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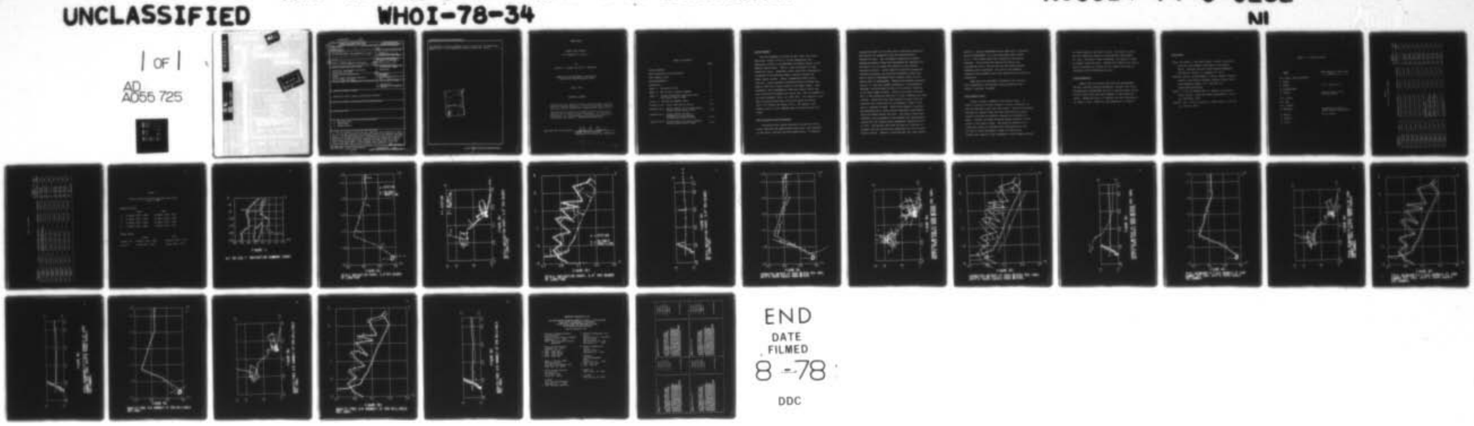

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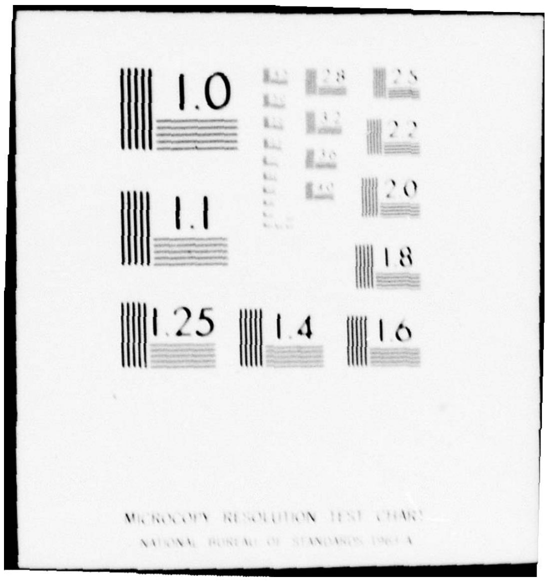
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   2. Somali Basin
   3. Amirante Trench
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The R/V ATLANTIS II Cruise 93 Leg 7 left Port Louis, Mauritius, 8 April 1976 on a 29 day geophysical and geological survey in the Mascarene and Somali Basins in the Western Indian Ocean. Seventeen piston cores were successfully recovered in the Mascarene Basin, Amirante Trench and Somali Basin regions. Single channel continuous seismic profiles were made on 2920 km of ship's track in the Somali Basin. Echo soundings, total geomagnetic field and gravity field data were collected throughout the entire leg. The
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R/V ATLANTIS II arrived in Mombasa, Kenya, on 6 May 1976. We present here summary charts of the underway data collected during this cruise. are provided.

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CRUISE DATA REPORT

R/V ATLANTIS II 93 LEG 7

by

Robert C. Groman and Jane A. Dunworth

WOODS HOLE OCEANOGRAPHIC INSTITUTION
Woods Hole, Massachusetts 02543

April 1978

TECHNICAL REPORT

Prepared for the Office of Naval Research under Contract N00014-74-C0262, NR083-004 and the Oceanographic Section, National Science Foundation, through Grant OCE-75-21522.

Approved for Distribution John I. Ewing, Chairman
Department of Geology and Geophysics

Table of Contents

Cruise Summary

The R/V ATLANTIS II Cruise 93 Leg 7 left Port Louis, Mauritius, 8 April 1976 on a 29 day geophysical and geological survey in the Mascarene and Somali Basins in the Western Indian Ocean. Table 1 lists the members of the scientific party. Seventeen piston cores were successfully recovered in the Mascarene Basin, Amirante Trench and Somali Basin regions. Table 2 summarizes these coring stations. Single channel continuous seismic profiles were made on 2920 km of ship's track in the Somali Basin. Echo soundings, total geomagnetic field and gravity field data were collected throughout the entire leg. The R/V ATLANTIS II arrived in Mombasa, Kenya, on 6 May 1976. For analysis of the data collected during this cruise see Bunce and Molnar (1977) and Johnson and Bunce (1977). We present here summary charts of the underway data collected during this cruise.

Data Acquisition and Processing

Navigation data, which consisted of satellite fixes, visual bearings and dead-reckoned positions, were acquired by the ship's officers and key-punched daily. A computer program was used to plot these data on Mercator charts for verification by comparison with the bridge Mercator navigation plots. The incremental headings and speeds between successive fixes were determined and compared with the ship's log to access the accuracy of the plotted navigation points. A more complete navigation stream was obtained by merging the satellite navigation fixes with ship's velocity determined from a Doppler speed log and Sperry Mark 19 gyrocompass. Depths were measured primarily using a 3.5 kHz echo sounder recorded on a Hydroproducts recorder, and digitized by hand at five minute intervals or at every break-in-slope. During a few short intervals the 3.5 kHz system was down and a 12 kHz transducer was used instead. These data were then punched on paper tape and corrected for sound velocity via Matthews' Tables (1939) using a computer program. Total-field magnetic intensity was measured with a Varian proton precession magnetometer towed 250 meters behind the ship. One minute values were recorded, and the magnetic field anomaly was calculated by subtracting the International Geomagnetic Reference Field of 1975. The digital data were plotted as a function of elapsed time and corrected by comparison with the original analog records. Magnetic field data were not taken during stations. Gravity measurements were made with a vibrating-string accelerometer on a gyro-stabilized table (Bowin et al., 1972) whose output was recorded as five-minute averages. Corrections were applied for Eotvos and instrumental drift, and the free air and simple Bouguer anomalies were calculated. The gravity and magnetic anomalies and bathymetry were then merged with the detailed navigation.

These data are available on magnetic tape and have been forwarded to the National Solar-Terrestrial Data Center in Boulder, Colorado.

Data Summary Plots

Figure 1 shows a summary of the ship's track. In order to display the data coverage to better advantage, we have divided the cruise into four areas. Figures 2a-d display the date at change of day and time ticks every six hours. Station locations and seismic coverage are indicated as shown. Figures 3a-d show corrected meters plotted at right angles to the ship's track. The plotting scales are 0.8 inches per degree of longitude and 2000 meters per inch. The ship's track represents a depth of 4000 meters. Figures 4a-d show the total geomagnetic field anomaly plotted at right angles to the ship's track. The plotting scales are 0.8 inches per degree of longitude and 1000 gammas per inch. The ship's track represents 250 gammas in order to remove a positive bias. Figures 5a-d showing the gravity free air anomaly are plotted at 0.8 inches per degree of longitude and 250 milligals per inch.

Acknowledgements

Support for this cruise came from the Oceanography Section, National Science Foundation, through Grant 21522. We gratefully acknowledge the help of Captain David Casiles and the entire crew and other members of the scientific party. Thanks are due to L. Whiteley for her contribution of figure 1 and J. Broda for the preparation of table 2.

References

Bunce, Elizabeth T. and Peter Molnar, Seismic reflection profiling and basement topography in the Somali Basin: possible fracture zones between Madagascar and Africa, JGR 82, 33, November 10, 1977.

Johnson, David A. and Elizabeth T. Bunce, Abyssal sediment waves in the Amirante passage, Western Indian Ocean, WHOI Technical Report 77-7, February 1977, unpublished manuscript.

Bowin, C., R.A. Folinsbee and T.C. Aldrich, VSA gravity meter system: tests and recent developments, JGR 77, pp. 2018-2033, 1972.

Leaton, B.R., I.A.G.A. division 1, study group, in EOS 57, pp. 120-121, 1976.

