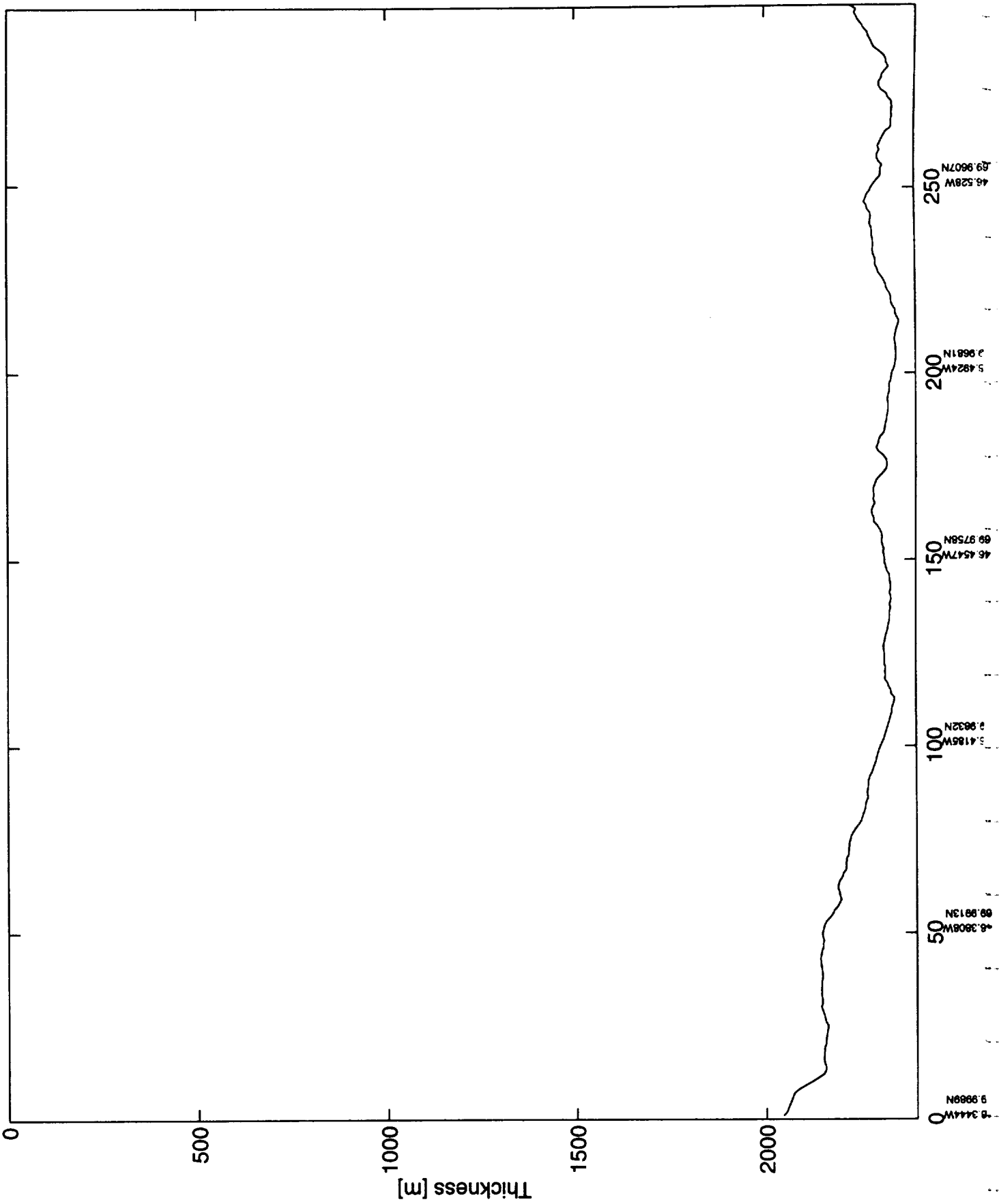
69.9758N
46.4547W

69.9834N
46.4169W

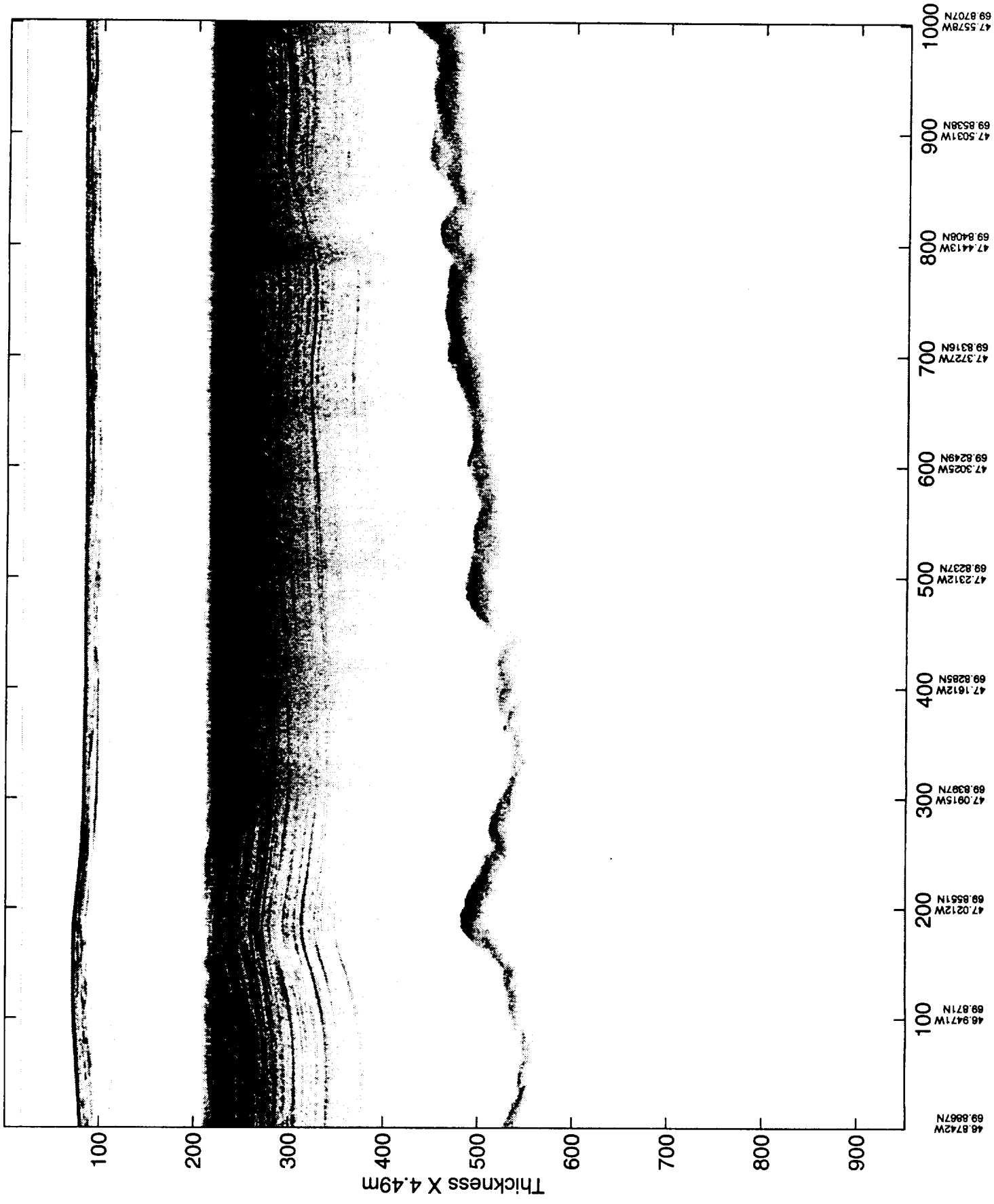
69.9913N
46.3808W

69.9989N
46.3444W

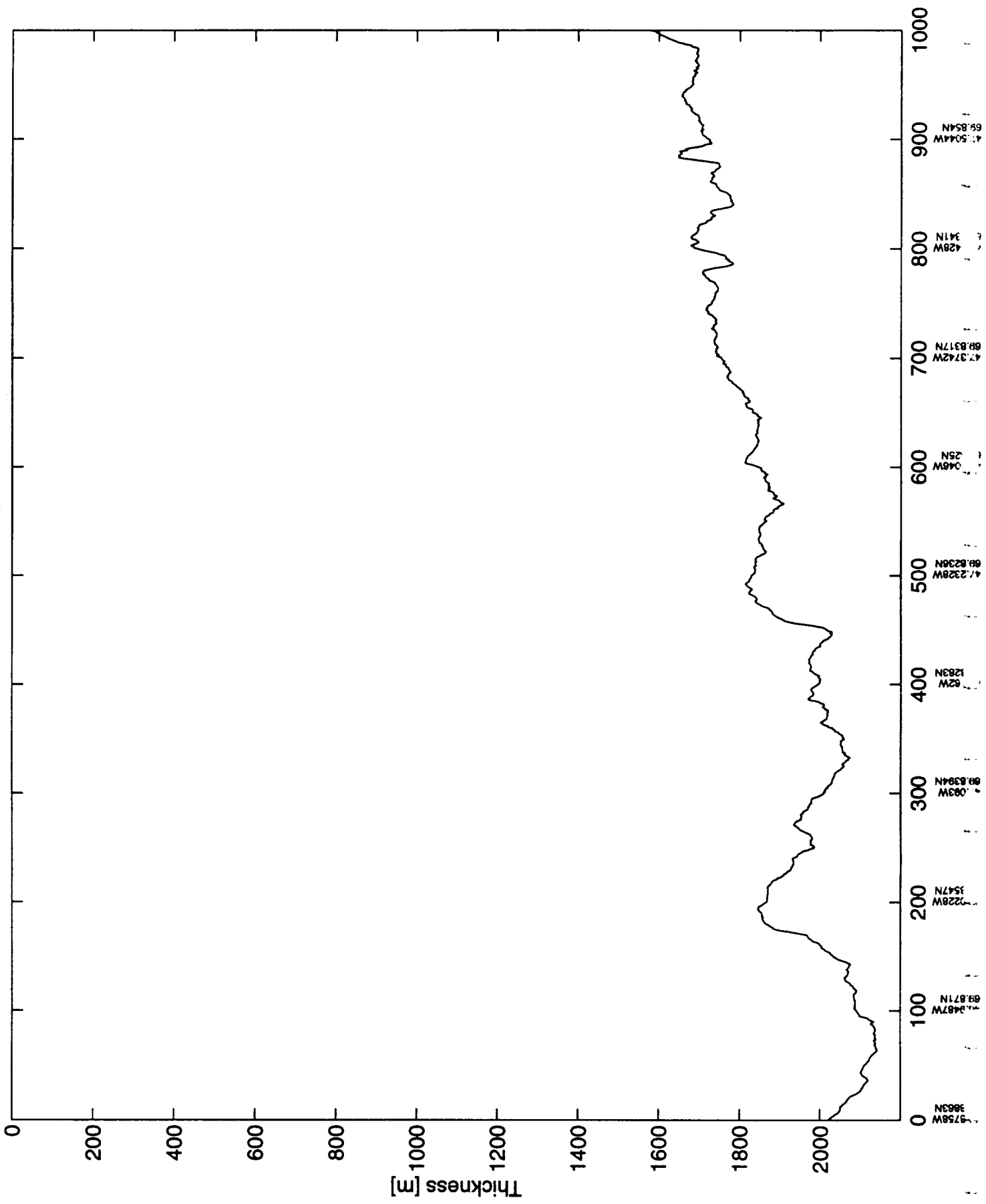
run_5l_9.1 (27) [26000-26298] thickness



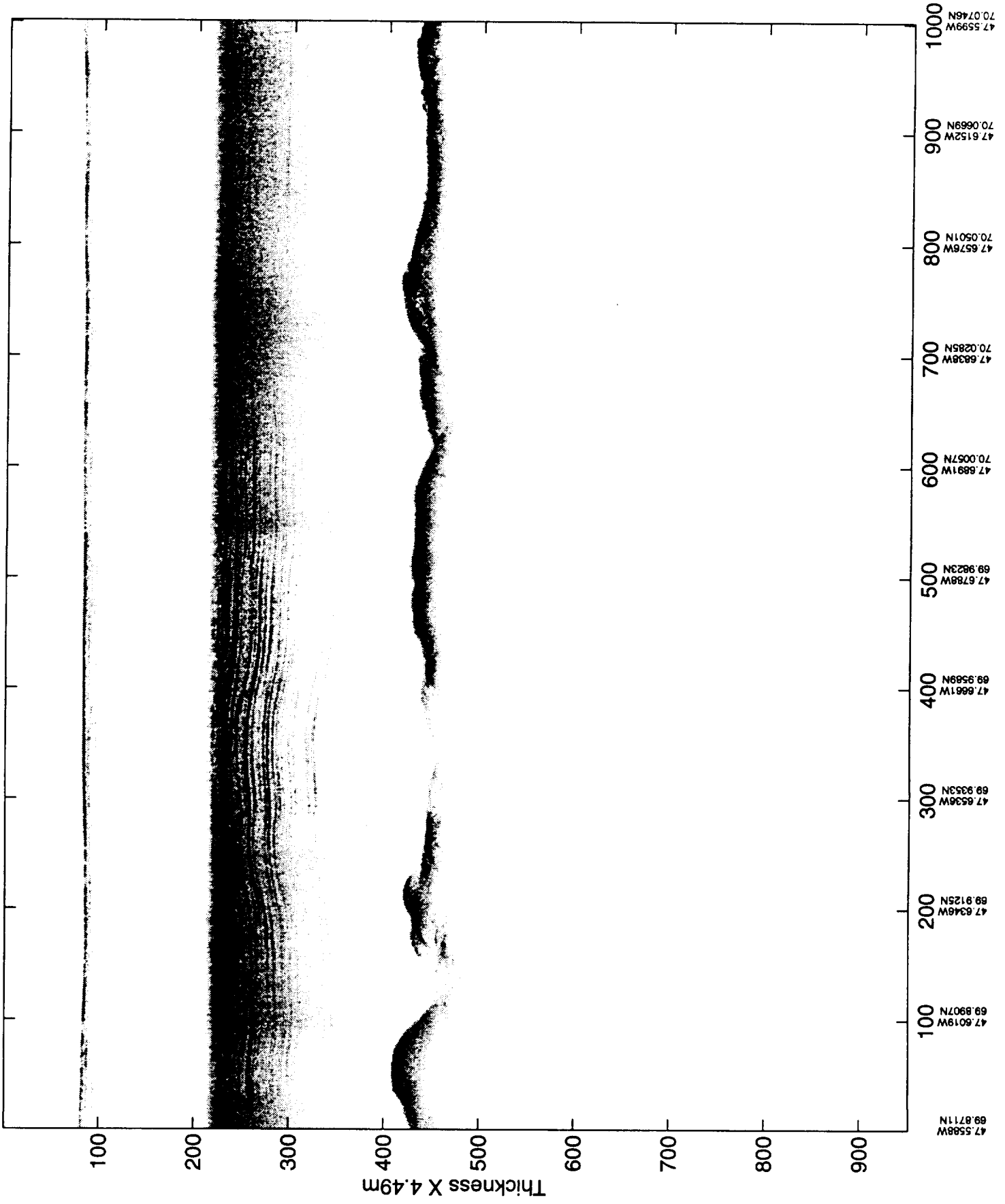
r_5l_10.11 [0-1000]



