IG2403
Cruise Report

This document combines two reports. The first report (pages 2-8) is the report for a cruises IG2402 and IG2403. The second report (pages 9-13) is a report for cruises IG2403 and IG2404.

IG2403,04

THE UNIVERSITY OF TEXAS
MARINE SCIENCE INSTITUTE
GEOPHYSICS LABORATORY
GALVESTON, TEXAS 77550

700 The Strand
713 765-2173

14 September 1977

RESEARCH CRUISE REPORT

SHIP NAME:
Ida Green

OPERATING INSTITUTION:
University of Texas
Marine Science Institute

CLEARANCE COUNTRIES:
Honduras
El Salvador
Guatemala
Nicaragua

DATES:
3 April-5 June 1977; 7-15 July 1977

PROJECT TITLES:
1) Survey of Middle America Trench IPOD Drill Sites
2) Tectonics of the Middle America Trench

PORTS OF CALL:

Puntarenas	31 March - 3 April
Puntarenas	6 April - 9 April
Acajutla	17 April - 23 April
Acajutla	3 May - 6 May
Acajutla	11 May
Puntarenas	16 May - 17 May
Acajutla	23 May - 26 May

FOREIGN PARTICIPANTS:
German Leandro C.
Escuela de Geologia
Universidad de Costa Rica
San José, Costa Rica
Alberto Horacio Comínguez and
J. Hector Sandoval:
Centro de Ciencias del Mar y Limnología
Ciudad Universitaria
México 20, D.F., México
José Bustamante
c/o Instituto Geografic Nacional
San Salvador, El Salvador, C.A.

SENIOR SCIENTISTS:
Joel S. Watkins
John W. Ladd
Mark H. Houston
Gary V. Latham

DESCRIPTION OF SCIENTIFIC PROGRAM:

The scientific program offshore Central America was designed to investigate the geology of the continental shelf and slope. The continental shelf between the Nicoya Peninsula of Costa Rica and the Gulf of Tehuantepec of Mexico is approximately 30 nautical miles wide and is underlain by a thick basin of mildly deformed sediments that are apparently ponded behind a structural high at the seaward edge of the shelf. From the shelf edge the seafloor slopes down to the Middle America Trench (MAT). This continental slope is underlain by a thick wedge of highly deformed sediments that thins seaward to the MAT where there is very little sediment.

DESCRIPTION OF SCIENTIFIC PROGRAM, continued:

Our data collection was designed to investigate the present structure within these major geologic units and to determine their tectonic history. It has been suggested that the deformed sediments of the continental slope are accumulated during a process of subduction in which the ocean floor west of the MAT slips eastward beneath Central America causing earthquakes and volcanoes. We are looking for evidence of this subduction process within the sediments of the continental margin.

OBSERVATIONS AND SAMPLES:

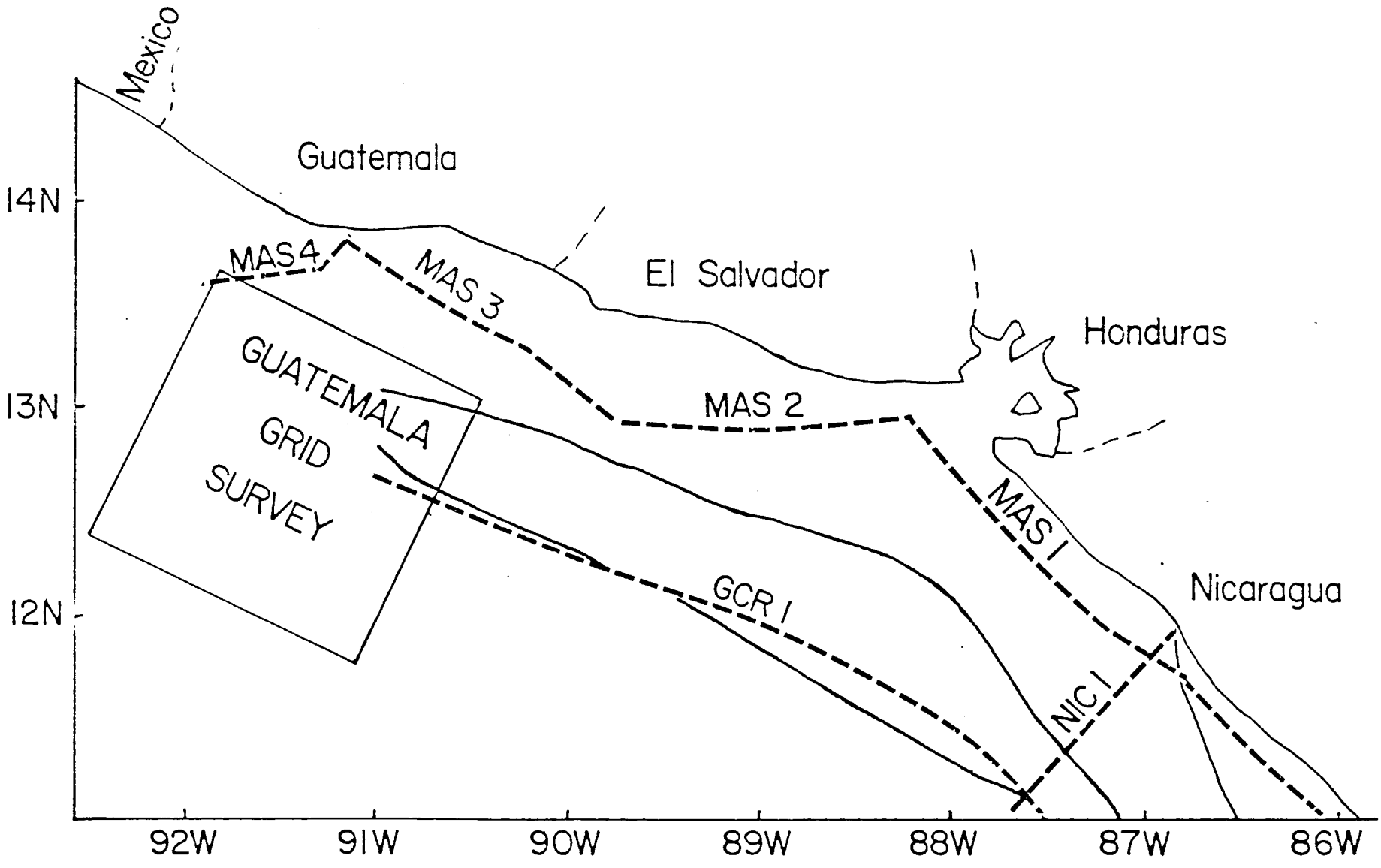
Data: 1800 n.m. of deep penetration multichannel seismic reflection data with magnetics and bathymetry collected simultaneously along dashed track line and in Guatemala survey grid plus an additional 400 n.m. of bathymetry and magnetics along regional lines between Guatemala grid and Costa Rica (see accompanying charts).