Table 1: Scientific Party

Name	Affiliation if other than W.H.O.I.
E.T. Bunce, Chief Scientist	
J. Broda	
E. Carter	M.I.T. and W.H.O.I.
R. Goldsborough	
P. Goreau	W.H.O.I.-M.I.T. Joint Program Student
R.C. Groman	
B.U. Haq	
D.A. Johnson	
G. Marshall	University of Alberta, Guest Student Investigator
P. Molnar	M.I.T. Staff
C. Polloni	
E. Young	

Table 2.

AII 93 LEG 7 STATION SUMMARY

Station No. and Type	Date	Physiographic Location	Latitude	Longitude	Length PC: piston core PG: Pilot gravity core	Depth in Meters
(21) Piston Core (4 PC)	10 April 76	Northern Mascarene Basin	15°17.4'S	53°31.5'E	PC: 970 cm	4641
(22) Piston Core (5 PC)	11 April 76	Northern Mascarene Basin	11°01.2'S	54°29.9'E	PC: 1088 cm PG: 97 cm	4599
(23) Piston Core (6 PC)	14 April 76	Southern Amirante Trench	09°28.5'S	52°23.8'E	PC: 554 cm PG: 108 cm	4196
(24) Piston Core (7PC)	14 April 76	Southern Amirante Trench	09°33.2'S	52°31.5'E	PC: 1180 cm PG: 96 cm	3726
(25) Piston Core (8PC)	14 April 76	Southern Amirante Trench	09°29.24'S	52°28.61'E	PC: 1080 cm PG: 104 cm	3888
(26) Piston Core (9PC)	15 April 76	Mud Waves: West Flank of Amirante Trench	09°26.5'S	51°57.7'E	PC: 1034 cm PG: 113 cm	4116
(27) Piston Core (10PC)	15 April 76	Abyssal Plain, Western Margin of Amirante Trench	09°24.8'S	52°01.5'E	PC: 972 cm PG: 89 cm	4129
(28) Piston Core (11PC)	15 April 76	Abyssal Plain, Western Margin of Amirante Trench	09°28.4'S	52°09.9'E	PC: 439 cm PG: 85 cm	4154
(29) Piston Core (12PC)	16 April 76	Southern Amirante Trench	09°30.7'S	52°26.3'E	PC: 729 cm PG: 125 cm	4148
(30) Piston Core (13PC)	16 April 76	Hill on Western Flank of Amirante Trench	09°32.5'S	52°28.6'E	PC: 846 cm PG: 112 cm	3975

Table 2 (continued)

Station No. and Type	Date	Physiographic Location	Latitude	Longitude	Length PC: Piston Core PG: Pilot gravity core	Depth in Meters
(31) Piston Core (14PC)	17 April 76	Channel Along Western Margin of Amirante Trench	09°29.9'S	52°22.9'E	PC: 839 cm PG: 94 cm	4471
(32) Piston Core (15PC)	18 April 76	Southern Somali Basin	07°16.5'S	50°08.9'E	PC: 1123 cm PG: 125 cm	4444
(33) Piston Core (16PC)	20 April 76	Southern Somali Basin	07°15.4'S	49°32.2'E	PC: 275 cm	2490
(34) Piston Core (17PC)	1 May 76	Central Somali Basin	02°03.8'N	52°23.9'E	PC: 944 cm PG: 138 cm	5115
(35) Piston Core (18PC)	1 May 76	Central Somali Basin	00°32.5'N	51°36.1'E	PC: 891 cm PG: 151 cm	5109
(36) Piston Core (19PC)	2 May 76	Central Somali Basin	01°01.8'S	50°57.1'E	PC: 827 cm PG: 102 cm	5089
(37) Piston Core (20PC)	2 May 76	Central Somali Basin	02°01.8'S	50°32.9'E	PG: 156 cm PC: no recoring	5080

Table 3

Seismic Reflection Profiling Dates and Times
(time in GMT)

Mascarene Basin

	Start	End
1.	11 April 1978 - 2000	14 April 1978 - 0415
2.	14 April 1978 - 1630	15 April 1978 - 1400
3.	16 April 1978 - 1000	16 April 1978 - 1630
4.	17 April 1978 - 0500	18 April 1978 - 1115

Somali Basin

	Start	End
Lines 1-30	22 April 1978 - 0300	30 April 1978 - 1730
Line 31	3 May 1978 - 1045	4 May 1978 - 0230

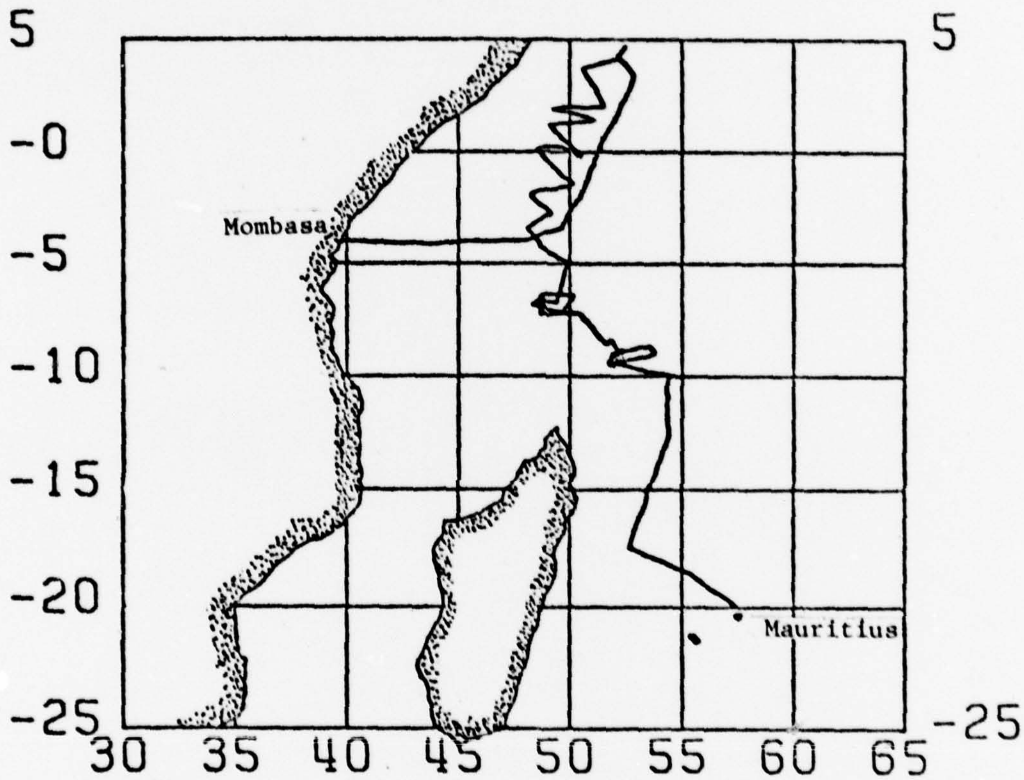


FIGURE 1:

AII 93 LEG 7 NAVIGATION SUMMARY CHART

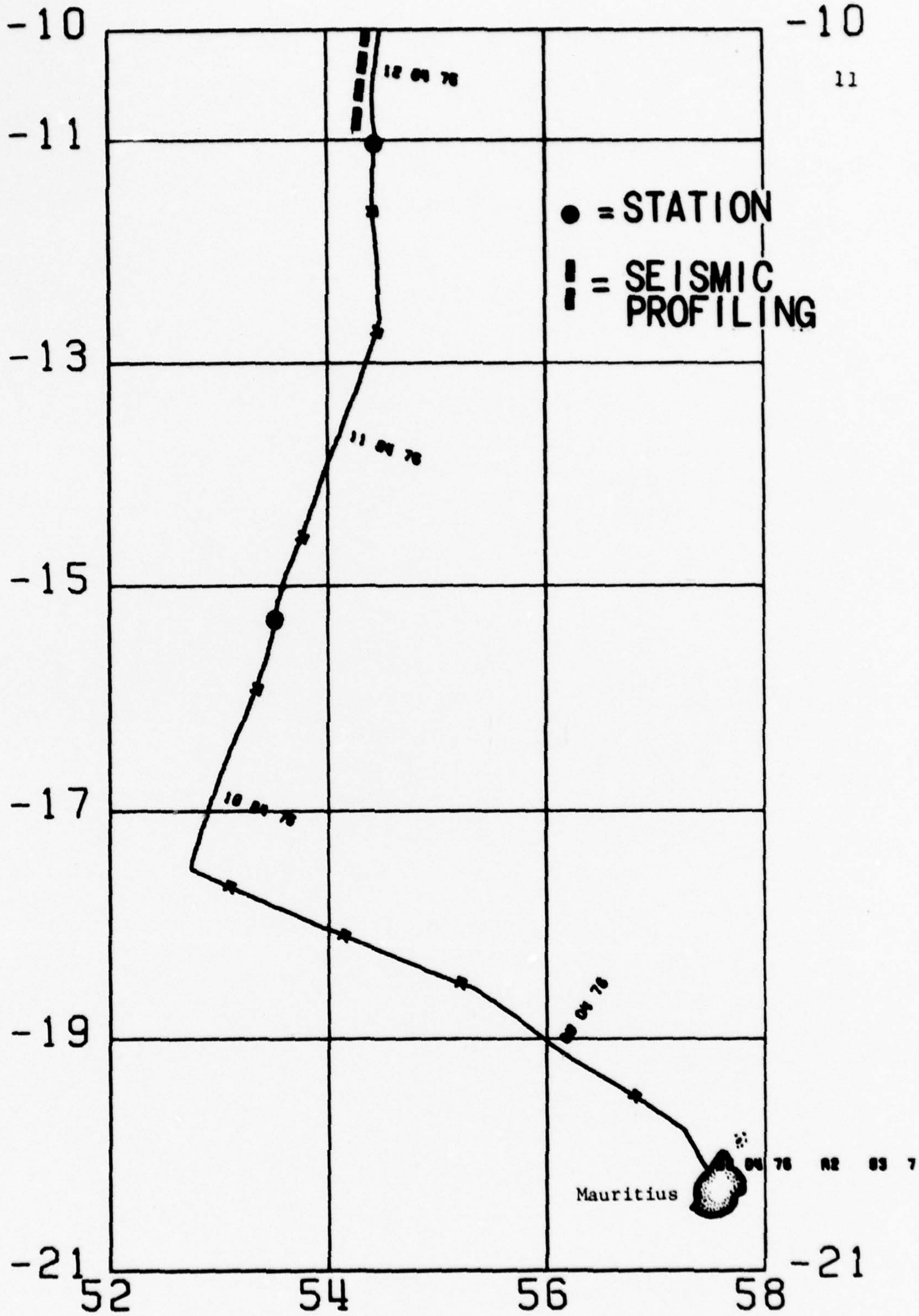


FIGURE 2A:

DETAIL NAVIGATION CHART, 0.8" PER DEGREE OF LONGITUDE

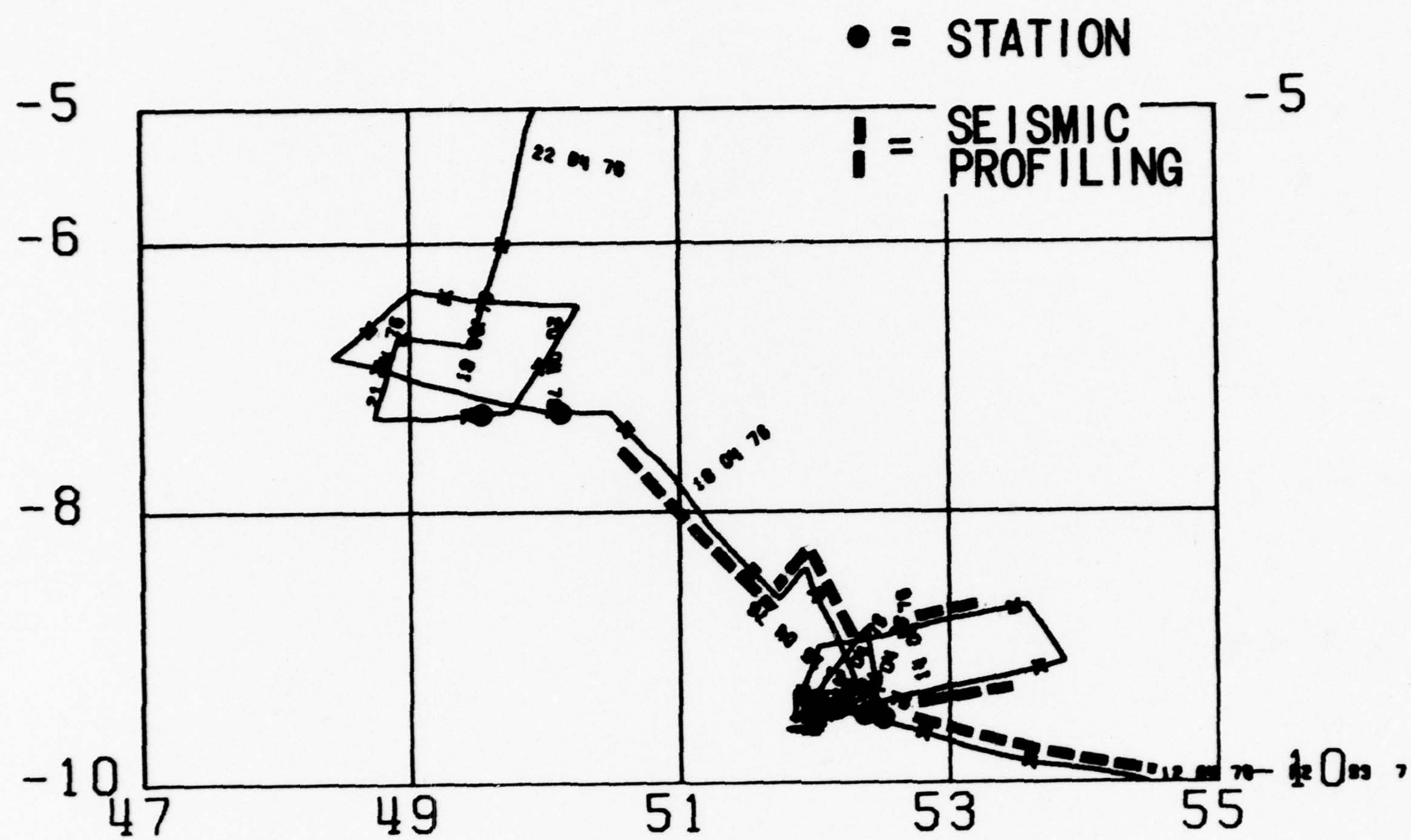


FIGURE 2B:

DETAIL NAVIGATION CHART, 0.8" PER DEGREE OF LONGITUDE

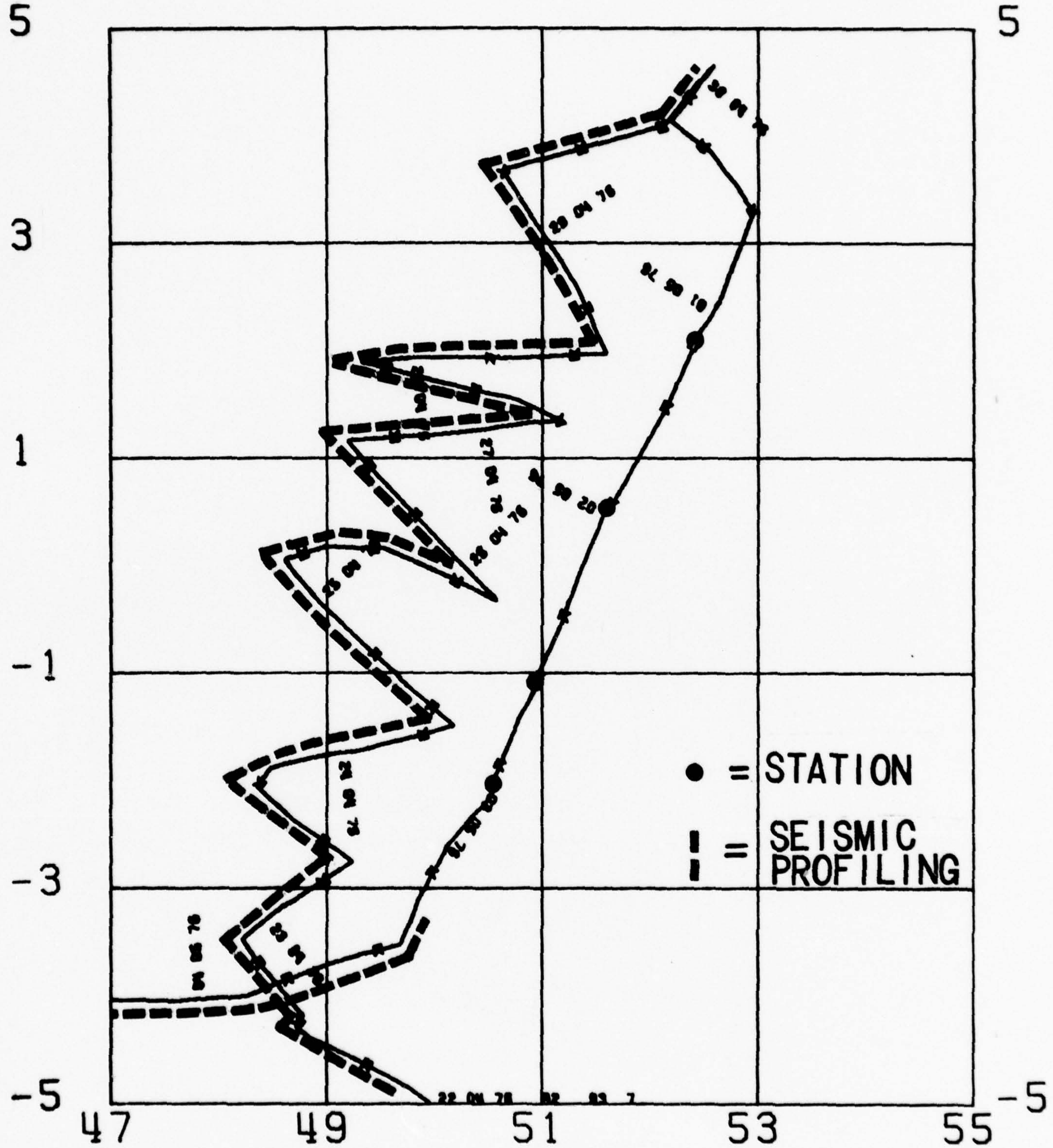


FIGURE 2C:

DETAIL NAVIGATION CHART, 0.8" PER DEGREE OF LONGITUDE

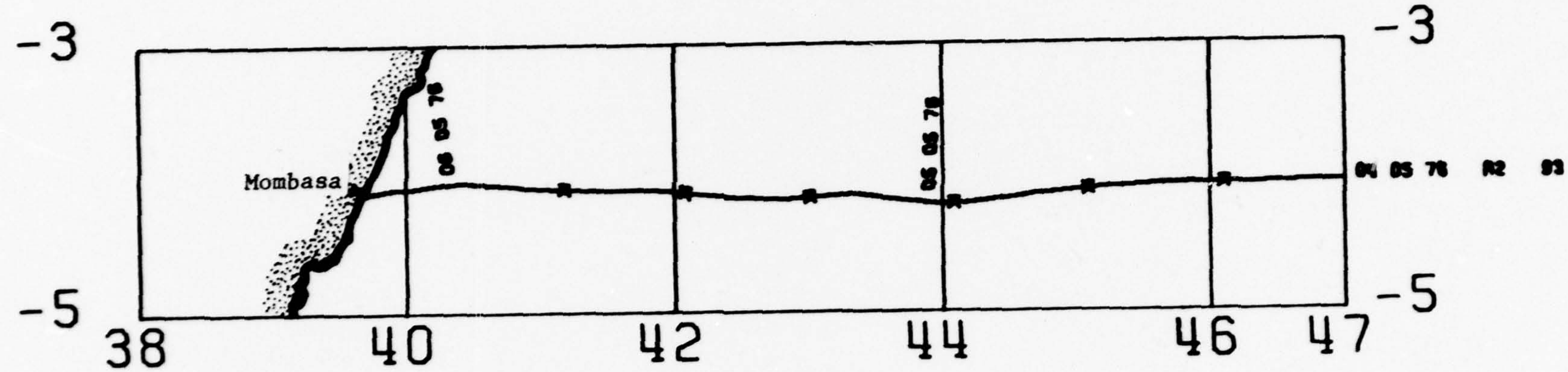


FIGURE 2D:

DETAIL NAVIGATION CHART, 0.8" PER DEGREE OF LONGITUDE

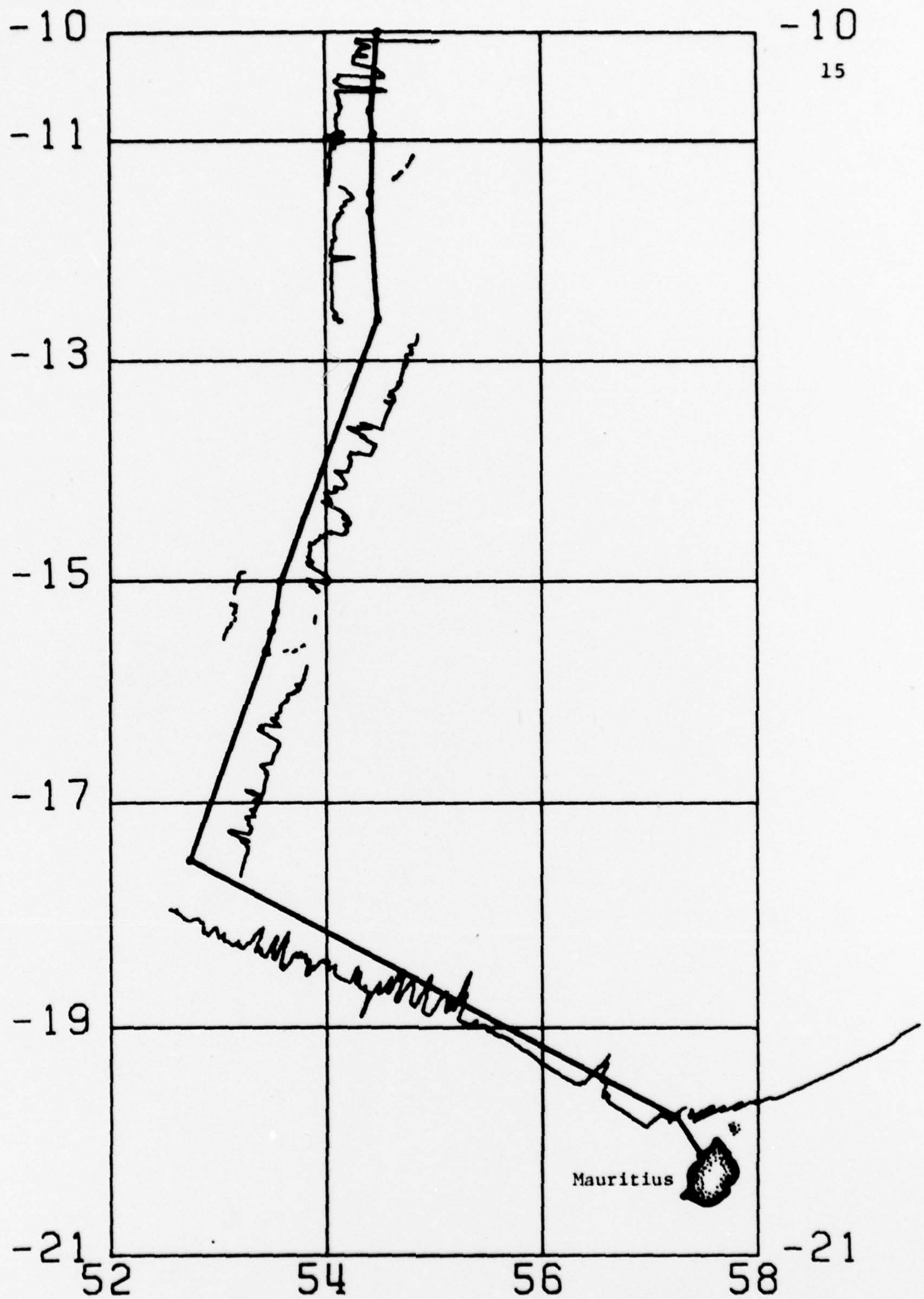
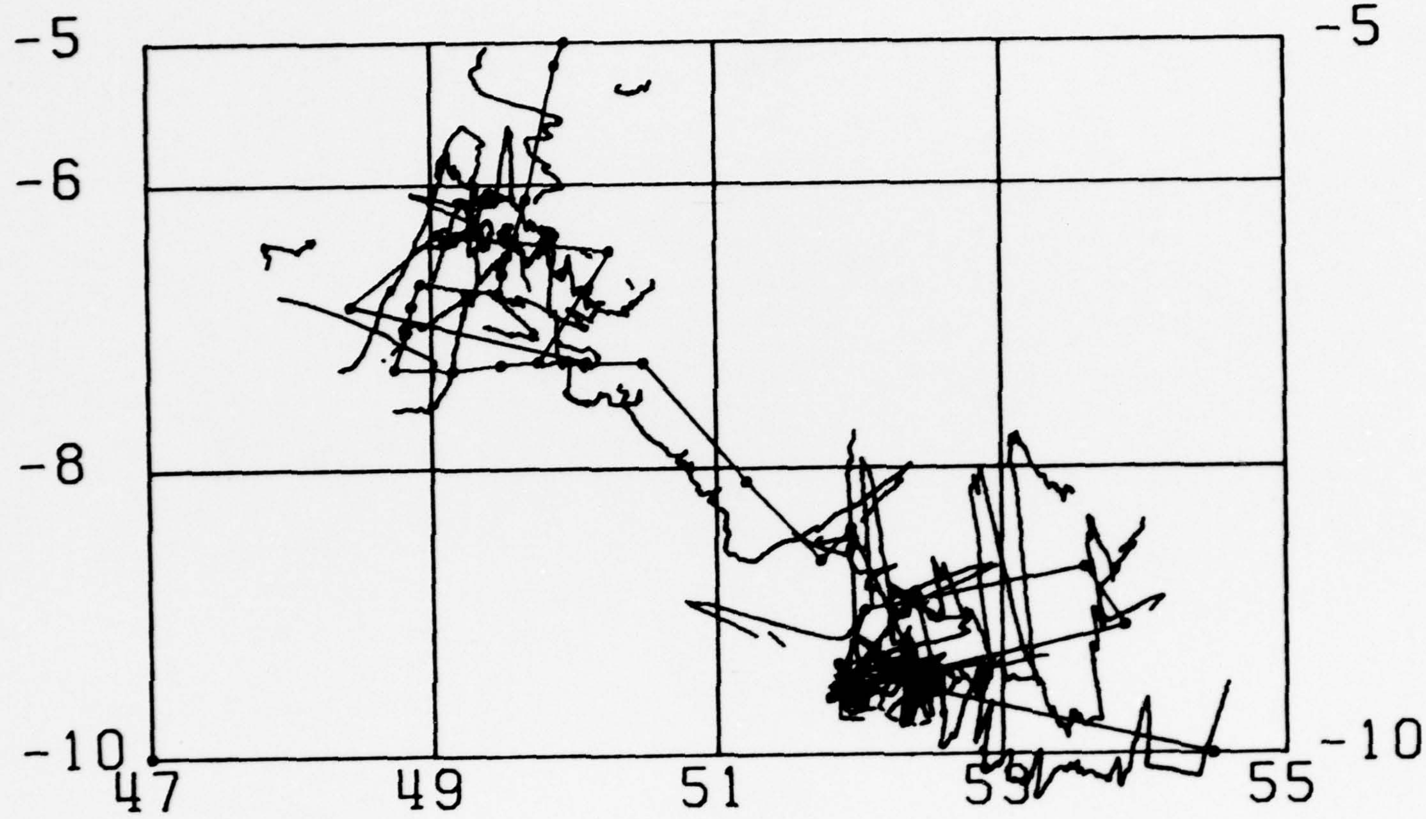