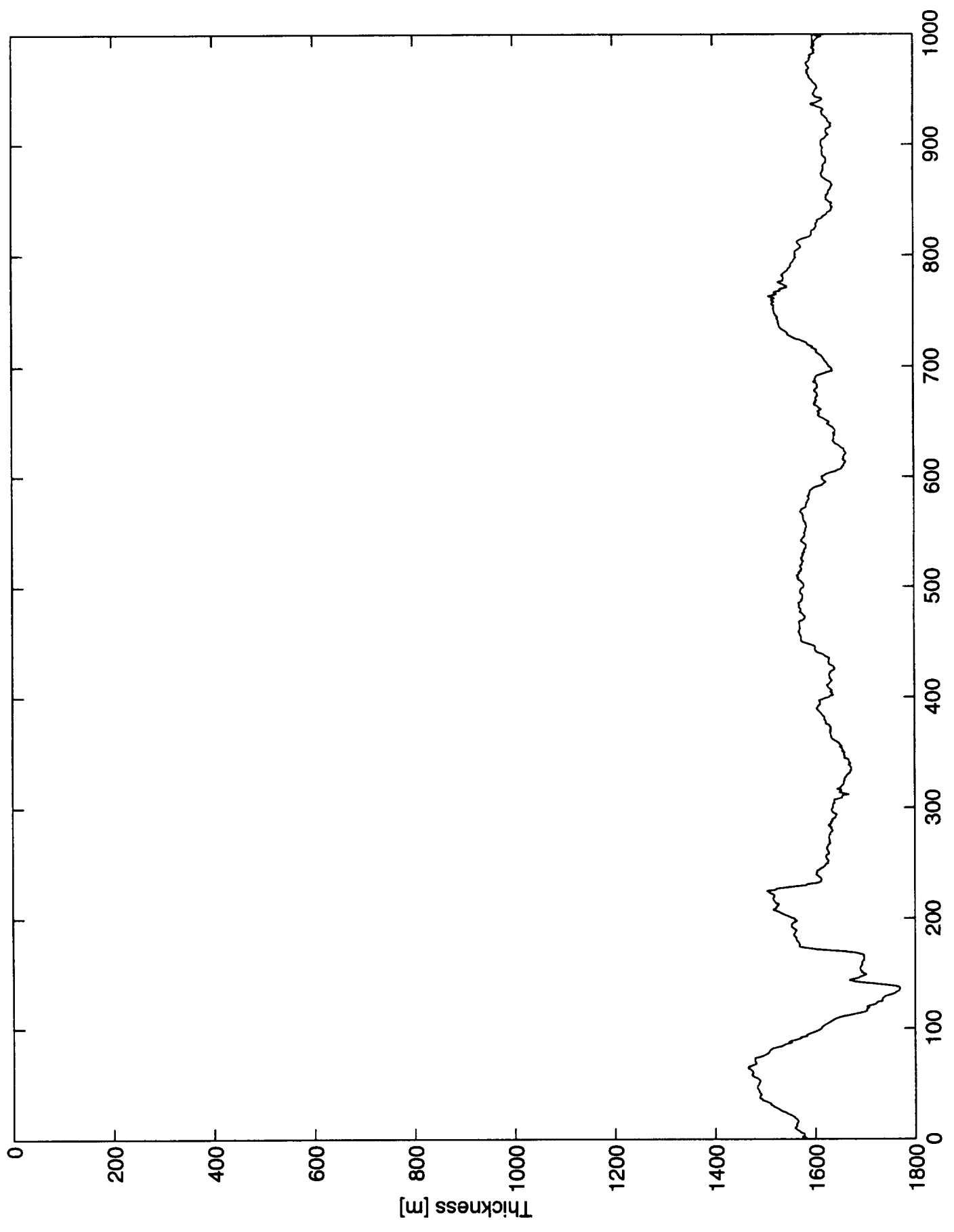
run_5l_10.1 (1) [0-1000] thickness



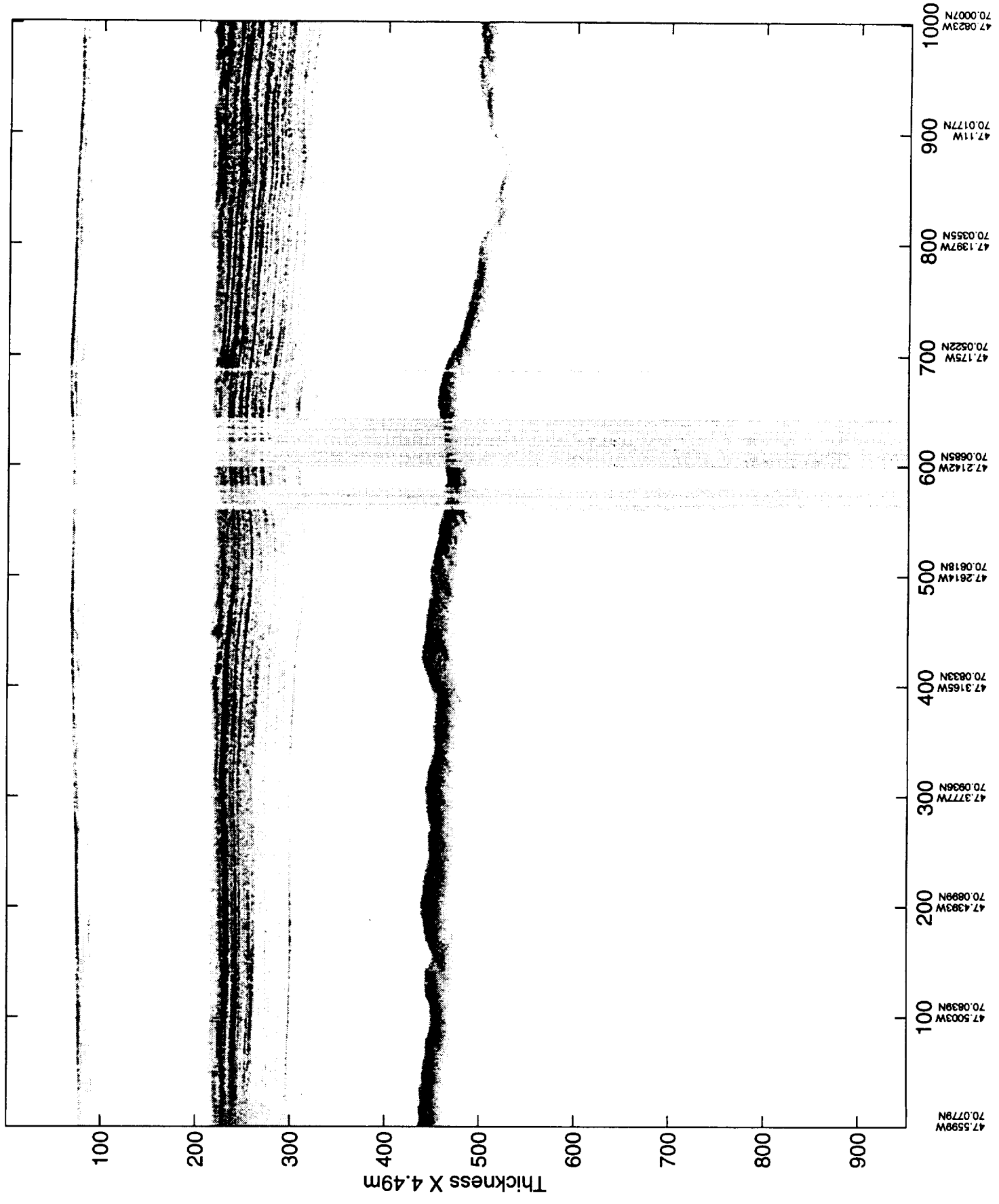
r_5l_10.12 [1000-2000]