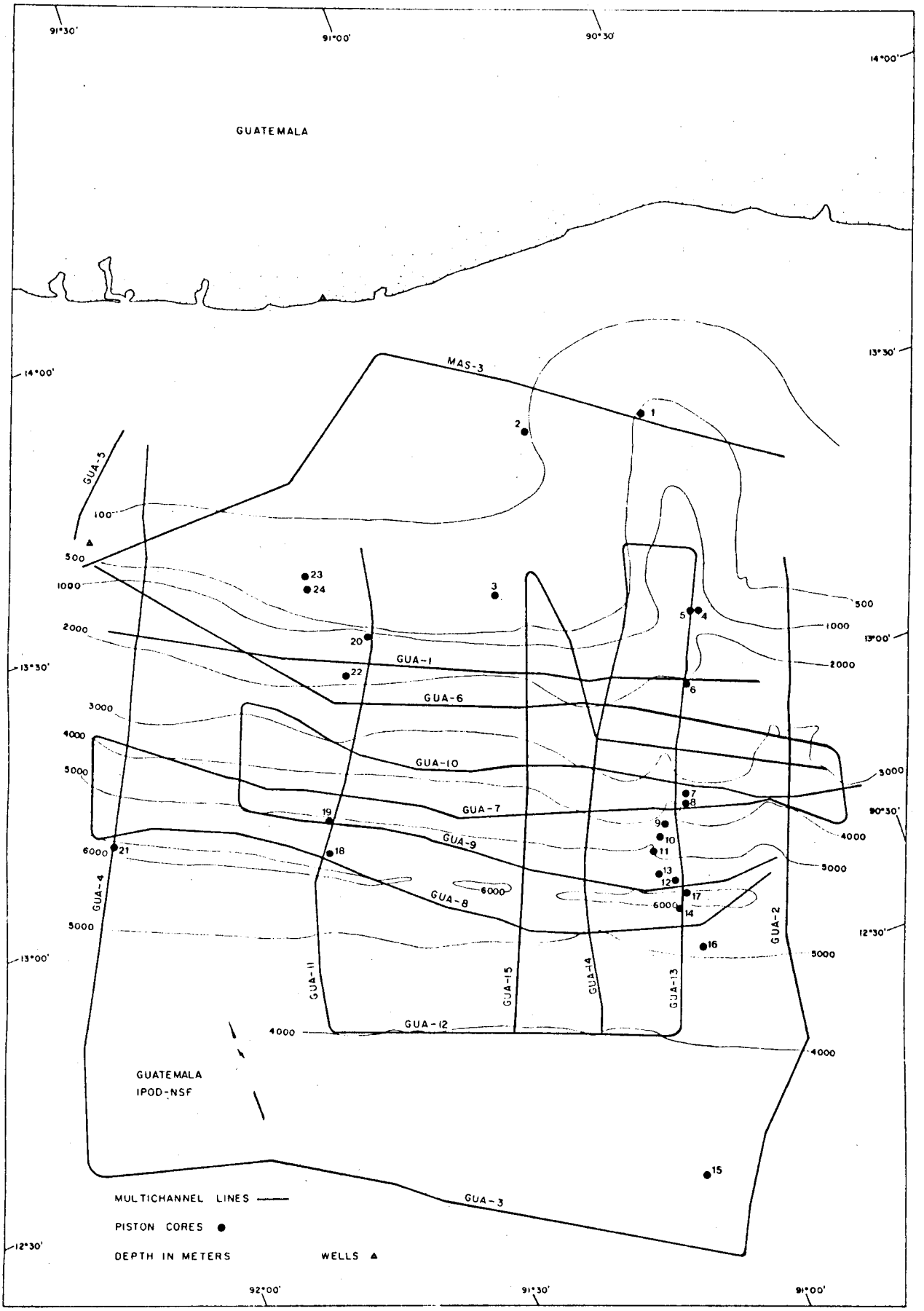
In Guatemala grid survey area we took 24 piston cores, deployed 4 ocean bottom seismometers (OBS's) which were left on the sea floor for 1 month, and shot 5 seismic refraction lines using OBS's (see accompanying track charts).

