OCEAN DRILLING PROGRAM

LEG 100 SCIENTIFIC PROSPECTUS

SHAKEDOWN AND SEA TRIALS CRUISE

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INTRODUCTION

The conversion of the drillship SEDCO BP/471, known as JOIDES RESOLUTION, is expected to be completed for a shakedown cruise departing from Pascagoula, Mississippi on December 29, 1984. The primary goals of the cruise are:

1) to familiarize SEDCO rig crews with ODP equipment;

2) to familiarize scientists and technicians with laboratory equipment, core handling, and sampling procedures;

3) to verify that all drilling, navigation, drill pipe severing, logging winch, laboratory, and geophysical systems are operational;

4) to acquire instrumentation data on ship systems;

5) to acquire cores from areas of scientific interest; and,

6) to familiarize ODP and SEDCO personnel with general drilling operations.

These shakedown cruise goals reflect the various needs of ODP Engineering, Drilling, Technical, and Scientific Operations Departments. The Engineering and Drilling Operations Department outline their plan for Leg 100 in Appendix A. The scientific thrust of Leg 100 is geared to accommodate the requirements of these and other operations while retrieving samples of scientific merit.

Two environments are the focus of drilling on Leg 100 (Figure 1). The Florida Escarpment area provides shallow-water (less than 1000 m) sites with critical paleoceanographic objectives regarding sealevel fluctuations and the relationship of these fluctuations to seismic reflectors. The Florida area will also provide detailed stratigraphic sections for biostratigraphic correlations. The second area of drilling is a deep-water (3000 m) site on the flank of the Mississippi Fan (Figure 1). The site is targeted primarily to test re-entry cone and rotary-core operations. Scientific objectives at this site are limited to deeper sedimentary horizons due to the limited amount of time and nature of operations here. Sediments retrieved by coring operations will elucidate the structure of the most recent fanlobe and an underlying older fanlobe, and the nature of sediments underlying both of these.

DE SOTO CANYON SITES

The De Soto Canyon region of the northeastern Gulf of Mexico separates predominantly terrigenous sediments of the Mississippi Fan from carbonates of the West Florida slope (Figure 2). Canyon cutting events in the area have occurred intermittently through the Upper Cretaceous-Cenozoic section. Data presented in Mitchum (1978) suggest that seismic boundaries in the region correspond to the eustatic cycles of Vail et al. (1977) (Figure 3). More stratigraphic control is needed to support this interpretation, however, particularly in the Paleogene section (Mitchum, 1978).

Several DSDP legs, including the Goban Spur (Leg 80) and New Jersey Transect (Leg 95), have investigated the record of disconformities in passive margin sequences with regard to the Vail model of eustatic sealevel fluctuations. Preliminary results from these legs support the Vail model, but more data are needed from other passive margins. The De Soto Canyon region provides an excellent Cenozoic record for this purpose, and numerous disconformities can be identified on seismic records in the area. Two sites, FLA-1 and FLA-2, are proposed for the purpose of obtaining a complete Cenozoic sedimentary record at De Soto Canyon. Materials from these sites would also provide the much-needed high quality biostratigraphic reference sections for the Gulf of Mexico.

FLA-1 and FLA-2 are located in relatively shallow water (approximately 900 m). Significant scientific results could be obtained with as little as 200 m HPC recovery at these sites.

MIDDLE FAN SITE

The Mississippi Fan was the target of numerous sites drilled during DSDP Leg 96. The sediments recovered during that leg provided much-needed information regarding the depositional style of the most recent fanlobe. The fan has been constructed by diverse depositional processes. Channelized flows appear to be prevalent throughout fan development. Mass movement events also represent a significant contribution to fan formation. The objectives of drilling the middle fan site MFAN (Figures 4 and 5) are:

1) to recover samples from a zone of mass movement identified by Walker and Massingill (1970) as a massive slump;

2) to sample overbank deposits from the modern channel;

3) to sample older channelized deposits; and,

4) to determine the sedimentary character of units underlying the older channelized deposits.

Sampling at this site will provide stratigraphic control for determining the sequence of events forming the fanlobes at this site and DSDP Sites 616, 617, 620, 621, and 622 (Bouma, Coleman, Meyer, et al., in press). It should also answer important questions about the types of deposits prevalent between episodes of fanlobe formation.