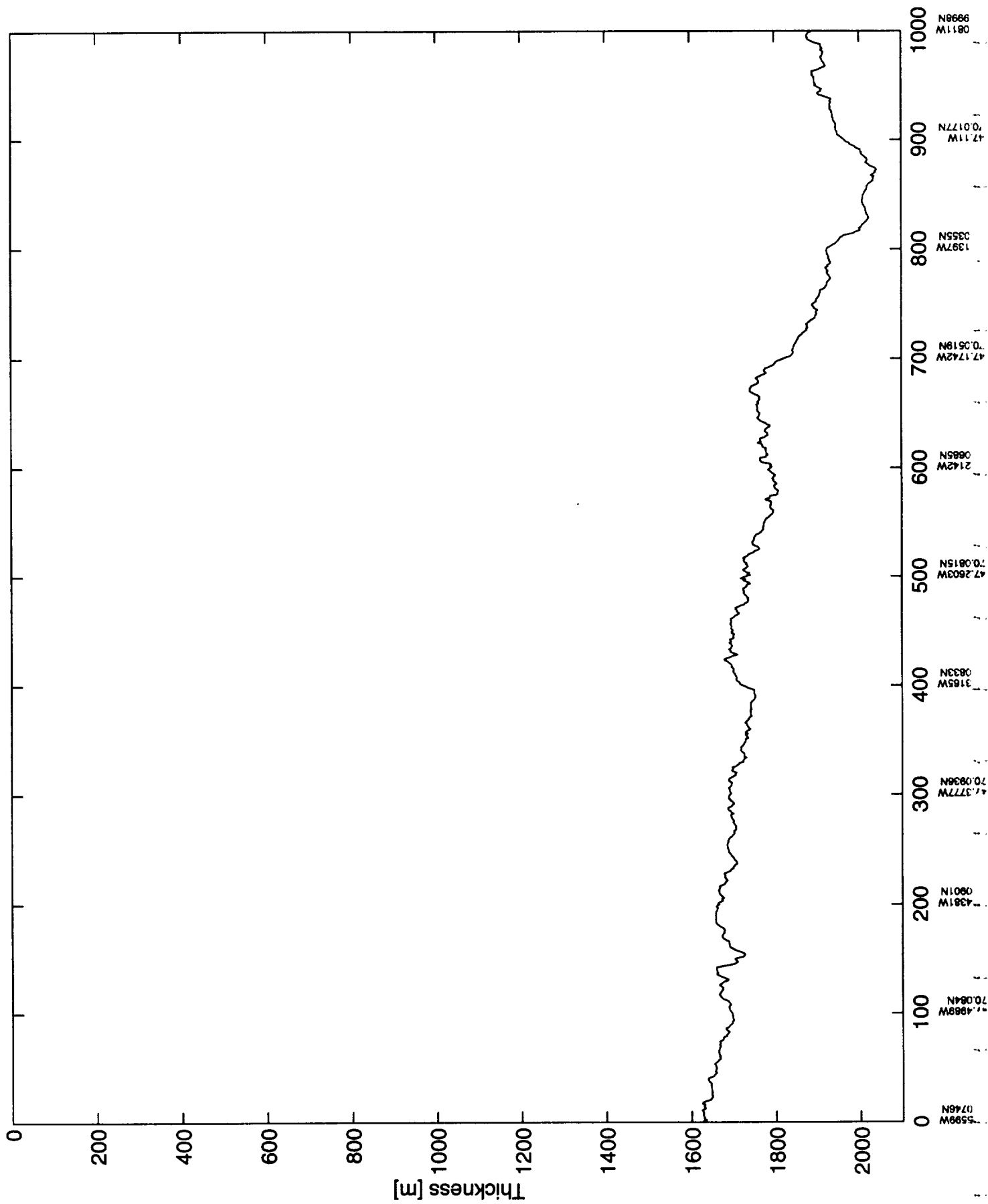
run_5l_10.1 (2) [1000-2000] thickness



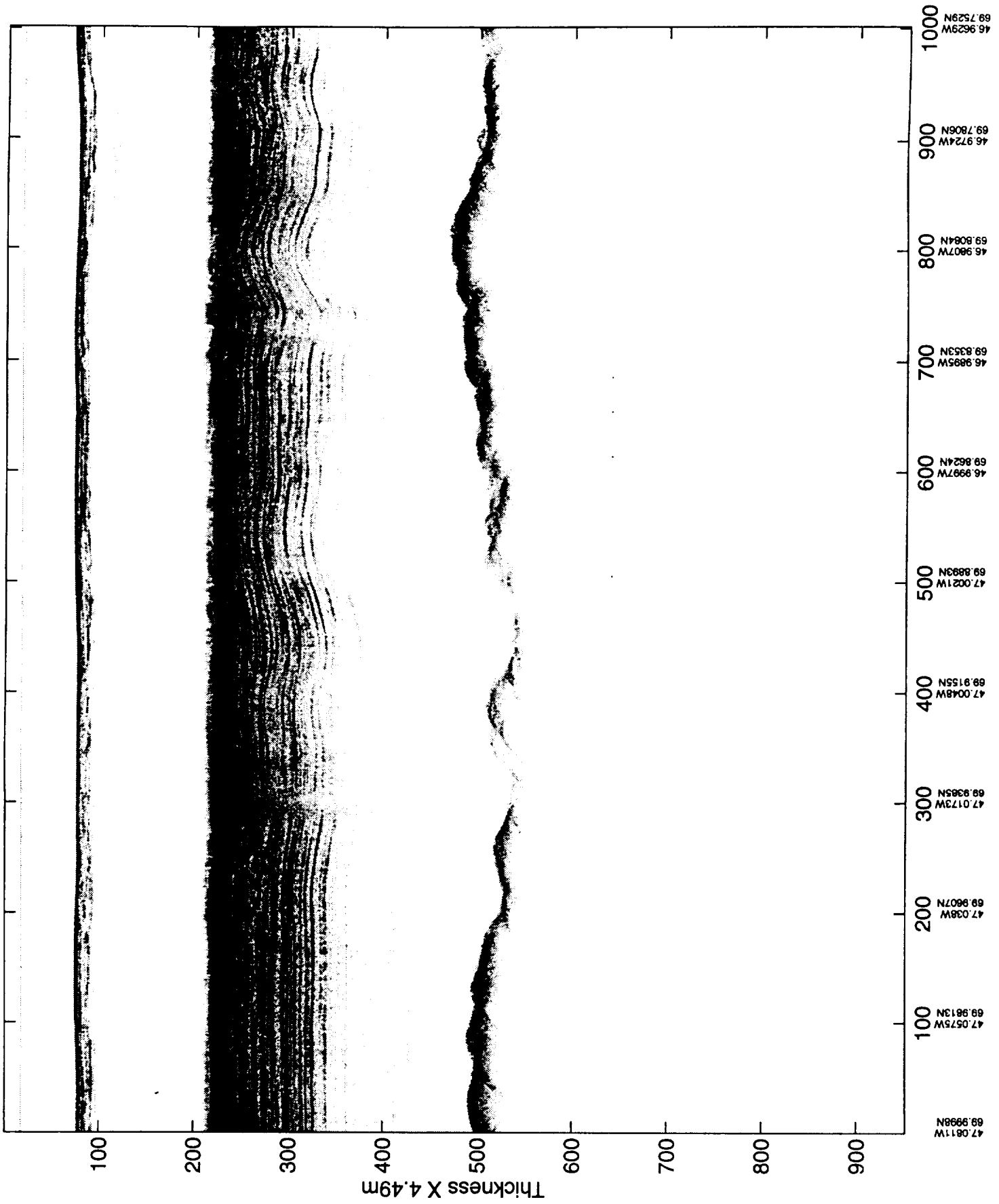
r_5l_10.13 [2000-3000]



run_5l_10.1 (3) [2000-3000] thickness

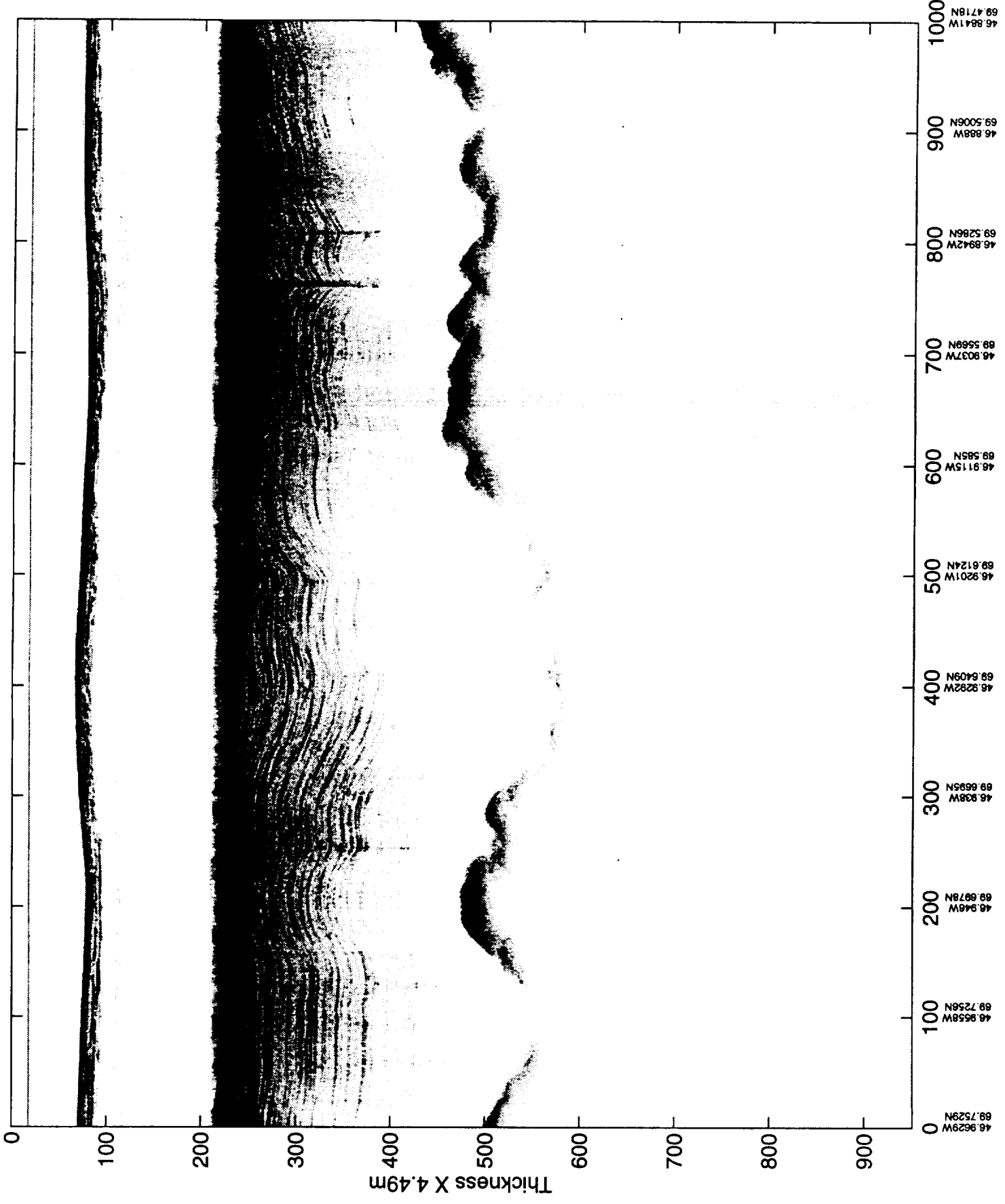


r_5l_10.14 [3000-4000]

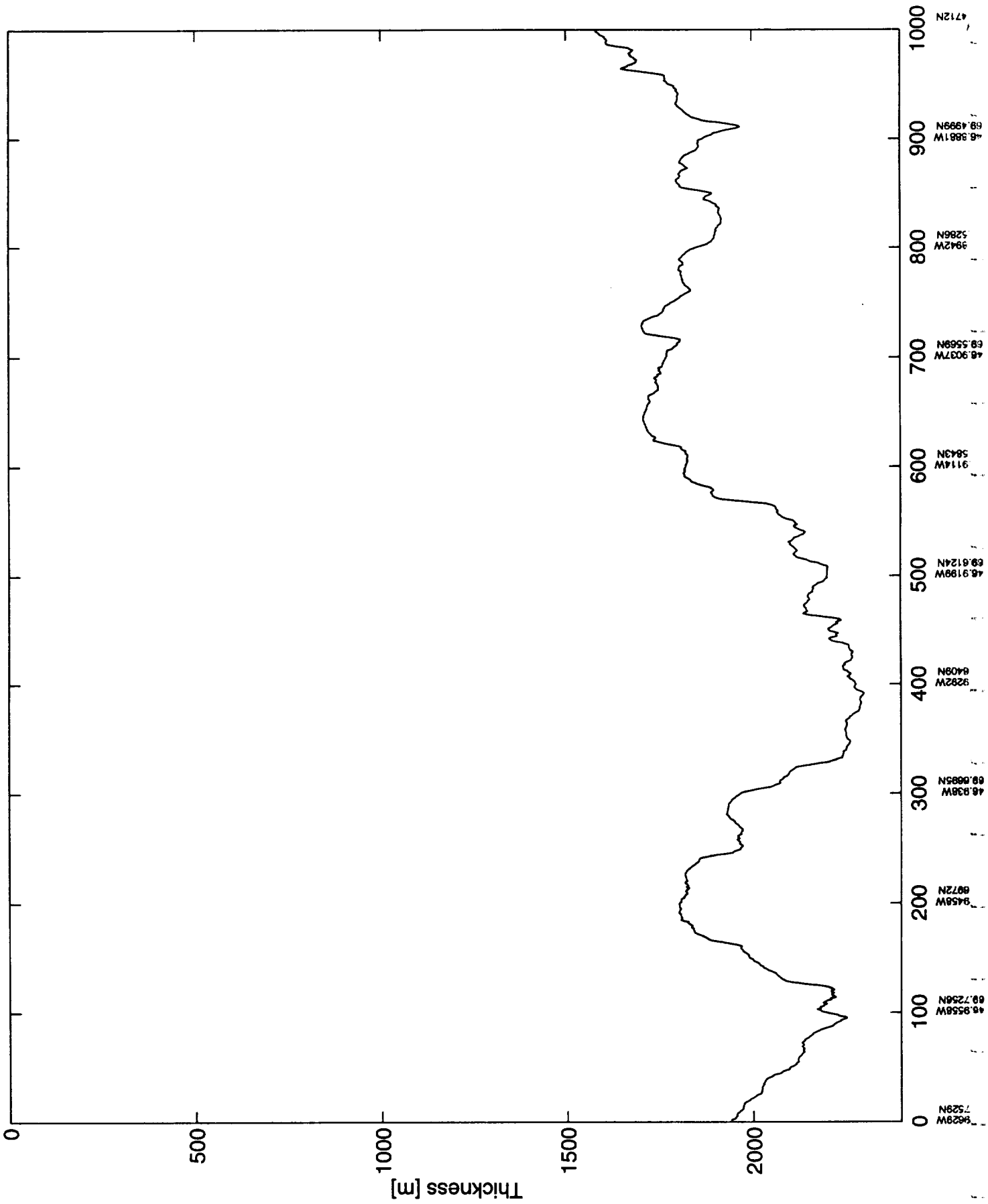


47.0811W
69.9998N
47.0575W
69.9813N
47.038W
69.9607N
47.0173W
69.9385N
47.0048W
69.9155N
47.0021W
69.8893N
46.9997W
69.8624N
46.9895W
69.8353N
46.9807W
69.8084N
46.9724W
69.7806N
46.9629W
69.7529N