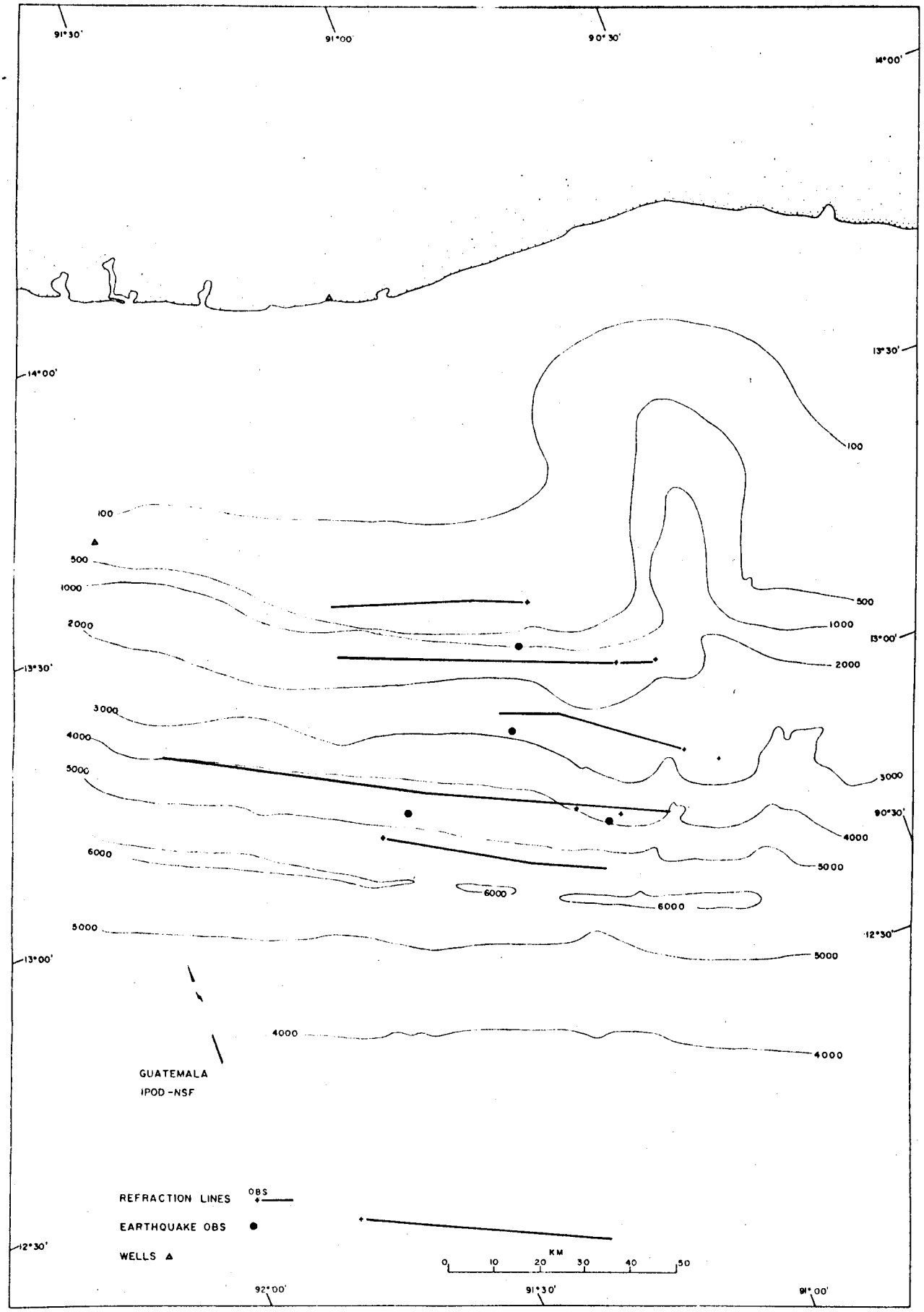
Location and Custodian: See letterhead address.