Water depth at the middle fan site is 3000 m, which satisfies the Engineering/Operations request for a site in over 8000 ft of water. Seismic gear may be streamed and tested during a pre-site survey. Subsequently, operations for re-entry can be run, including an exploratory hole, rigging re-entry core and conductor casing, and testing re-entry capabilities. A cone at this site will provide scientists with the opportunity of deepening this hole at a later date.

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TABLE 1

LEG 100 OCEAN DRILLING PROGRAM
SHAKEDOWN AND SEATRIALS CRUISE

Location of proposed sites

Drill Sequence	Site Number	Latitude	Longitude	Water Depth	Locality	Hole Type
1	FLA-1	28°50'N	87°10'W	920 m	DeSoto Canyon	HPC/XCB to 550 m
2	MFAN	26°33'N	86°48'W	3000 m	Middle fan region of Mississippi Fan	Re-entry rotary core to 600 m
3	FLA-2	27°40'N	85°25'W	900 m	DeSoto Canyon	HPC/XCB to 750 m

TABLE 2

LEG 100 TENTATIVE SITE OCCUPATION SCHEDULE

Location	Travel Time (days)	Drilling Time (days)	Departure (approx)
DEPART: Pascagoula, Miss.			Dec. 29, 1984
Underway	0.4		
SITE FLA-1		4.0	Jan. 4, 1985
Underway	0.6		
SITE MFAN		2.0	Jan. 12, 1985
Underway	0.4		
SITE FLA-2		4.0	Jan. 17, 1985
Underway	1.9		
ARRIVE: Fort Lauderdale, Fla.			Jan. 19, 1985

TENTATIVE SCHEDULE

LEG 100

Day 0 — Depart Pascagoula

Deploy seismic gear and test underway geophysics equipment enroute to FLA-1. (Estimate 9-12 hrs.)

Day 1 — Arrive FLA-1 (3000+ ft. water depth)

Begin 48 hour ASK system check out.
Begin coring tool assembly and space out.

Day 2 — FLA-1 Operations

Complete ASK system check out.
Complete coring tool assembly and space out.
Assemble and test bit release systems (MBR & HBR).
Run logging winch load test if allowed.

Day 3 — FLA-1 Operations

Make-up APC/XCB BHA without bumper subs.
Strap pipe while R.I.H. & begin continuous APC/XCB coring operations (utilizing both tours).

Day 4 — FLA-1 Operations

Continue APC/XCB coring operations.

Day 5 — FLA-1 Operations

Continue APC/XCB coring operations.

Day 6 — Depart FLA-1

Complete APC/XCB coring operations to 300+m sub-bottom (6 hrs.).
Trip drill string and prepare to get underway (6 hrs.).
Depart FLA-1 for Site MFAN (11-14 hrs.).
Redress coring tools while underway.

Day 7 — Arrive MFAN (9800+ Ft. Water Depth)

Locate site, drop beacon, and position vessel (3 hrs.).
Run standard RCB BHA without bumper subs (10 hrs.). (Include HBR and Junk Bit).
Wash-in test for RE-Cone deployment (1 hrs.).
Core exploratory hole to 100 m for RE OPS (10 hrs.).

Day 8 — MFAN Operations

Drop bit using Hydraulic Bit Release (HBR) (2 hrs.).
Trip drill pipe (10 hrs.)
Rig RE-Cone & Conductor Pipe (12 hrs.)

Day 9 — MFAN Operations

Make-up cone to drill pipe & run to bottom.

Day 10 — MFAN Operations

Jet-in Csg. and release from cone (6 hrs.).
Core with RCB utilizing both tours (18 hrs.).

Day 11 — MFAN Operations

Trip clear of mudline and begin re-entry.
Sonar practice with "A" crew (11 hrs.).

Crew Change @ 1200 Hrs.

Conduct sonar practice with "B" crew.
Trip back to bottom on final RE (11 hrs.).

Day 12 — MFAN Operations

Continue RCB coring utilizing both tours of "B" crew to desired depth of 600 m sub-bottom if possible (18 hrs.).
Conduct drill bit motion indicator (DMBI) test (2 hrs.).
Trip clear of mud line, offset and drop bit using HBR (4 hrs.).

Day 13 — MFAN Operations

Trip drill string (8 hrs.).
Rig-up and conduct high torque logging winch test.
Rig-up and conduct vertical displacement measurements on logging line. (4 hrs.)