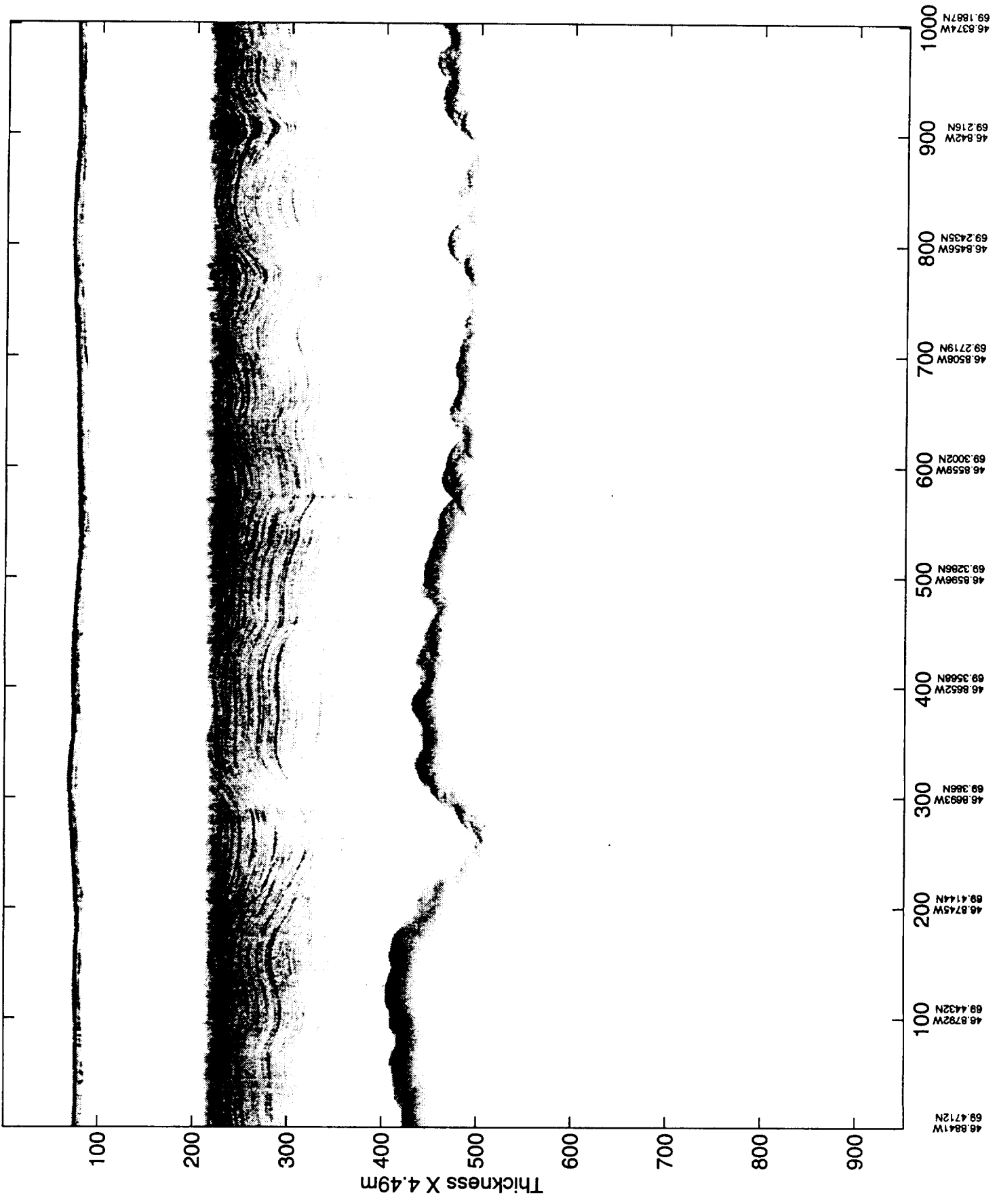
r_5l_10.15 [4000-5000]



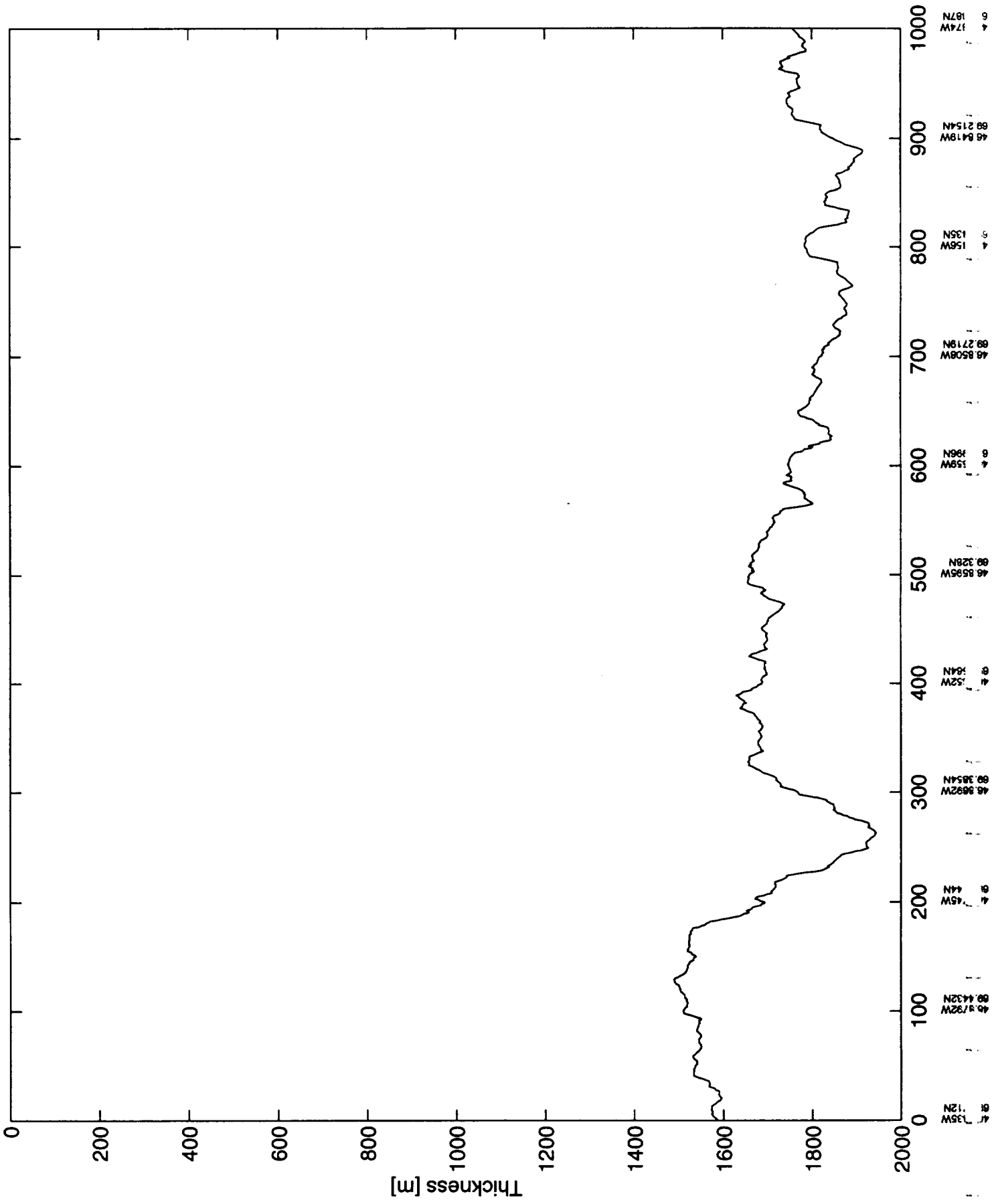
run_5l_10.1 (5) [4000-5000] thickness



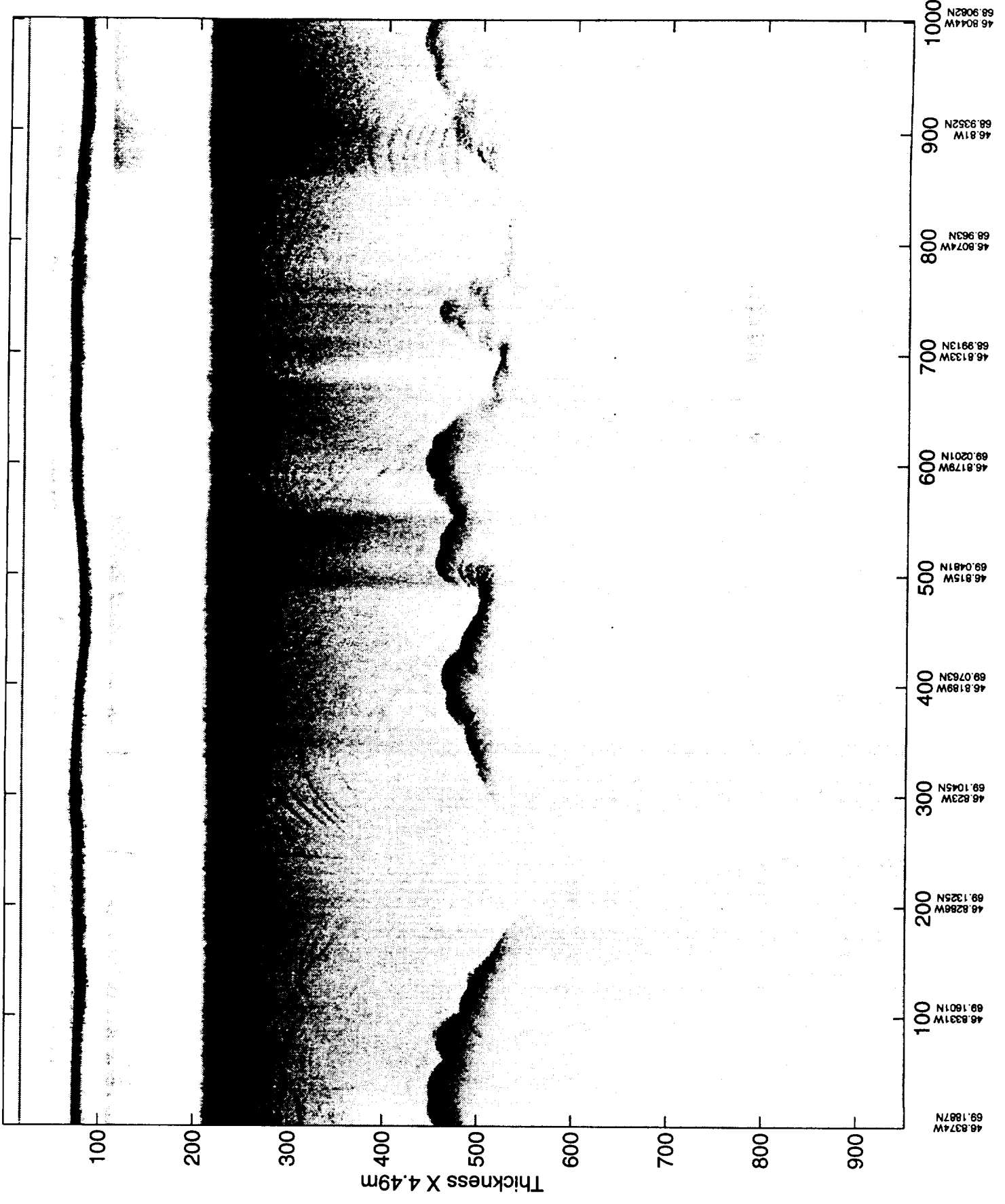
r_5L_10.16 [5000-6000]