NAME AND ADDRESS OF CONTACT TO WHOM INQUIRIES REGARDING CRUISE SHOULD BE MADE:

John W. Ladd
University of Texas
Marine Science Institute
Geophysics Laboratory
700 The Strand
Galveston, TX 77550


Mexico
Guatemala
El Salvador
Honduras
Nicaragua
14N
13N
12N
92W
91W
90W
89W
88W
87W
86W
MAS 4
MAS 3
MAS 2
MAS 1
GCR 1
NIC 1
GUATEMALA
GRID
SURVEY
multichannel seismic reflection
bathymetry and magnetics only


91°30'
91°00'
90°30'
14°00'
GUATEMALA
13°30'
MAS-3
GUA-5
100
500
1000
2000
3000
4000
5000
6000
GUA-1
GUA-6
GUA-10
GUA-7
GUA-9
GUA-8
GUA-4
GUA-11
GUA-15
GUA-14
GUA-13
GUA-12
GUA-2
GUA-3
13°00'
12°30'
92°00'
GUATEMALA
IPOD-NSF
MULTICHANNEL LINES
PISTON CORES
DEPTH IN METERS
WELLS


91°30'
91°00'
90°30'
14°00'
13°30'
13°00'
12°30'
92°00'
91°30'
91°00'
100
500
1000
2000
3000
4000
5000
6000
GUATEMALA
IPOD-NSF
REFRACTION LINES
OBS
EARTHQUAKE OBS
WELLS
KM
0
10
20
30
40
50

IG2402_3

THE UNIVERSITY OF TEXAS
MARINE SCIENCE INSTITUTE
GEOPHYSICS LABORATORY
GALVESTON, TEXAS 77550

700 The Strand
713 765-2173

20 September 1977

RESEARCH CRUISE REPORT

SHIP NAME:
R/V *Ida Green*

OPERATING INSTITUTION:
University of Texas
Marine Science Institute
Geophysics Laboratory

CLEARANCE COUNTRY:
Costa Rica

DATES:
March - July 1977

PROJECT TITLE:
Tectonics of the Middle America Trench

PORT CALLS:

Puntarenas, C.R.	3/31/77-4/03/77
"	4/06/77-4/09/77
"	5/16/77-5/17/77
"	7/18/77-7/19/77

FOREIGN PARTICIPANTS:
Dr. Rodrigo Saenz, Director,
Ministry of Geology & Economics
German Leandro C.
Escuela de Geologia
Universidad de Costa Rica
San Jose, Costa Rica

SENIOR SCIENTIST:
Joel S. Watkins

DESCRIPTION OF SCIENTIFIC PROGRAM:

This project is an investigation of the geology and tectonics of the continental margin off Costa Rica. It is part of a larger overall study of the entire Middle America Trench (MAT) area between Mexico and Costa Rica. The objective of the project is to learn more about the geology and tectonics of an active plate margin. According to plate tectonic theory, an active margin is where one lithospheric plate dives beneath another and is consumed or subducted. During this process part of the oceanic plate is scraped off and thrust up and incorporated within the continental slope. Earthquakes and volcanoes are also produced. The results of this project will help in understanding the mechanisms of this process as well as resulting geometries or structure of the rocks within the crust.

OBSERVATIONS AND SAMPLES:

The data collection phase of the project was conducted from shipboard and consists of four general aspects as follows:

1) Earthquake study. The tectonics of the area are being studied by continuously monitoring all earthquakes in the area. An array of five ocean bottom seismometers (OBS's) were deployed off the Nicoya Peninsula for several months to supplement land stations already established by Dr. T. Matumoto of UT/MSI. Figure 1 shows OBS and land station locations.

OBSERVATIONS AND SAMPLES, continued:

2) Refraction study. A series of five refraction lines parallel to the trench axis were shot to determine the crustal structure beneath the continental shelf and slope. The location of four lines is shown in Figure 1. The location of the fifth line is discussed in the cruise report by Dr. Houston on Legs IG 24-7, -8, -9. Two lines were shot to land stations in order to increase their length. OBS's and sonobuoys were used as marine recording stations. These studies will supplement crustal studies being conducted on land by Dr. Matumoto.

3) Multichannel seismic reflection study. 600 nautical miles of CDP multichannel seismic reflection data were collected off Costa Rica (Fig. 2). These data will be used to determine the geology and structure of the crust beneath the entire continental margin, including the geometry of deep layers within the oceanic crust and upper mantle, the geometry of the upper part of the subducting oceanic plate beneath the slope, the structure of subduction complex beneath the slope, and the nature of the sedimentary sequences beneath the slope and shelf. A high energy source using small explosive charges (Maxipulse) was used successfully along one line for maximum penetration of seismic energy (Fig. 2). Continuous sonobuoys were recorded along this line (Fig. 3).

4) Sedimentation study. Five cores were taken from the shelf, slope, and trench off the Nicoya peninsula to study sedimentation patterns. The location of these cores is included with the accompanying cruise report of Dr. Houston for Legs IG 24-7, -8, -9.

Bathymetry and magnetic data were routinely collected along all tracts of the cruise. The tracks of Legs IG 24-2 and IG 24-3 are included here (Figs. 4 and 5). Tracks for subsequent IG 24 legs off Costa Rica are included in accompanying reports.

Location of data stored is UT/MSI Galveston (address on letterhead).

NAME AND ADDRESS OF CONTACT TO WHOM INQUIRIES REGARDING CRUISE SHOULD BE MADE:

Richard T. Buffler
University of Texas
Marine Science Institute
Geophysics Laboratory
700 The Strand
Galveston, TX 77550.