Day 14 — Depart MFAN Arrive FLA-2

Rig-up and conduct drill pipe severing test (6 hrs.).
Trip drill string and prepare to get underway (4 hrs.).
Depart for FLA-2 by 1200 hrs.
Underway for FLA-2 (10 hrs.).
Locate site, drop beacon, and position vessel (4 hrs.).

Day 15 — FLA-2 Operations (<3000 Ft. Water Depth)

Make-up APC/XCB BHA without bumper subs.
R.I.H. with drill pipe and begin continuous APC/XCB coring operations (utilizing both tours).

Day 16 — FLA-2 Operations

Continue APC/XCB coring operations.

Day 17 — FLA-2 Operations

Continue APC/XCB coring operations.

Day 18 — FLA-2 Operations

Complete APC/XCB coring operations to 750 m sub-bottom if possible.

Day 19 — Depart FLA-2

Deploy DBMI tool for shallow measurements (4 hrs.).
Trip drill string and prepare to get underway (8 hrs.).
Depart for Ft. Lauderdale by 0200 hrs.
Enroute Ft. Lauderdale (12 hrs.).

Day 20 — Enroute Ft. Lauderdale

Enroute Ft. Lauderdale

Day 21 — Enroute Ft. Lauderdale

Arrive Ft. Lauderdale no later than 1200 hrs.

Day 22 — Ft. Lauderdale

Port Call

Day 23 — Depart Leg 101

Depart for Leg 101 no later than 1200 hrs.