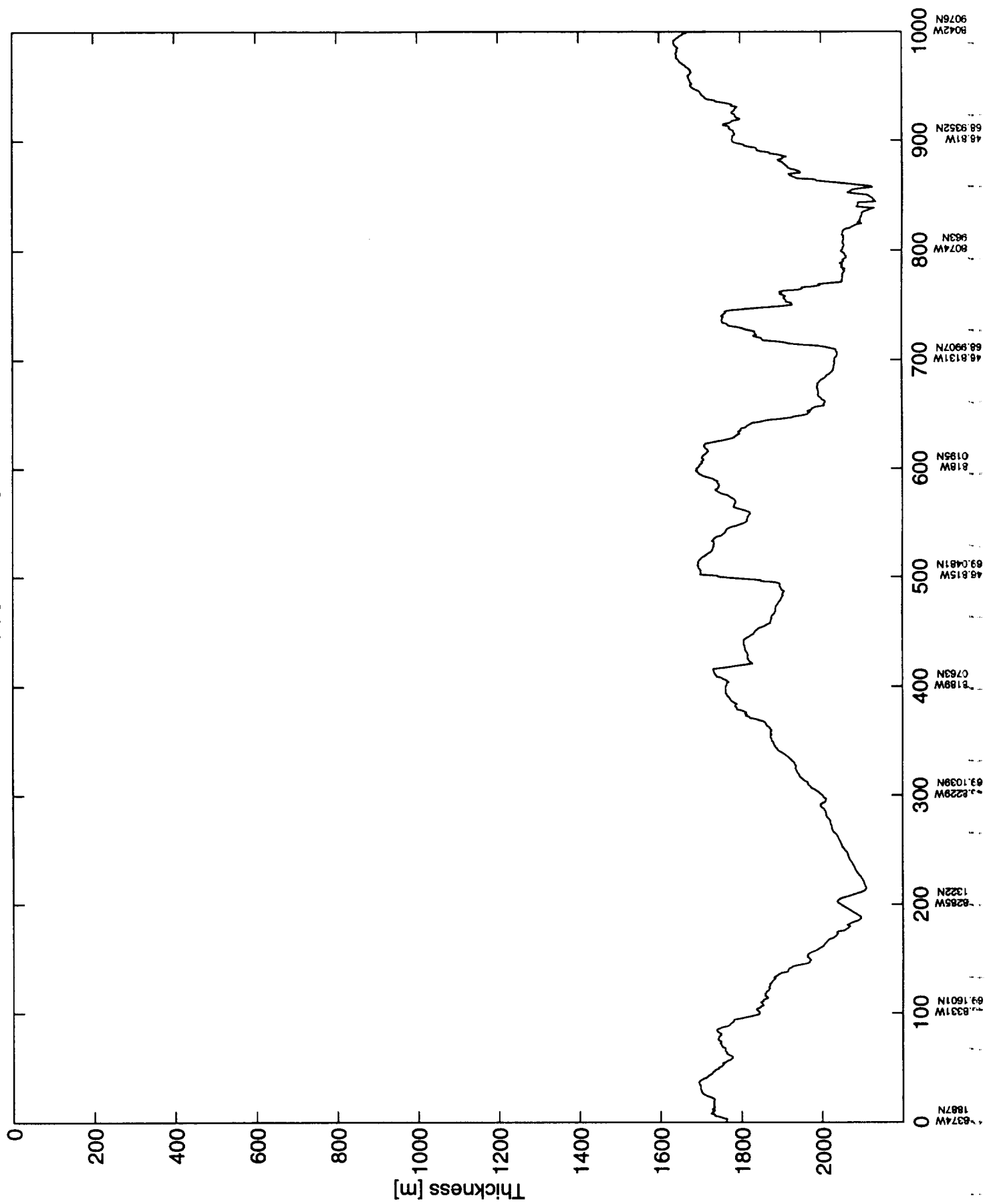
run_5l_10.1 (6) [5000-6000] thickness



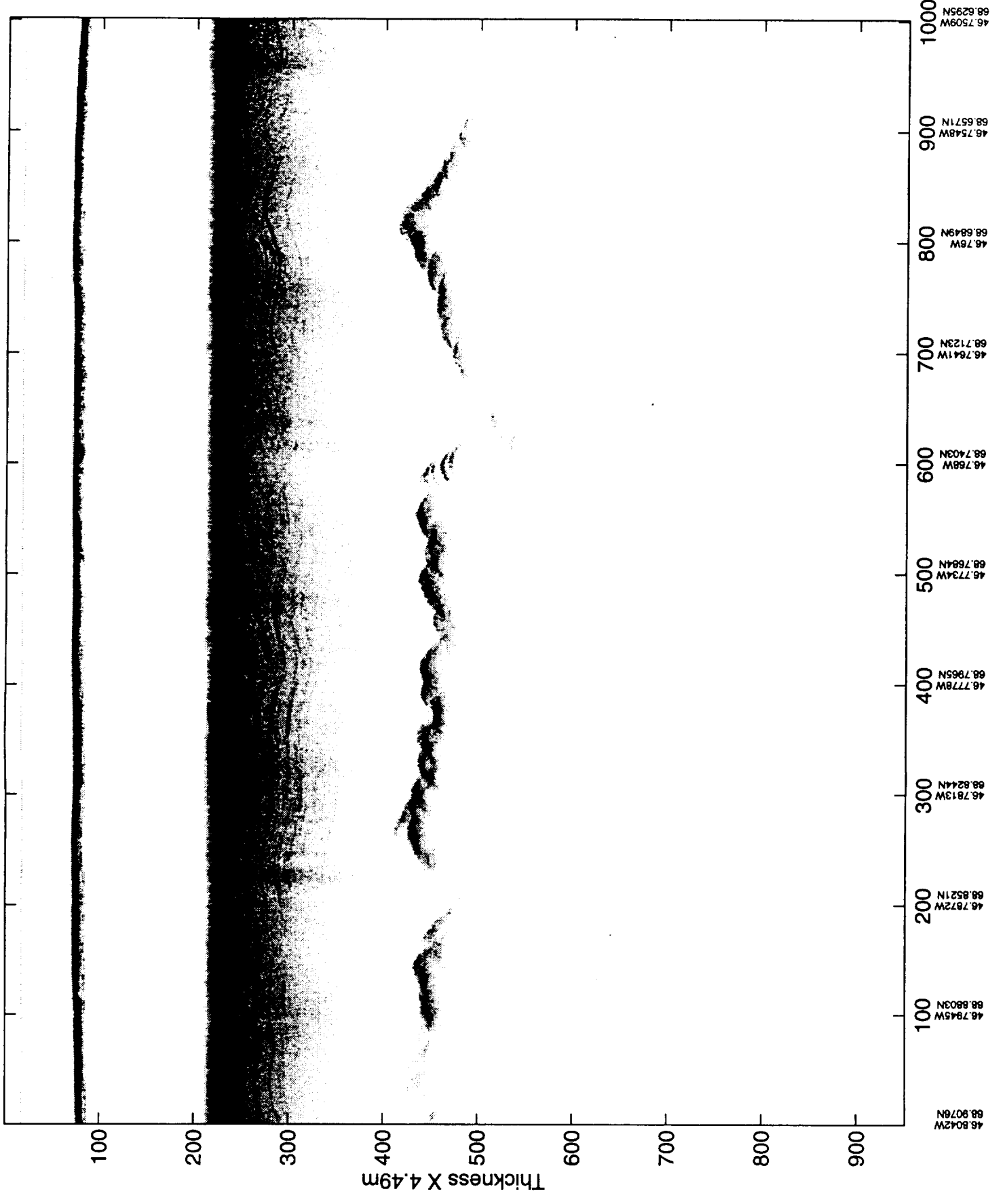
r_5l_10.17 [6000-7000]



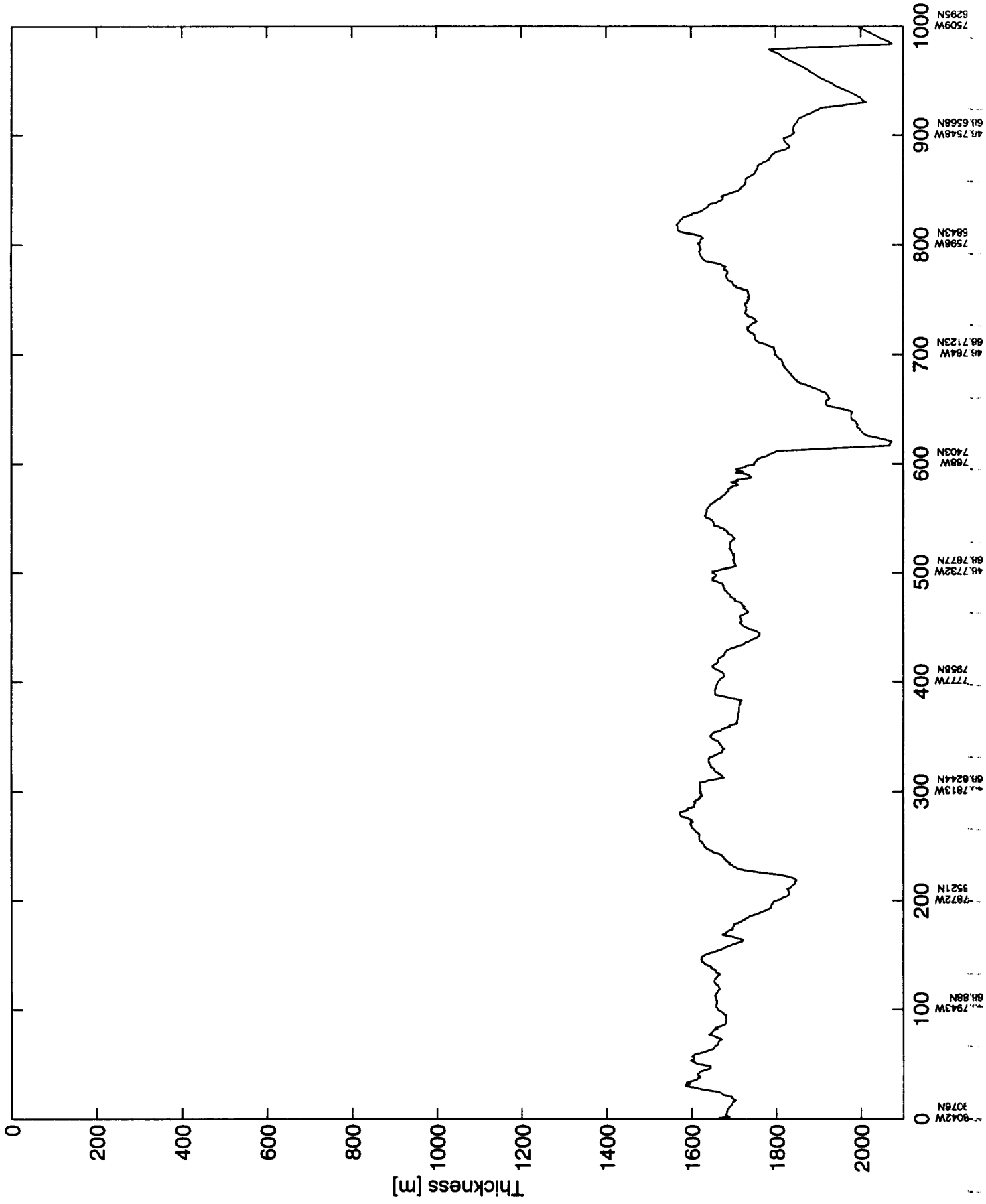
run_5l_10.1 (7) [6000-7000] thickness



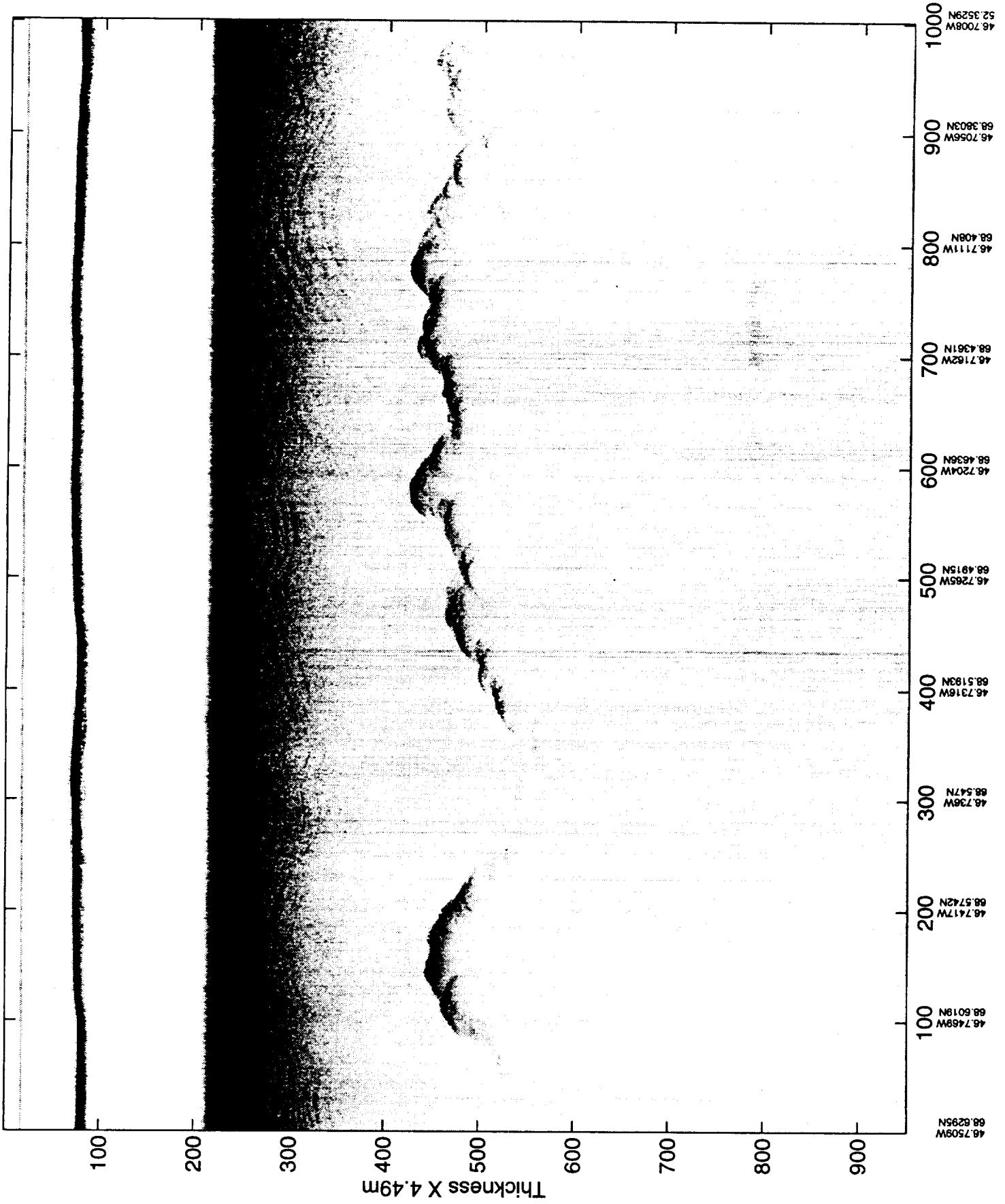
r_5|_10.18 [7000-8000]