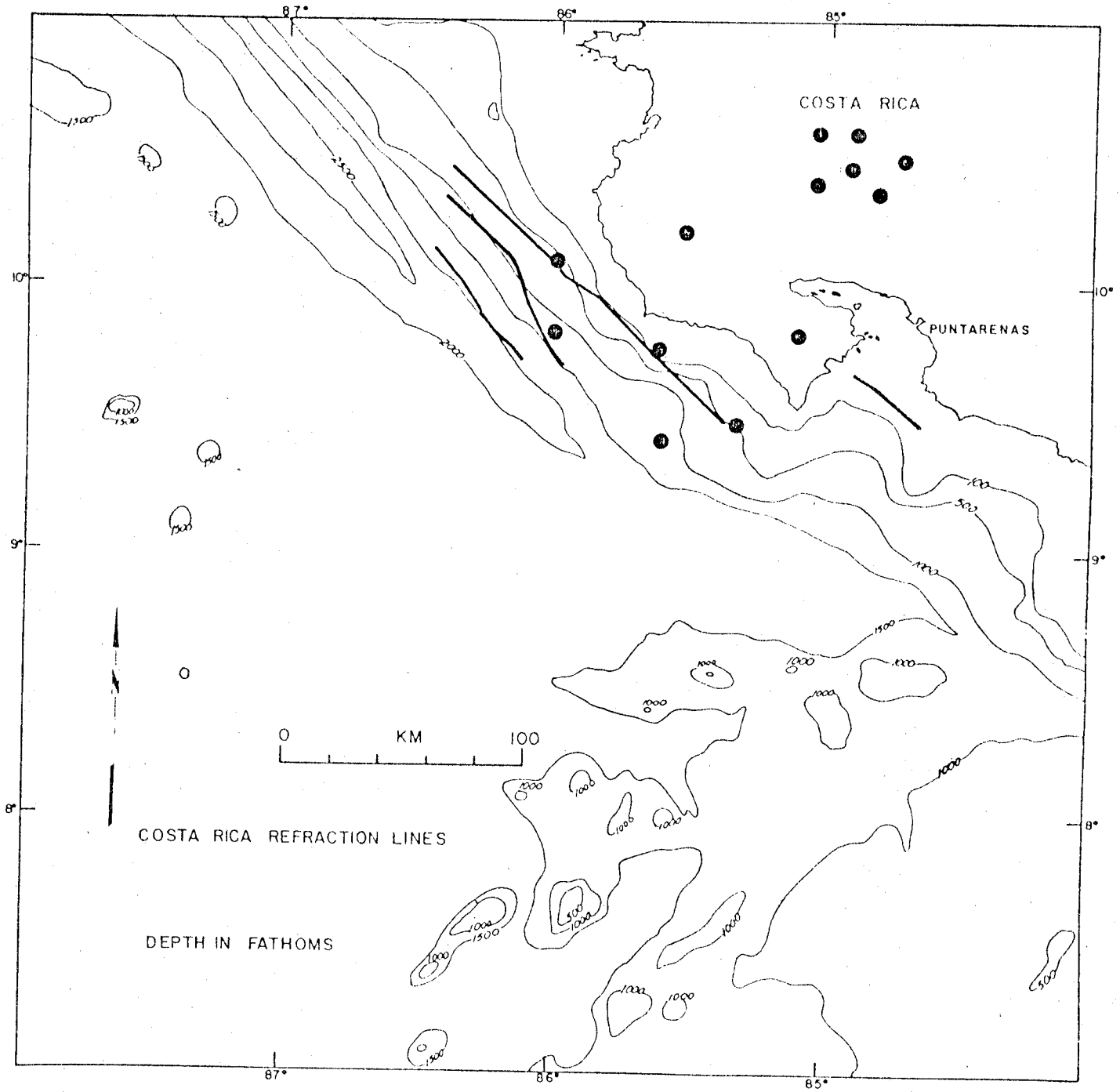

87°
86°
85°
COSTA RICA
PUNTARENAS
10°
9°
8°
0
KM
100
COSTA RICA REFRACTION LINES
DEPTH IN FATHOMS

Fig. 1

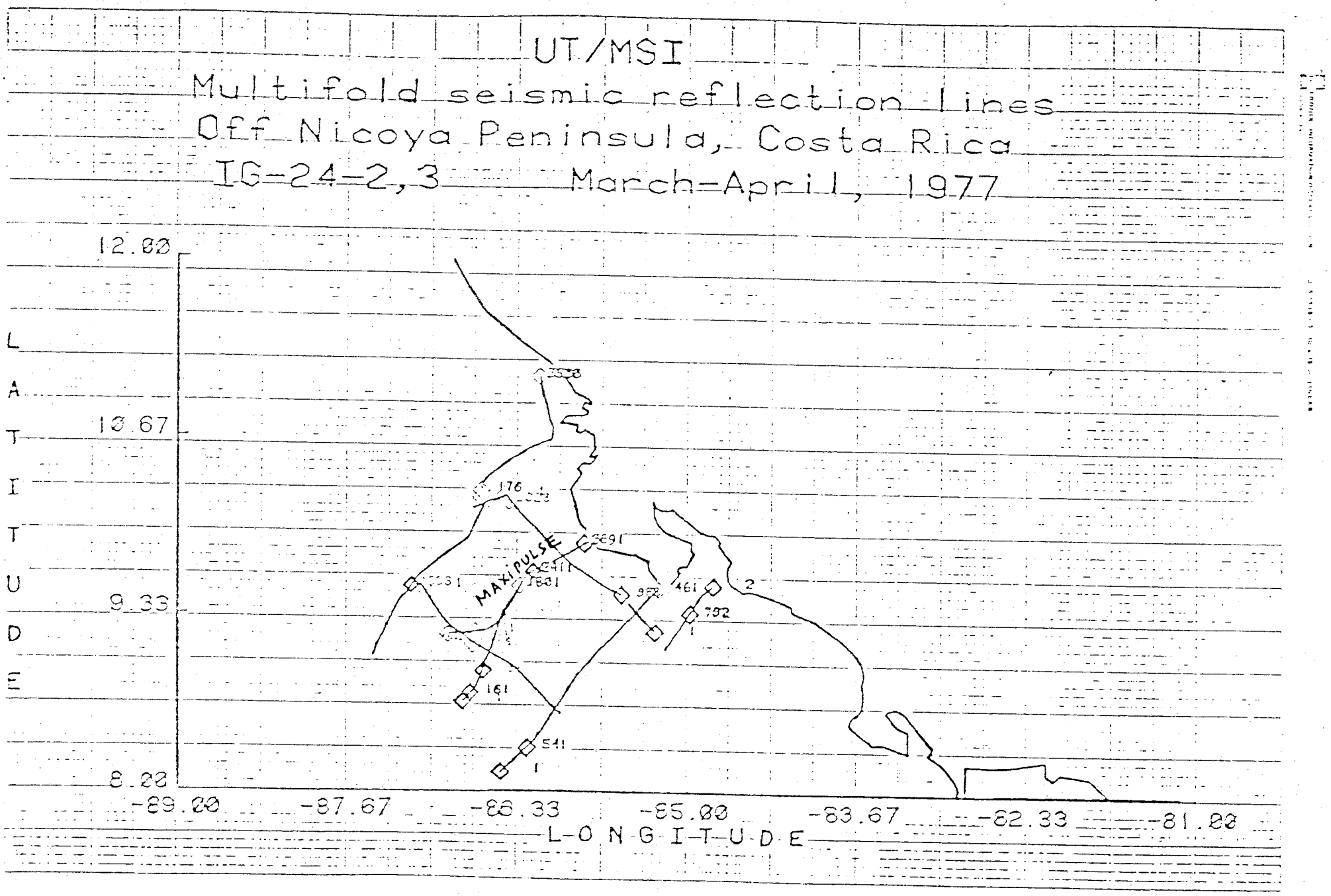

UT/MSI
Multifold seismic reflection lines
Off Nicoya Peninsula, Costa Rica
IG-24-2,3 March-April, 1977
12.00
10.67
9.33
8.00
LATITUDE
-89.00
-87.67
-86.33
-85.00
-83.67
-82.33
-81.00
LONGITUDE
MAXIPULSE
176
691
461
782
161
541