FIGURE 3A:

CORRECTED METERS AT 2000 METERS PER INCH.
SHIP'S TRACK EQUALS 4000 METERS.



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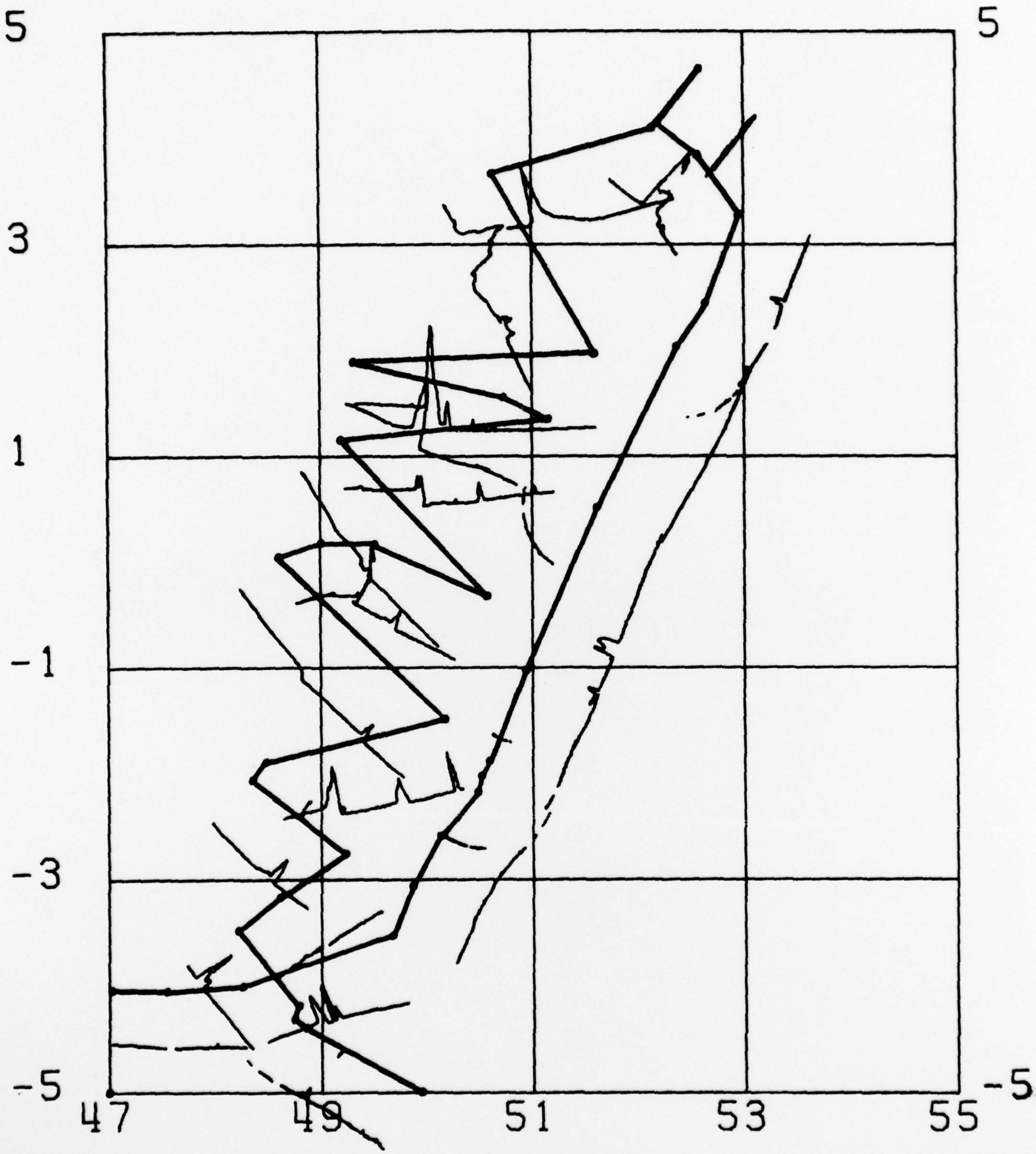

FIGURE 3C:

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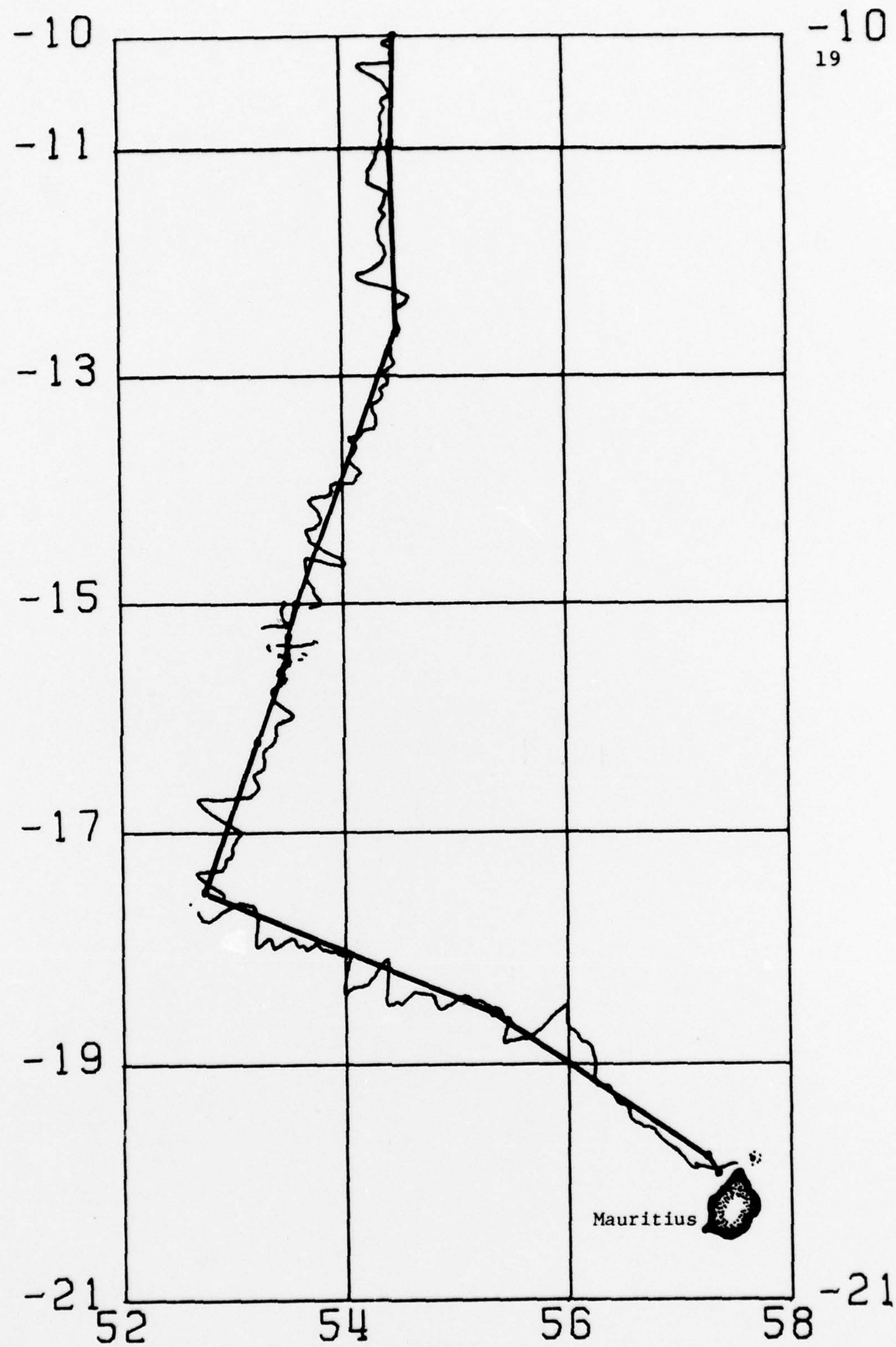