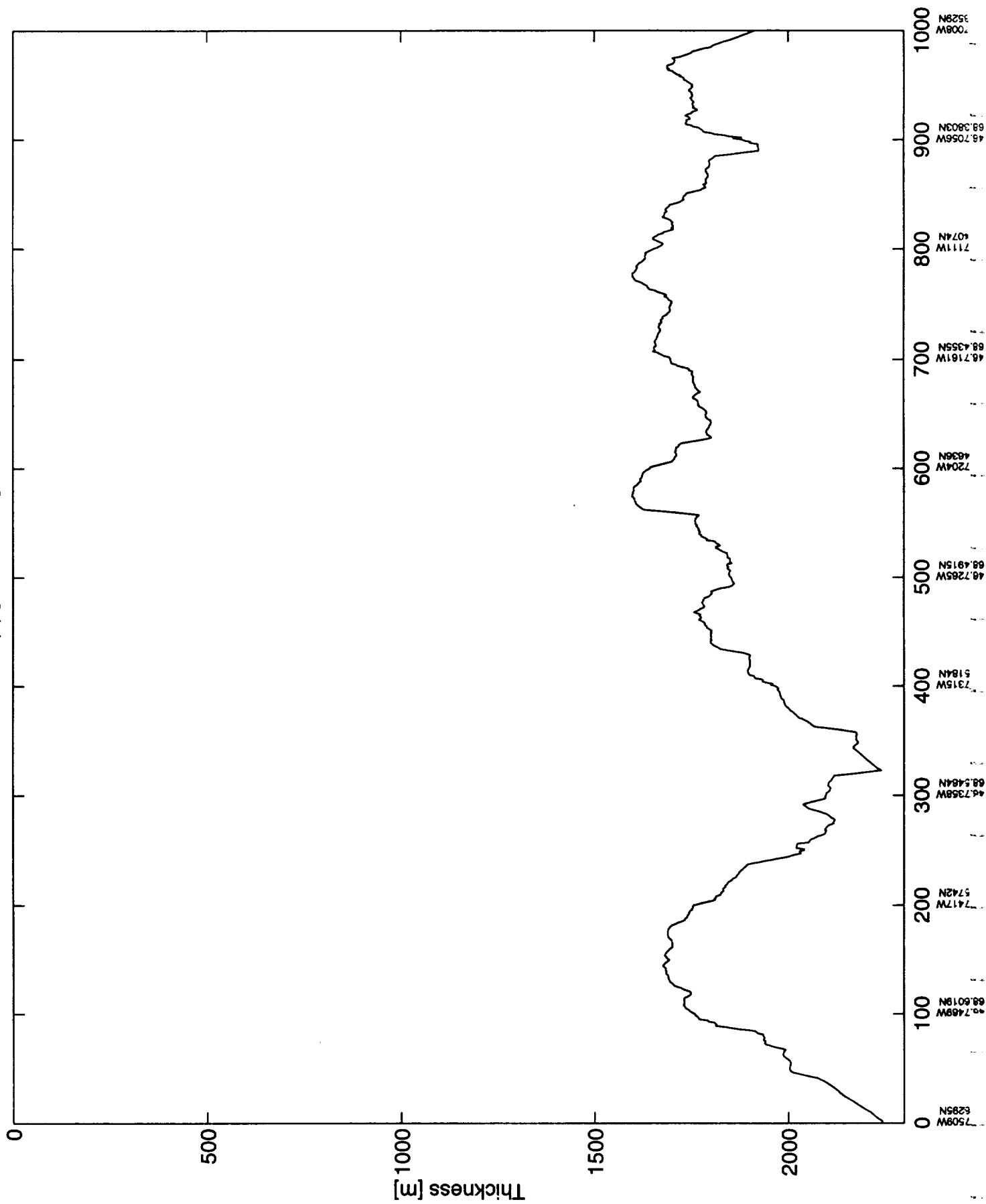
run_5l_10.1 (6) [7000-8000] thickness



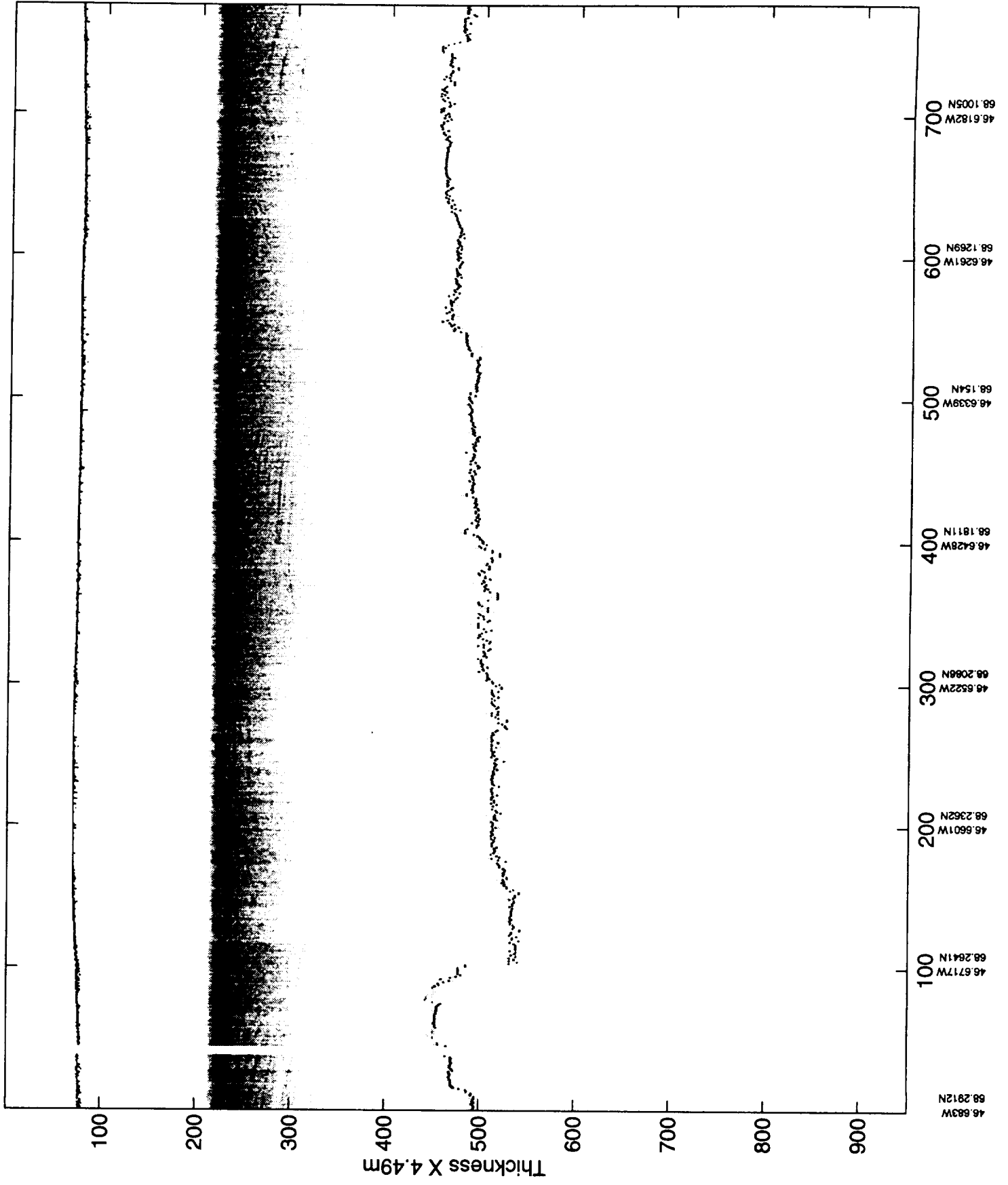
r_5l_10.19 [8000-9000]



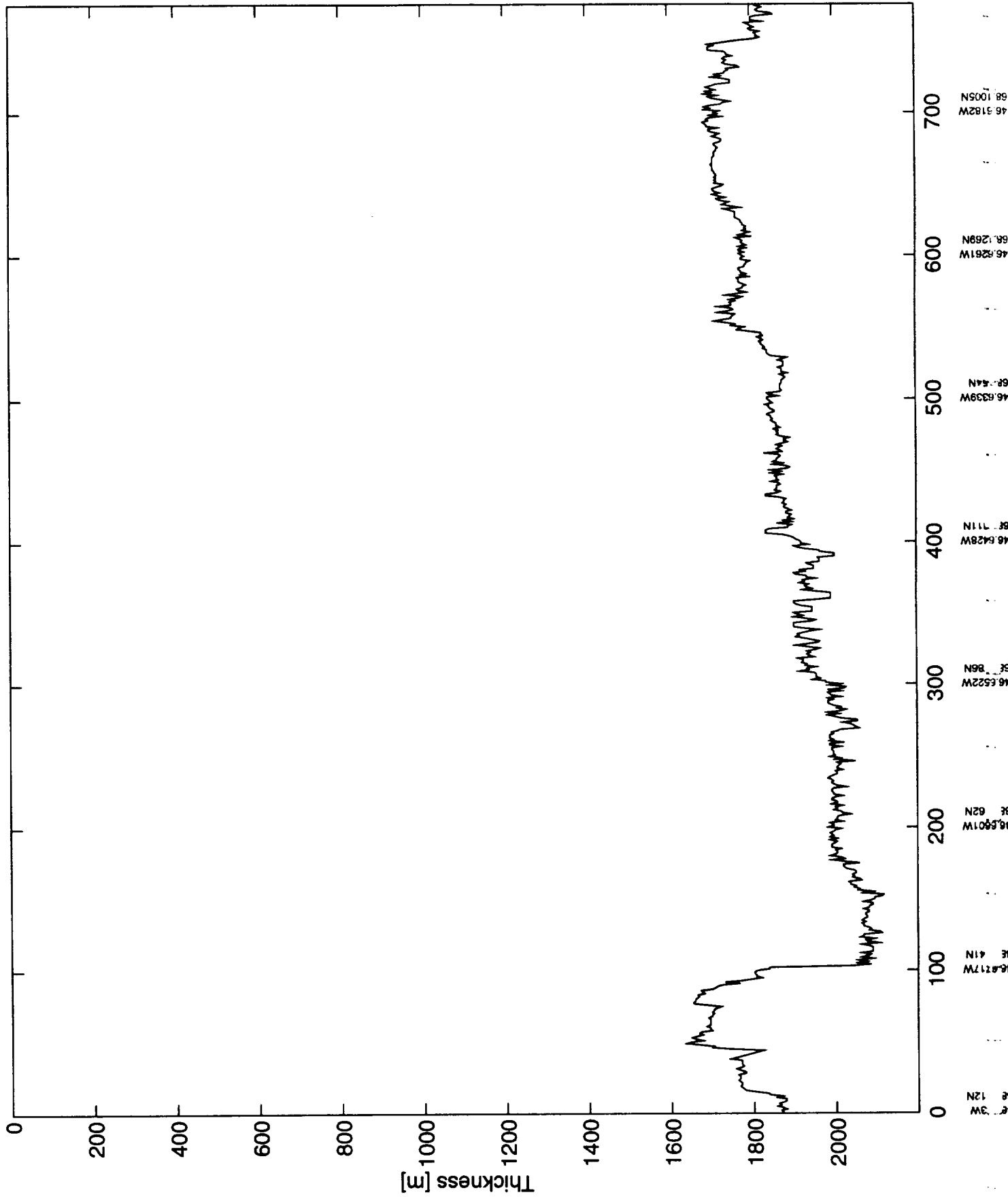
run_5l_10.1 (7) [8000-9000] thickness



r_5[10.110a [9225--10000]