Fig. 2

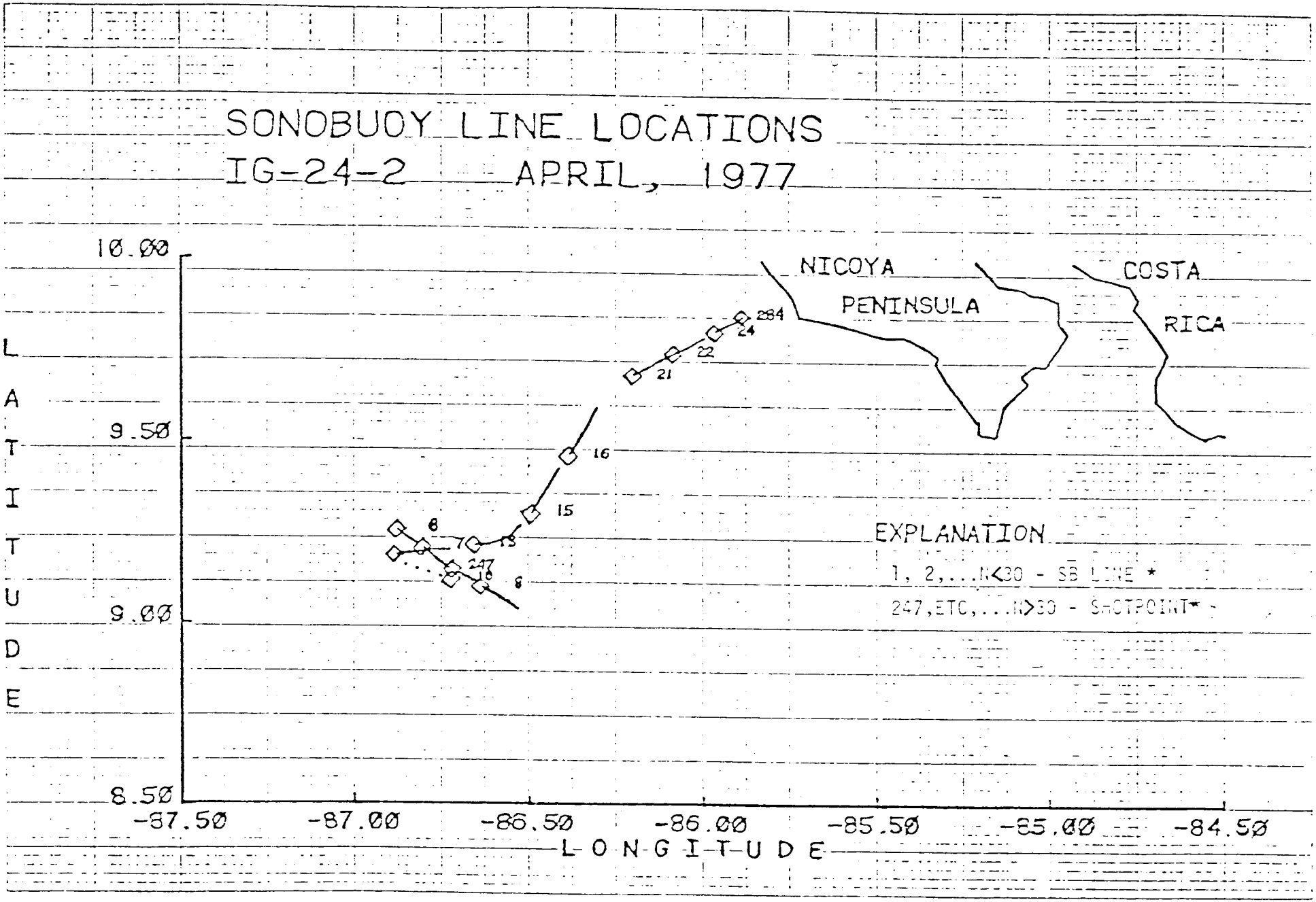

SONOBUOY LINE LOCATIONS
IG-24-2 APRIL, 1977
10.00
9.50
9.00
8.50
LATITUDE
-87.50
-87.00
-86.50
-86.00
-85.50
-85.00
-84.50
LONGITUDE
NICOYA
PENINSULA
COSTA
RICA
284
24
22
21
16
15
8
7
247
EXPLANATION
1, 2,...N<30 - SB LINE *
247,ETC,...N>30 - SHOTPOINT*