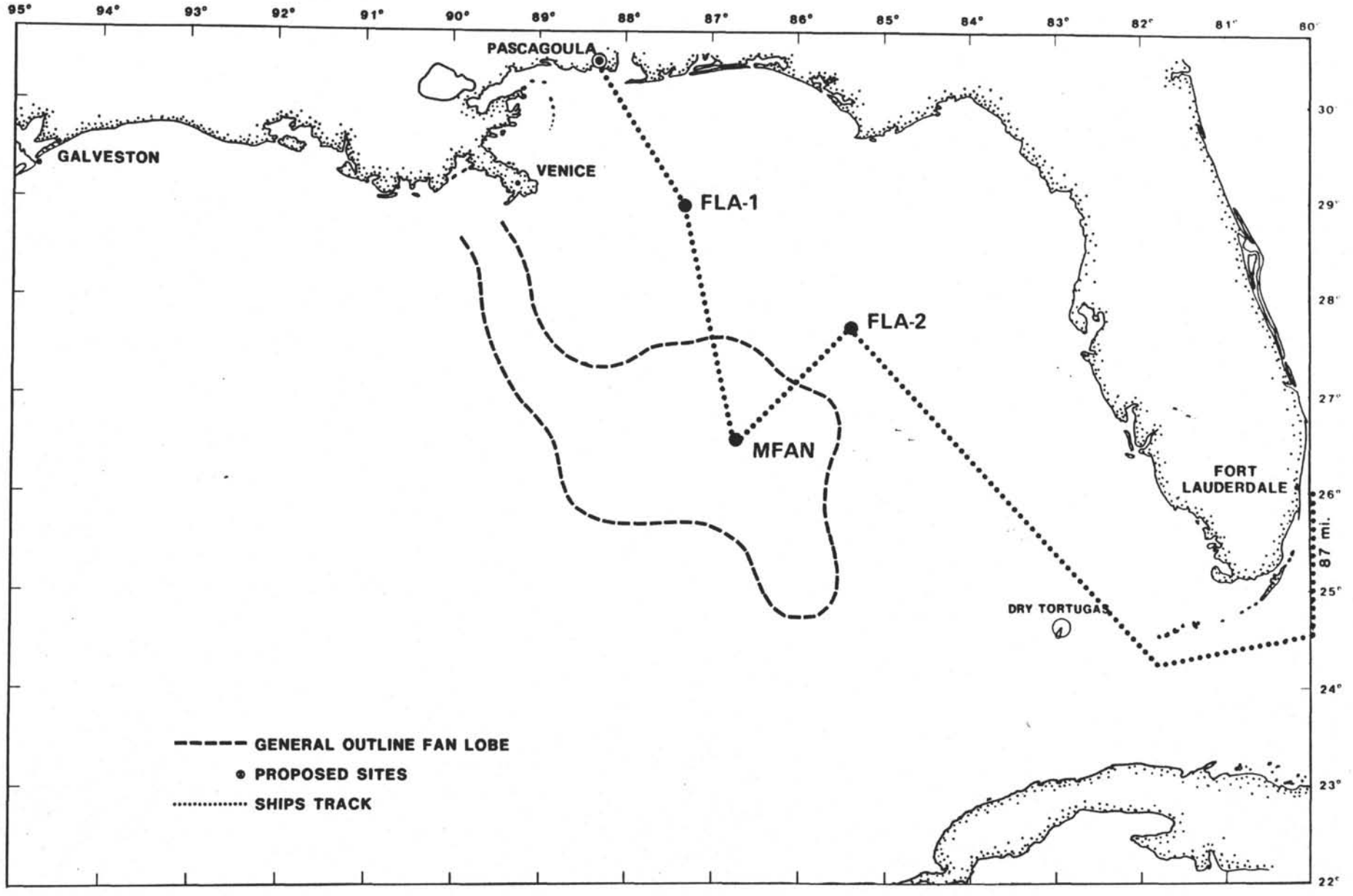

Figure 1. Gulf of Mexico map with outline of the most recent fan lobe, locations of proposed drill sites, and transit routes. Modified from Bouma and Coleman (1983).