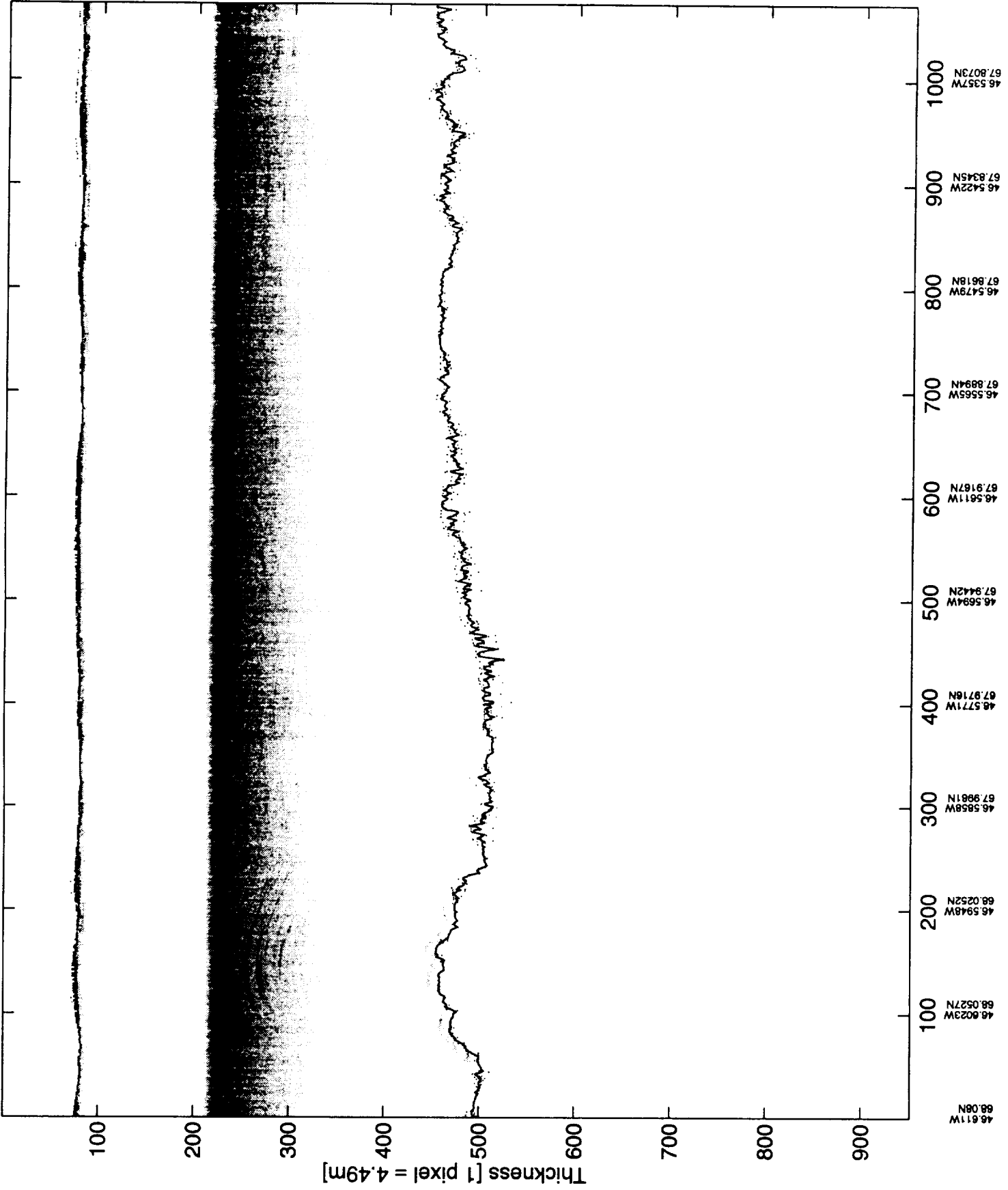


r_5l_10.110a [9225-10000] thickness

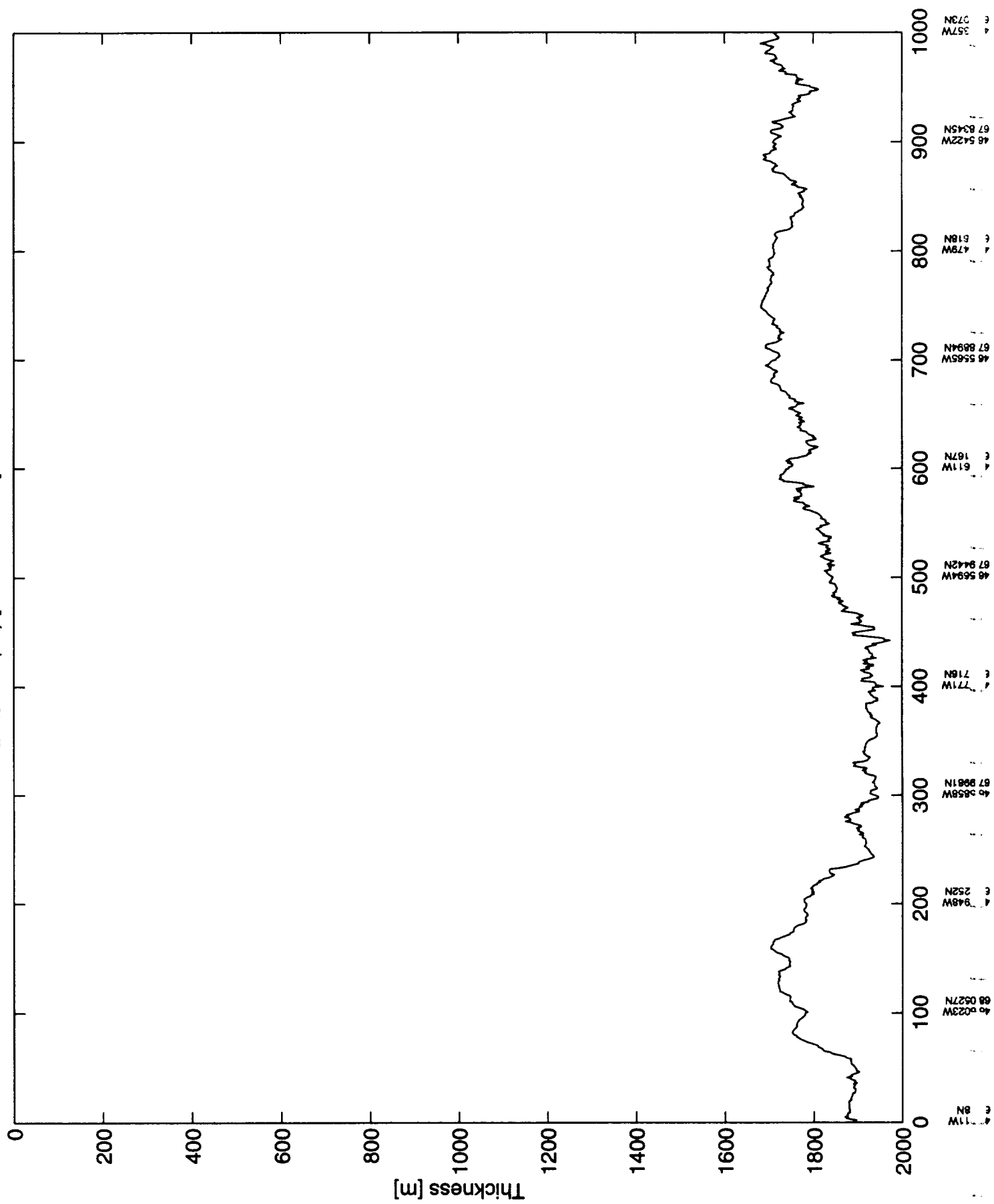


46 3W 68 12N
46 417W 68 41N
46 501W 68 62N
46 522W 68 76N
46 542W 68 711N
46 539W 68 54N
46 5261W 68 126N
46 3182W 68 1005N

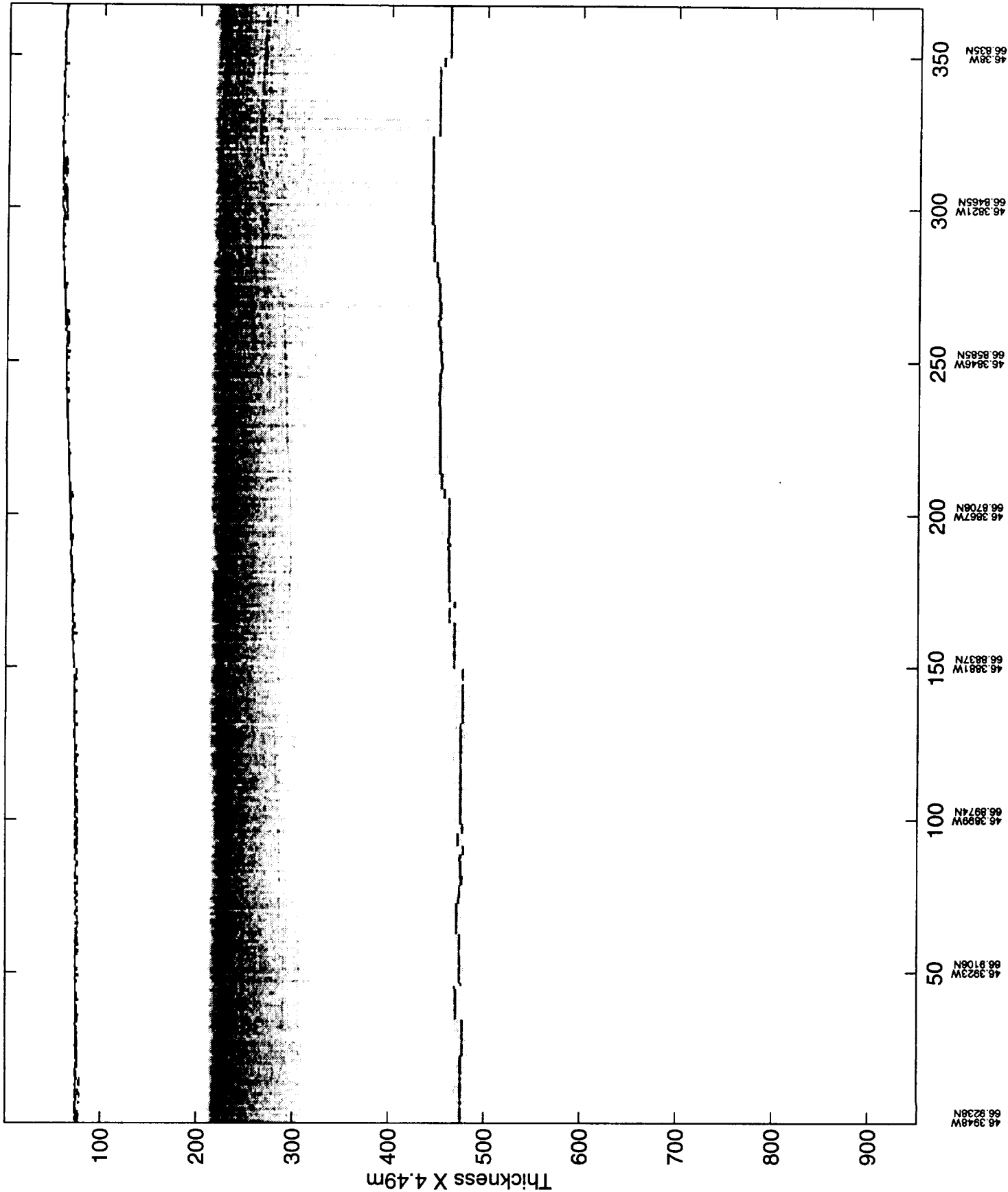
run_5l_10.1 (11) [10000-11073]



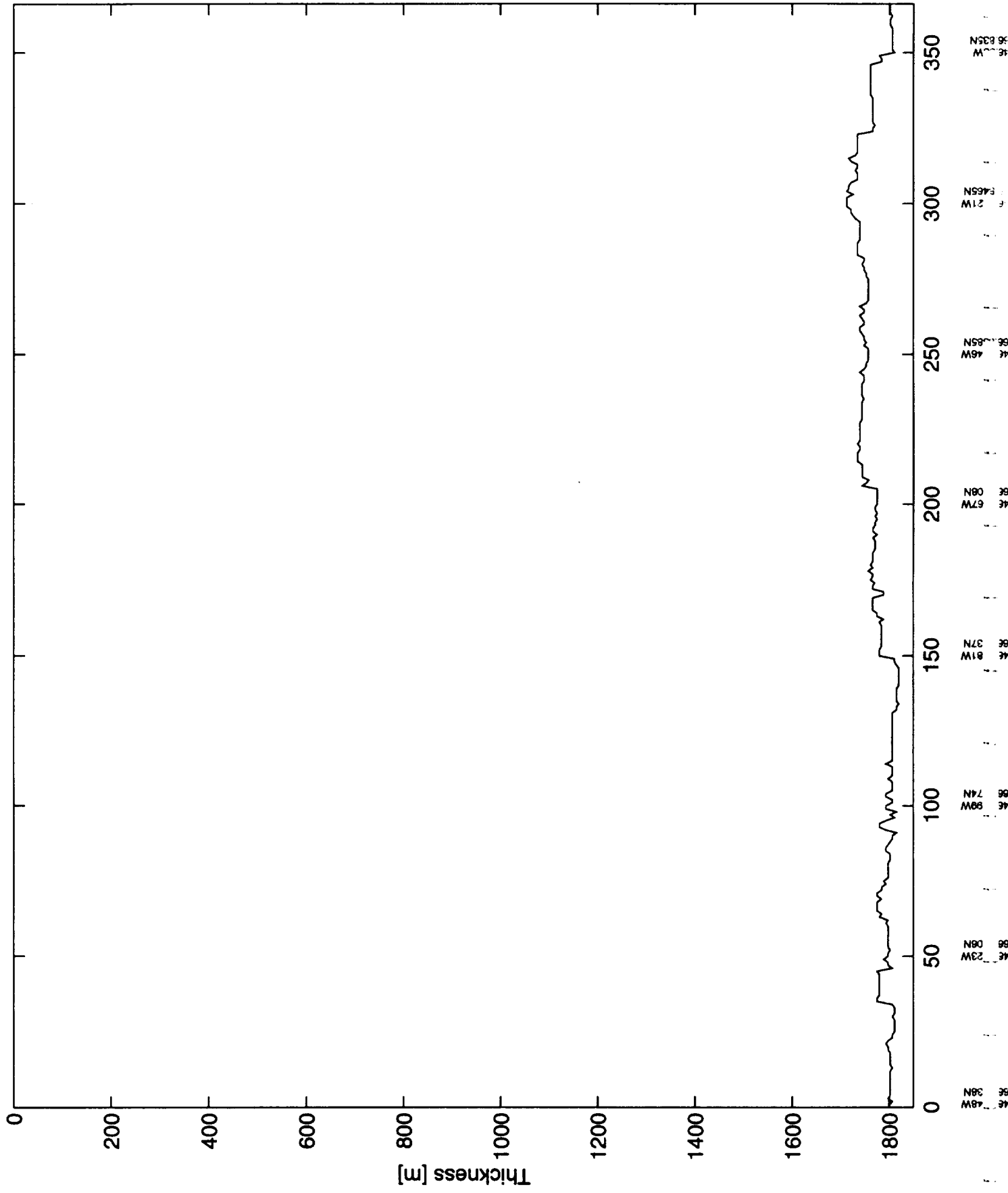
run_5L_10.1 (11) [10000-11073] thickness



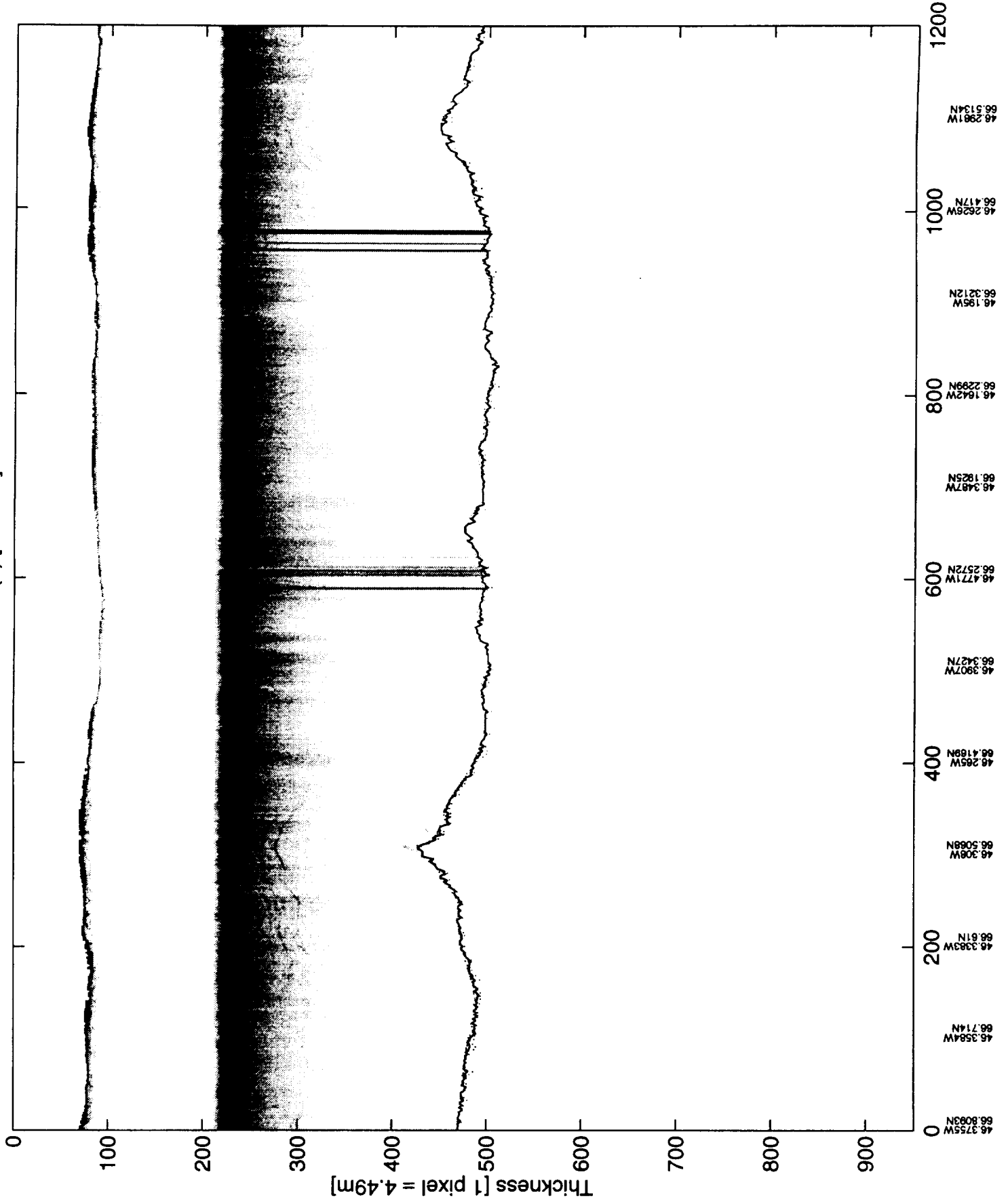
r_5l_13.1 [0-366]