Fig. 3

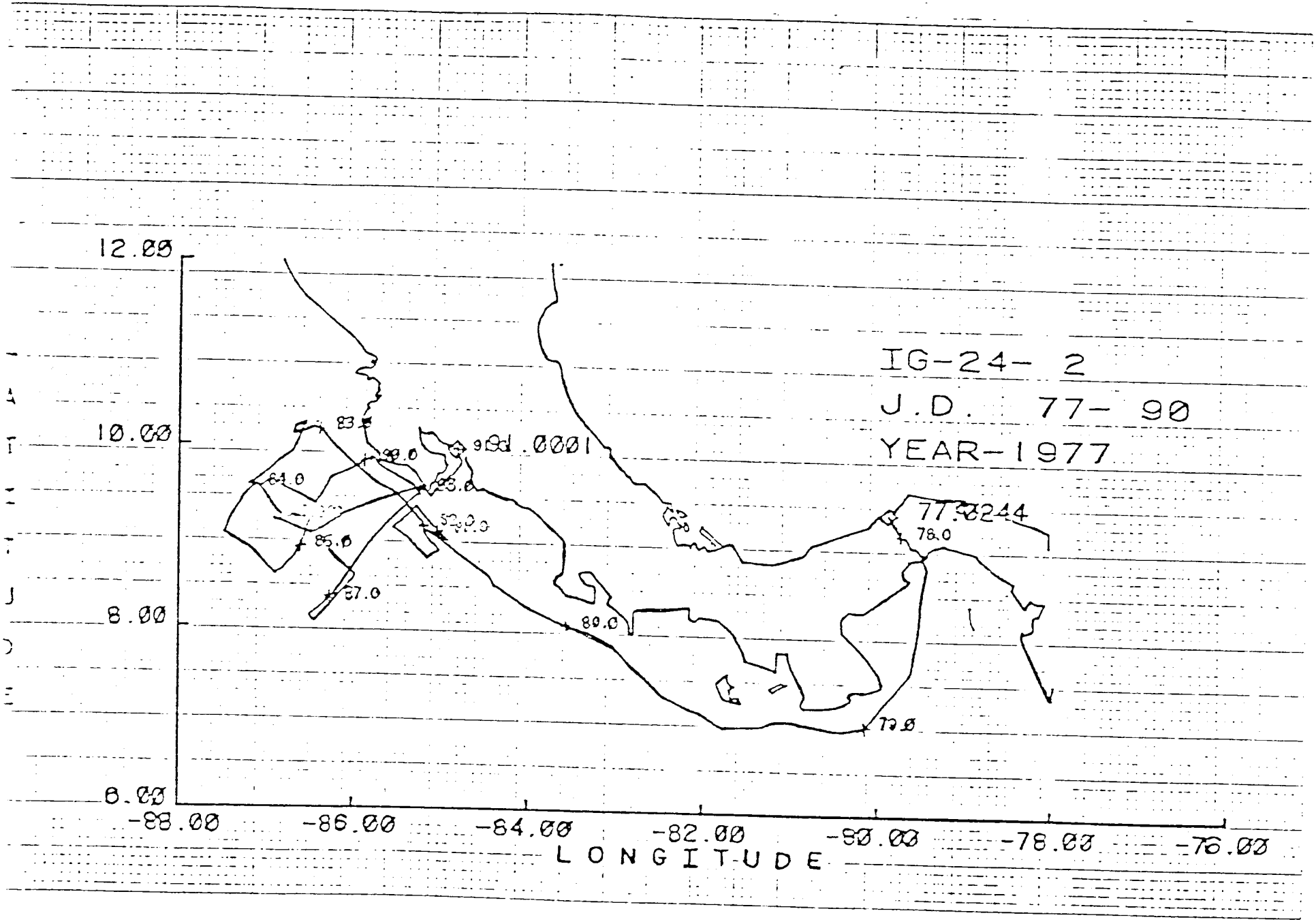

IG-24- 2
J.D. 77- 90
YEAR-1977
12.00
10.00
8.00
6.00
-88.00
-86.00
-84.00
-82.00
-80.00
-78.00
-76.00
LONGITUDE
83
84.0
85.0
87.0
89.0
78.0
79.0

Fig. 4