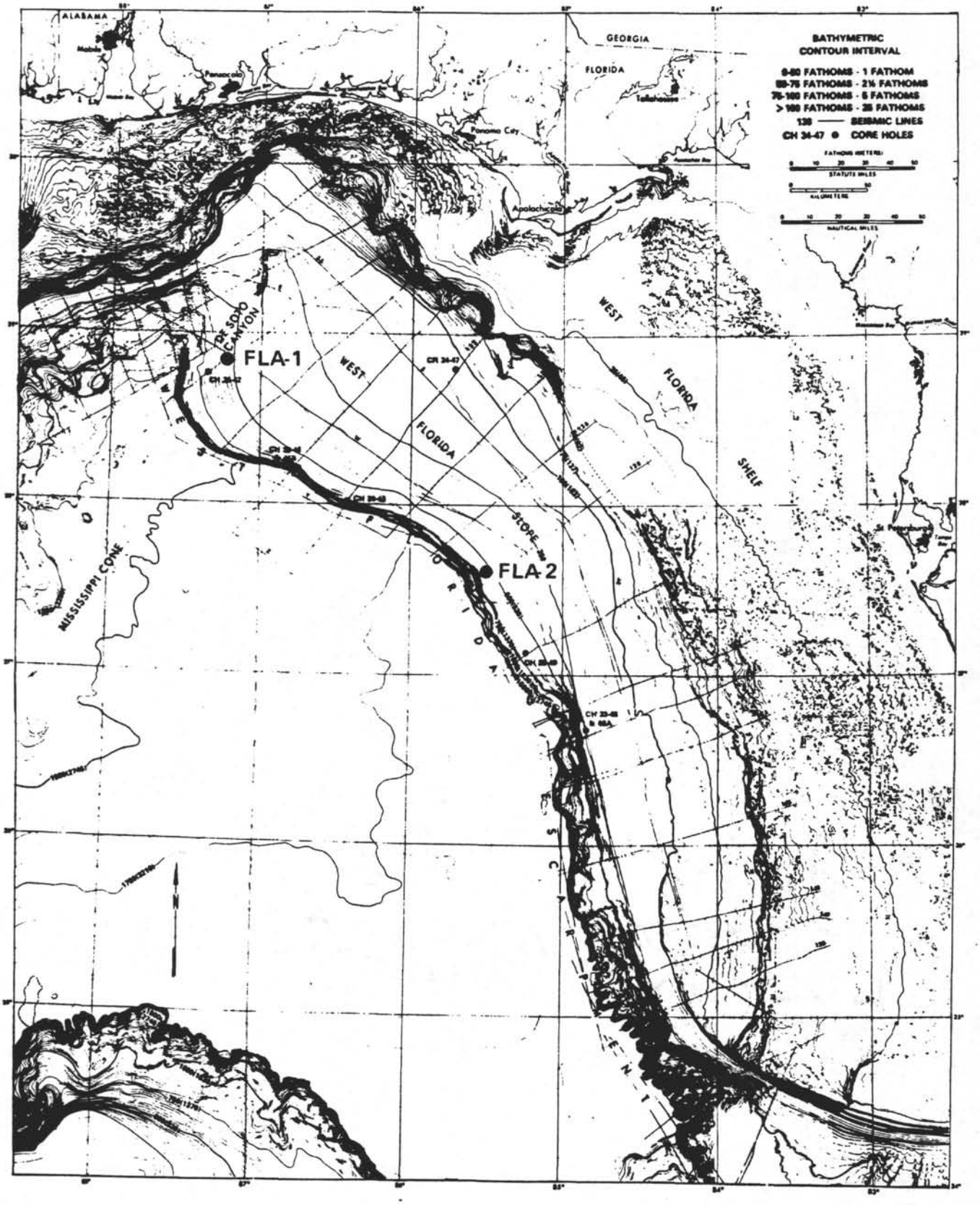

Figure 2. Bathymetric map, northeastern Gulf of Mexico, showing location of seven core holes, seismic profile lines on West Florida Slope, and locations of target sites FLA-1 and FLA-2. From Mitchum (1978).

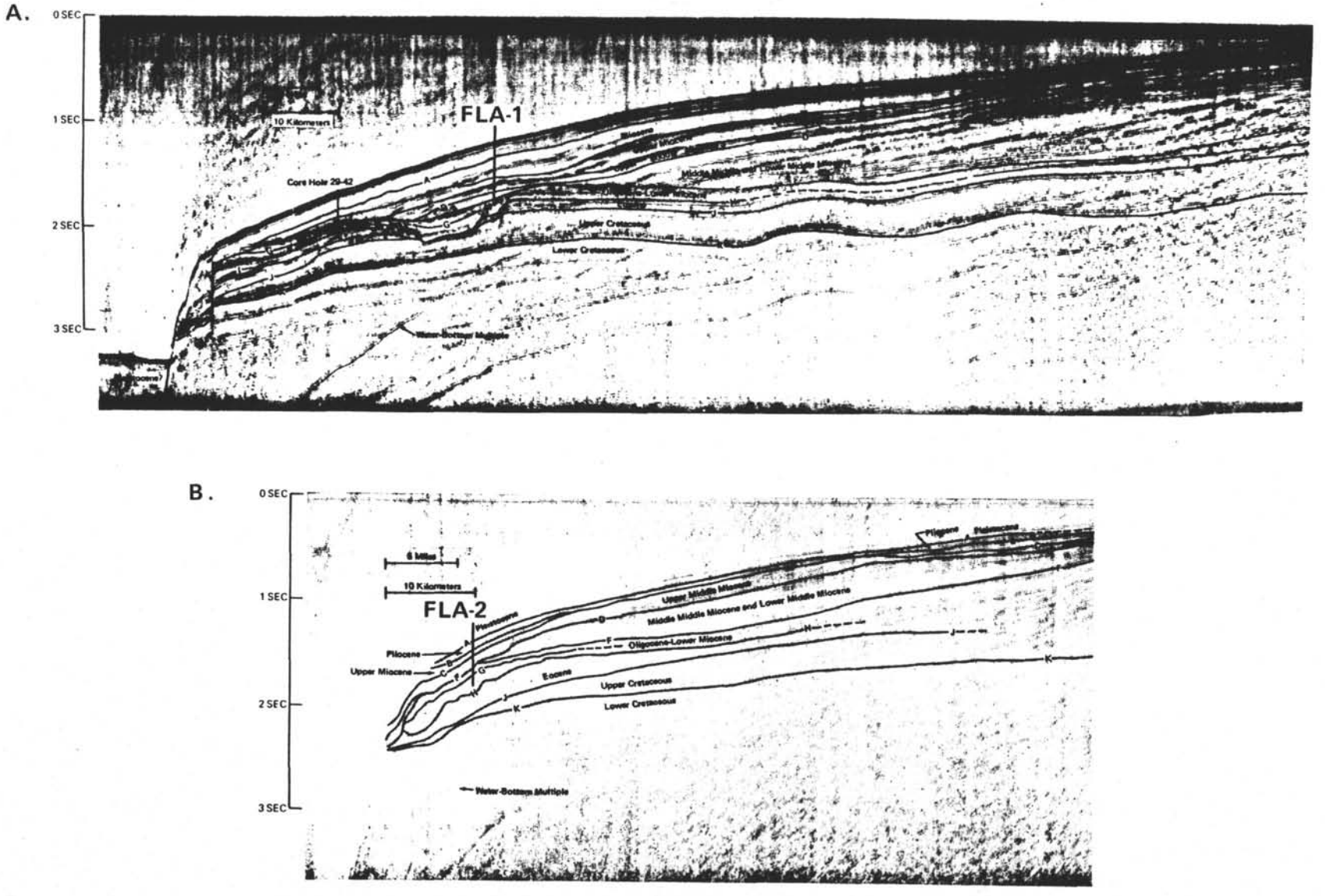

Figure 3. A. Seismic profile line 126, showing location of target site FLA-1.
B. Seismic profile line 138, showing location of target site FLA-2. From Mitchum, 1978.