FIGURE 4A:

TOTAL GEOMAGNETIC FIELD ANOMALY AT 1000 GAMMAS PER INCH. SHIP'S TRACK EQUALS 250 GAMMAS.

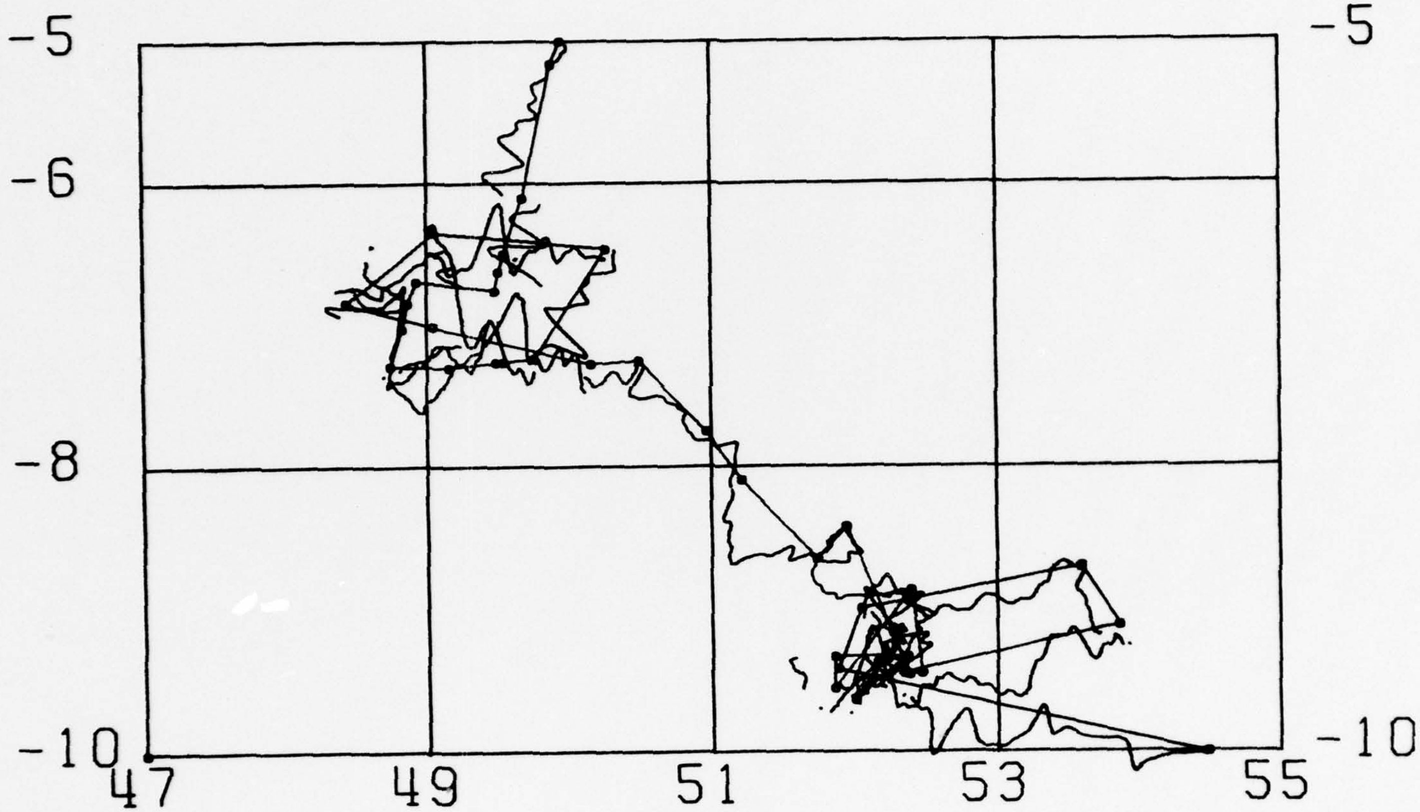

FIGURE 4B:

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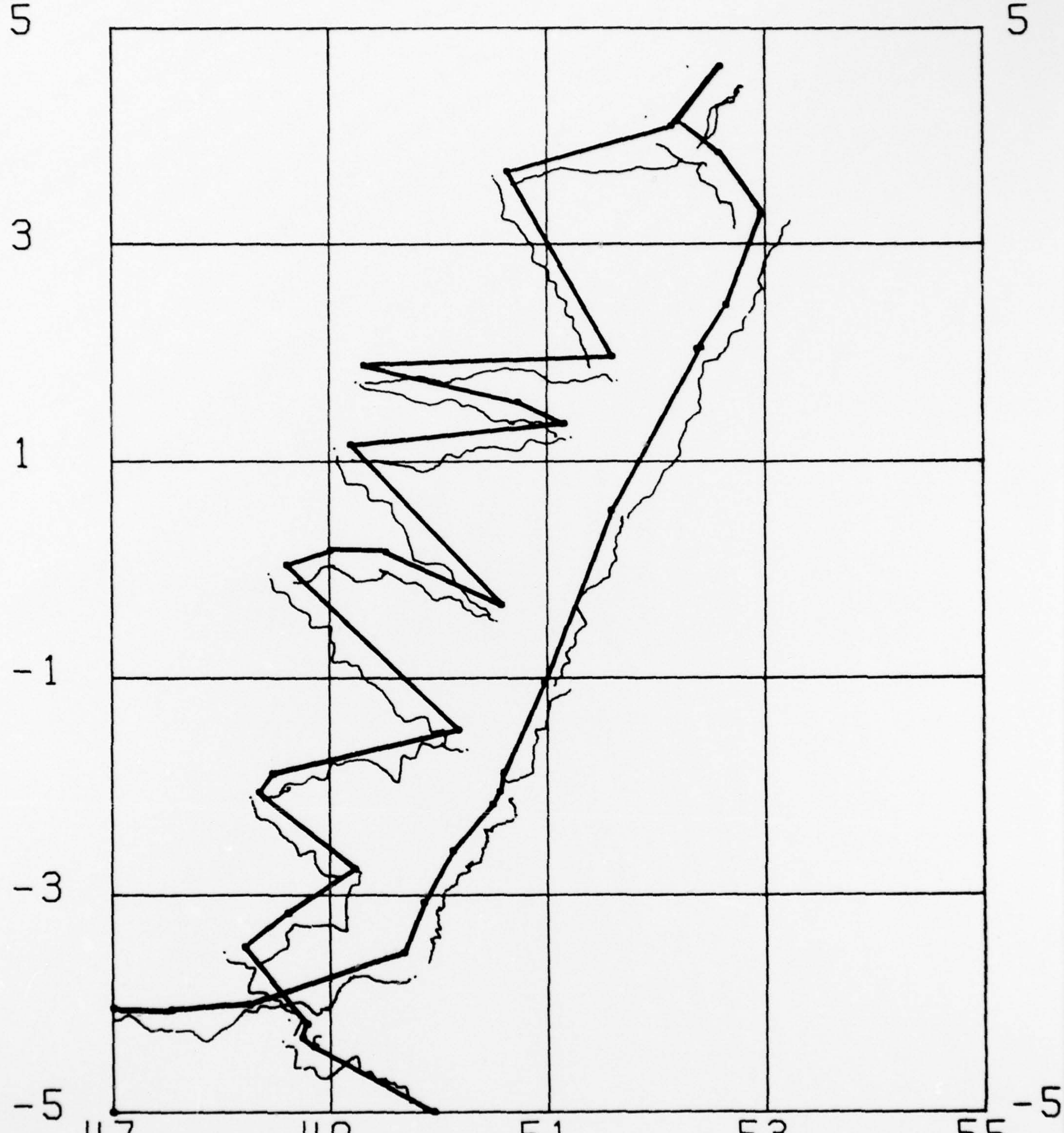