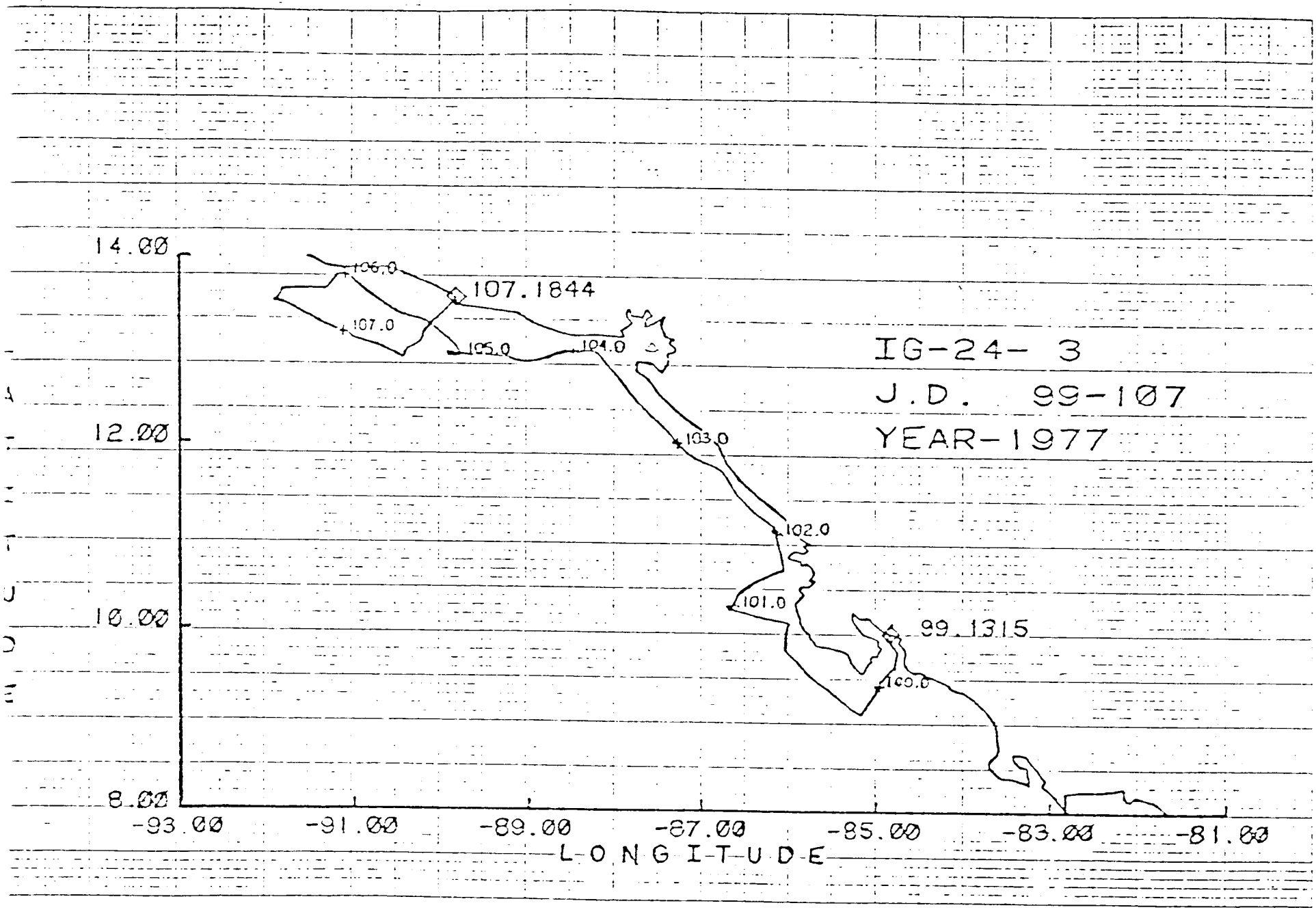

14.00
12.00
10.00
8.00
106.0
107.1844
107.0
105.0
104.0
103.0
102.0
101.0
99.1315
100.0
IG-24- 3
J.D. 99-107
YEAR-1977
-93.00
-91.00
-89.00
-87.00
-85.00
-83.00
-81.00
LONGITUDE

Fig. 5