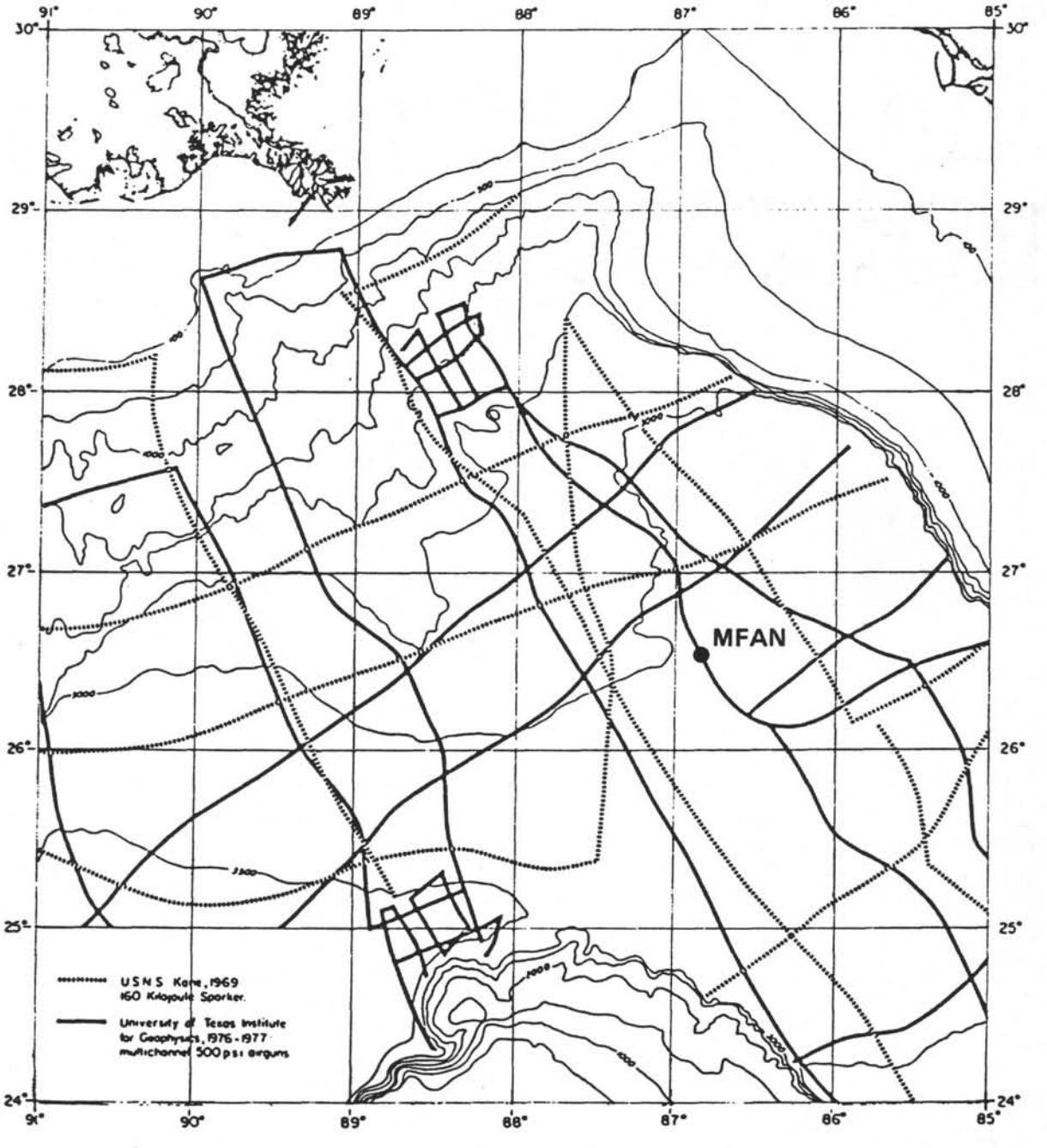

Figure 4. Location of proposed MFAN site. Modified from Feeley et al., 1984.