FIGURE 4C:

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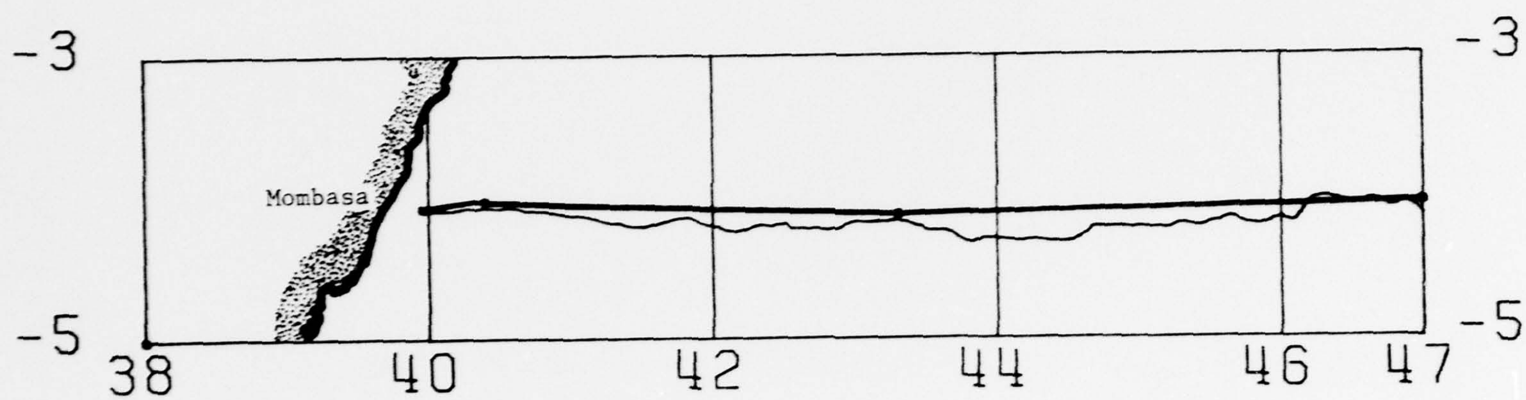

FIGURE 4D:

TOTAL GEOMAGNETIC FIELD ANOMALY AT 1000 GAMMAS PER INCH. SHIP'S TRACK EQUALS 250 GAMMAS.

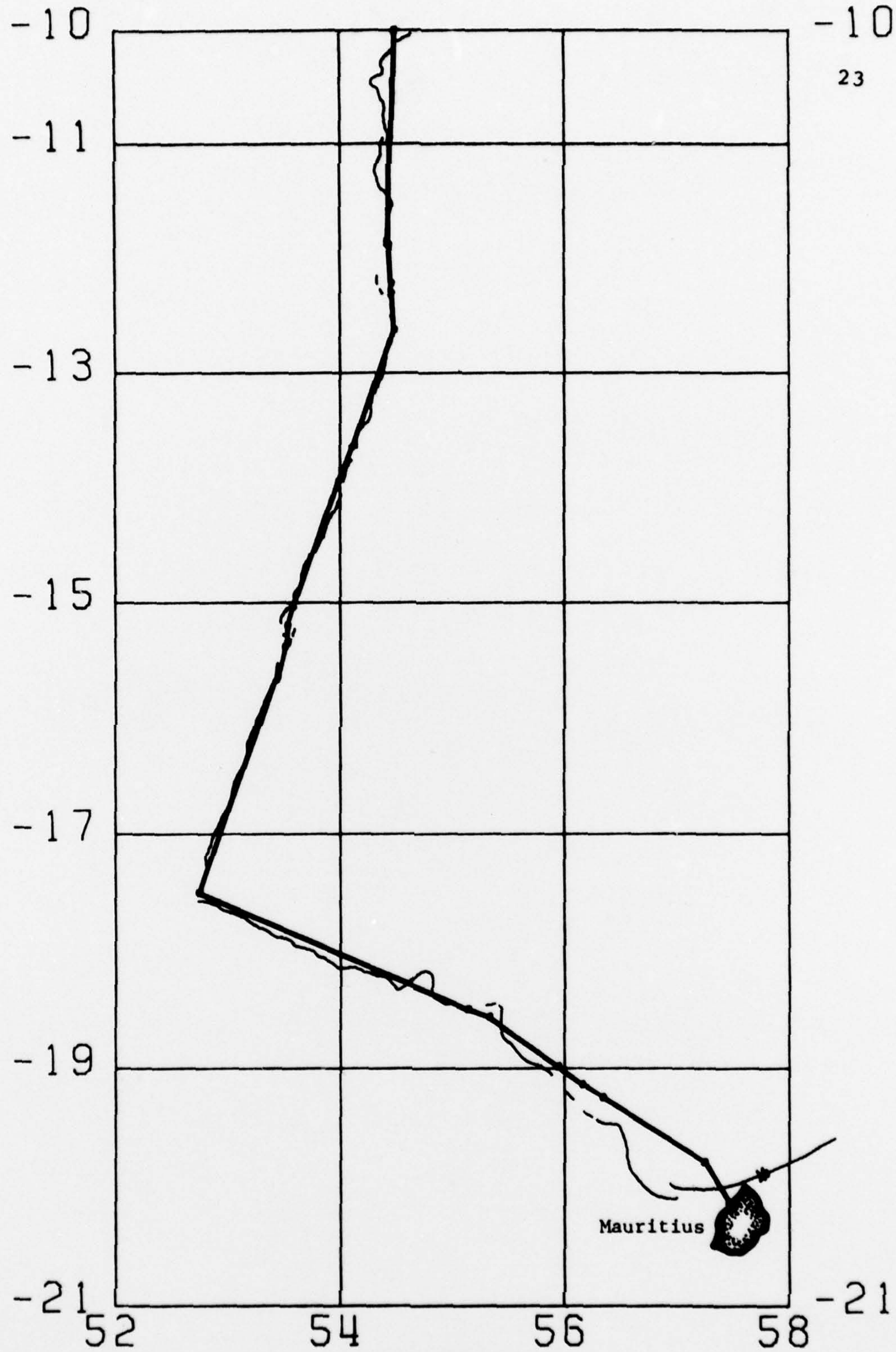

FIGURE 5A:

GRAVITY FREE AIR ANOMALY AT 250 MILLIGALS PER INCH.