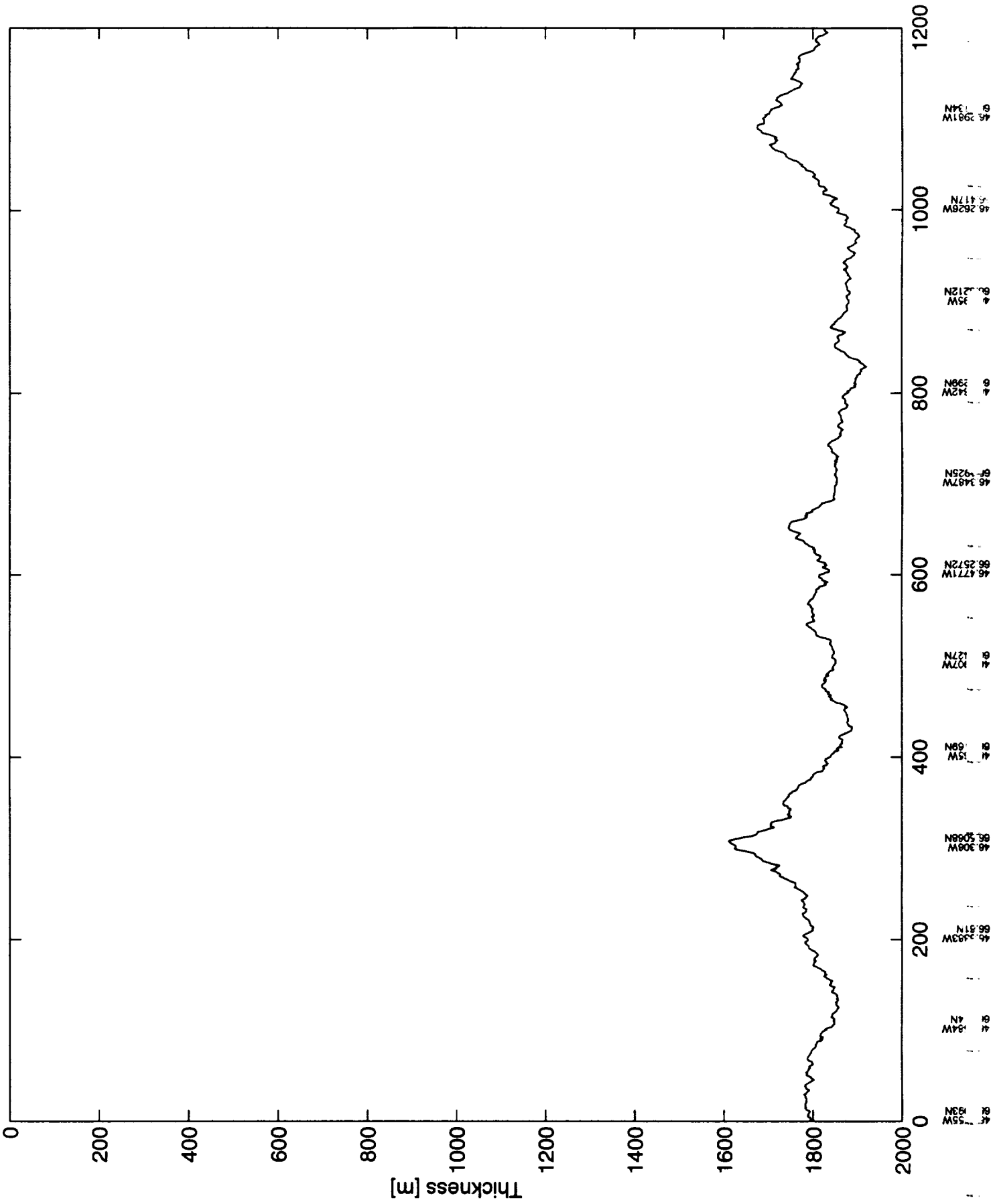
r_5l_13.1 [0-366] thickness



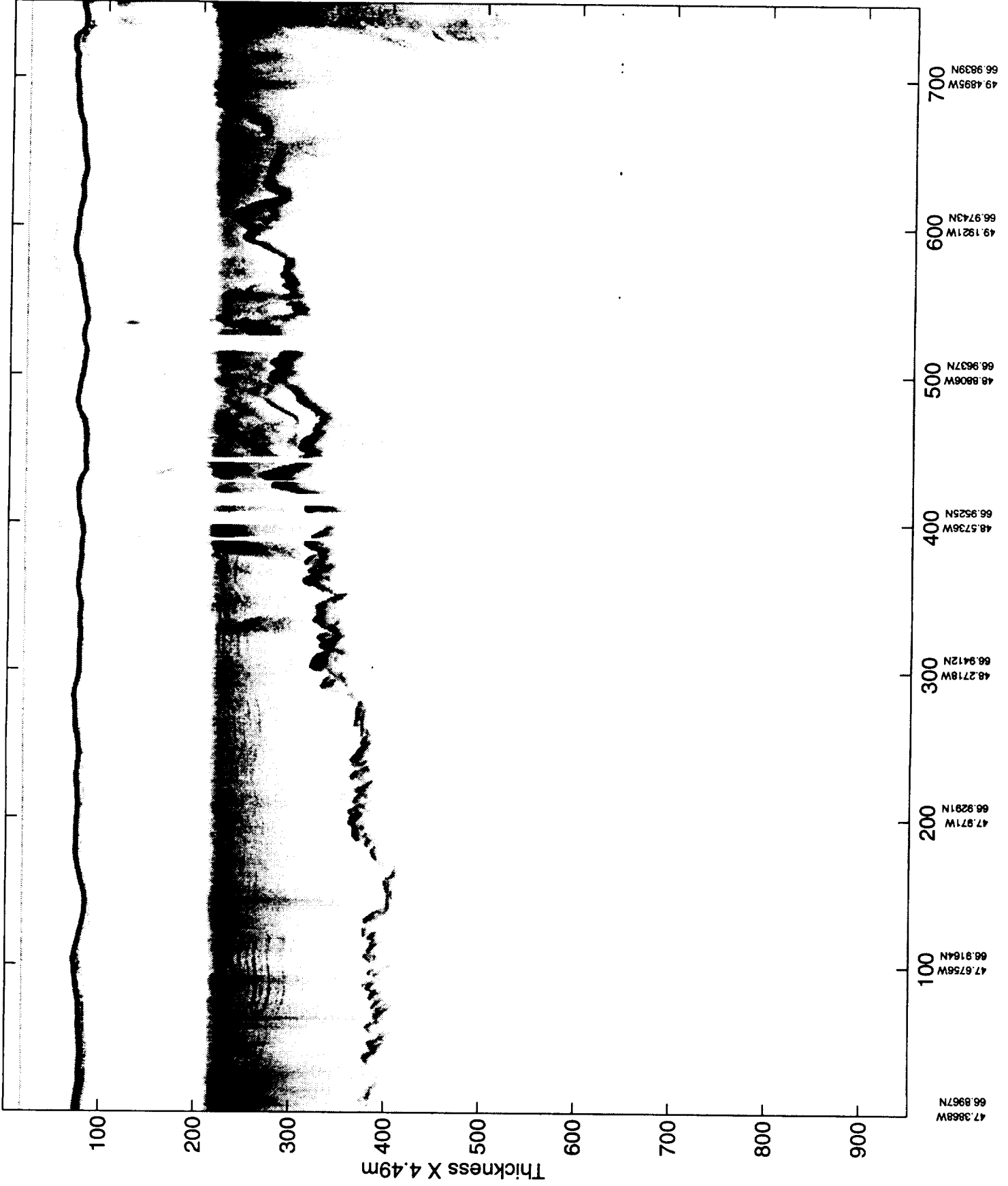
r_5l_14.1 (1) [0-1200]



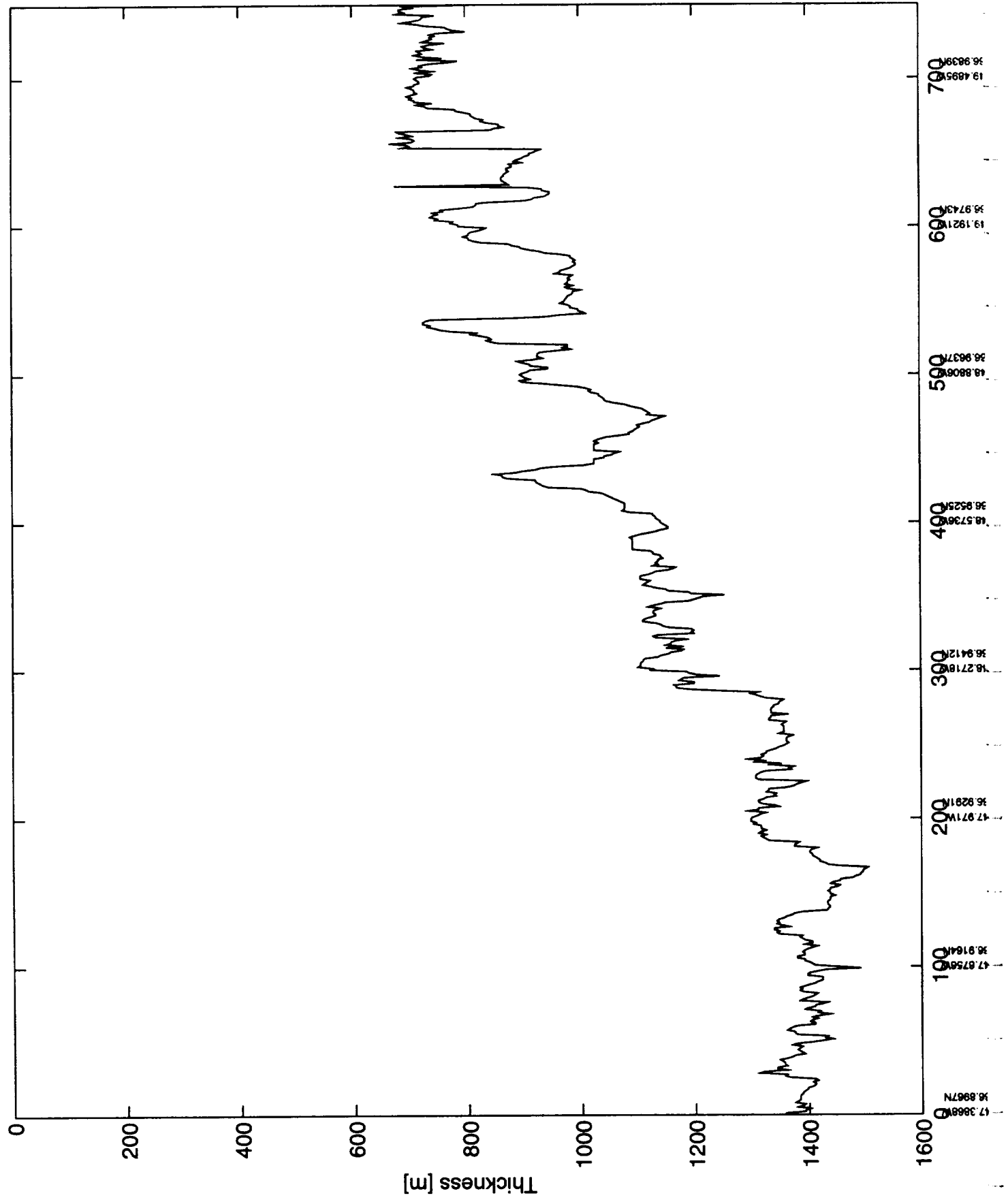
run_5l_14.1 (1) [0-1200] thickness



r_5l_14.12a [1600-2350]



r_5l_14.12a [1600-2350] thickness



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