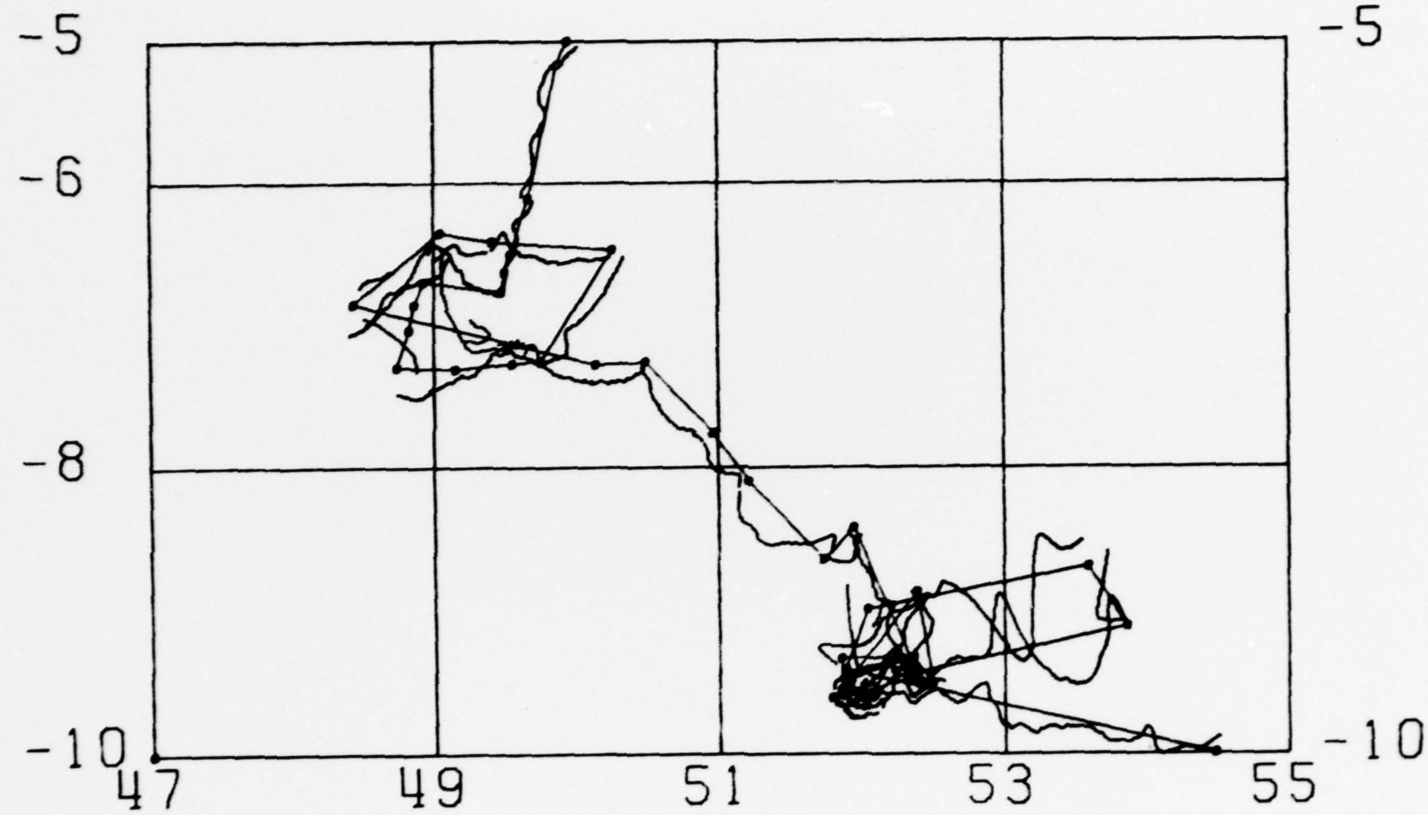

FIGURE 5B:

GRAVITY FREE AIR ANOMALY AT 250 MILLIGALS PER INCH.

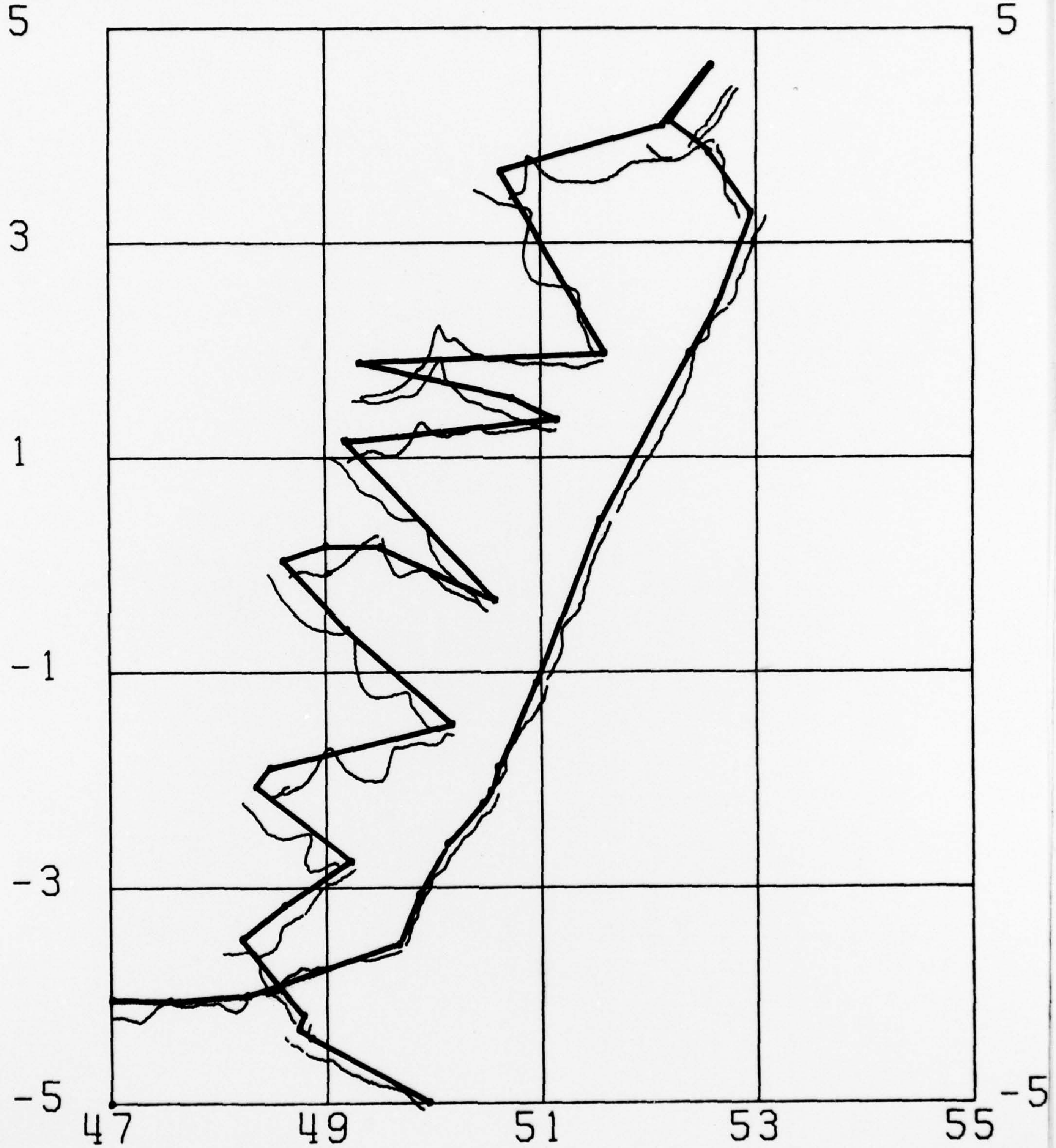

FIGURE 5C:
GRAVITY FREE AIR ANOMALY AT 250 MILLIGALS PER INCH.

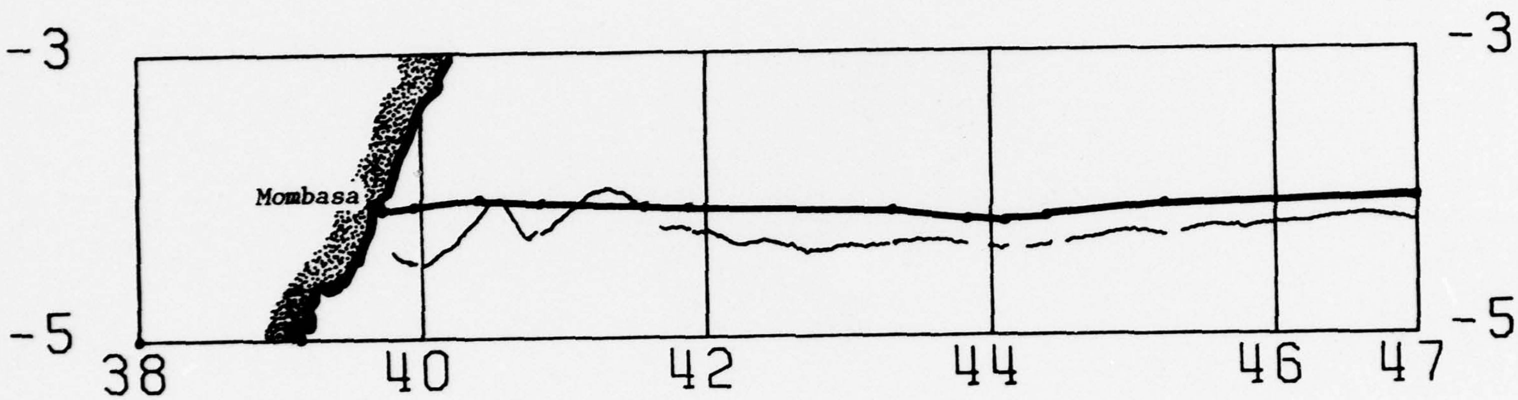

FIGURE 5D:

GRAVITY FREE AIR ANOMALY AT 250 MILLIGALS PER INCH.

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2. Somali Basin
3. Amirante Trench

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