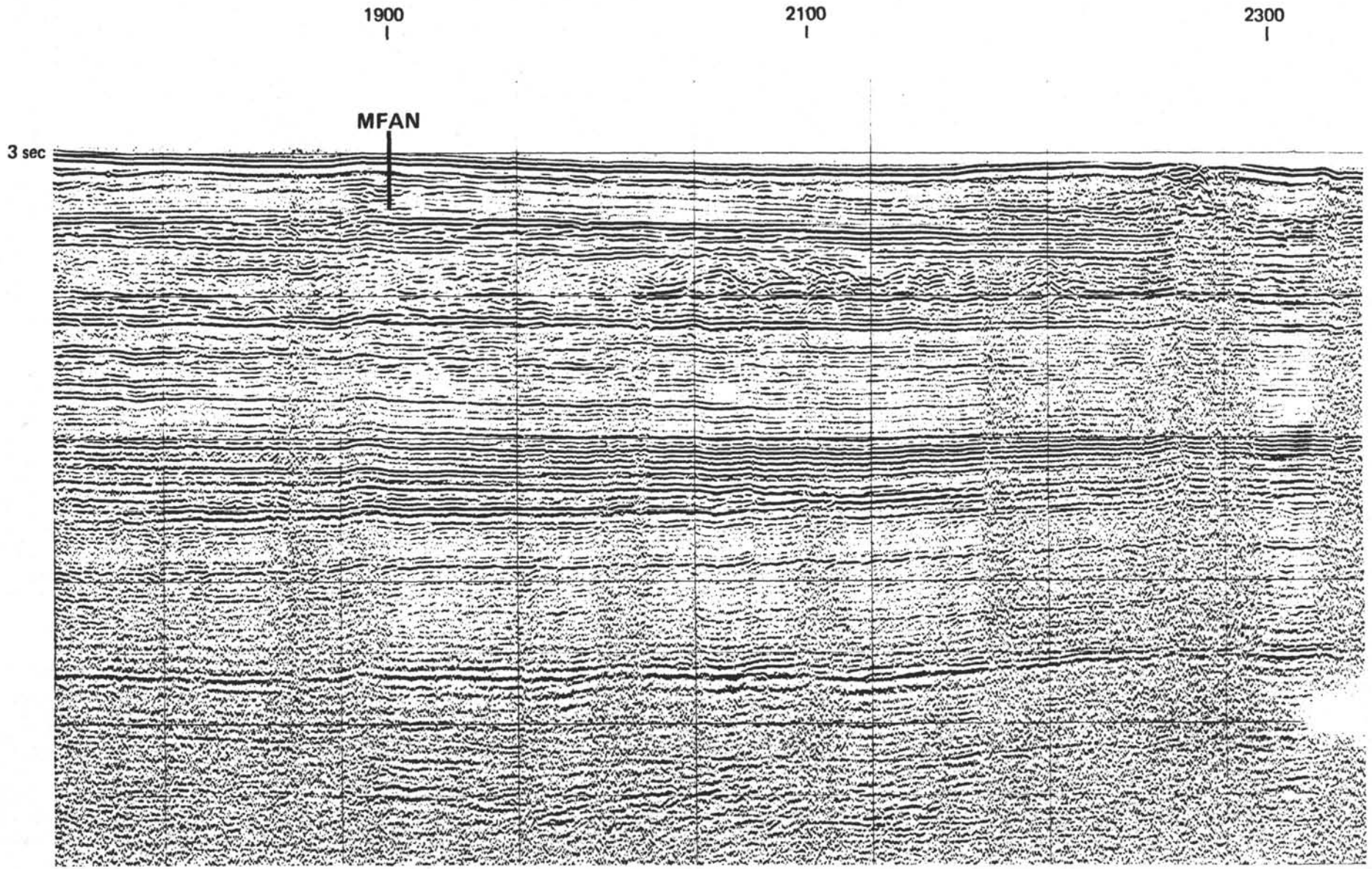

FIGURE 5. Portion of UTMSI seismic line GT2-10A, showing location of proposed deep water site MFAN.

SITE NUMBER:	FLA-1
POSITION:	28° 50'N; 87° 10'W
WATER DEPTH:	920 m
PROPOSED DRILLING PROGRAM:	HPC/XCB core to 550 meters sub-bottom, or to refusal.
SEISMIC RECORD:	Seismic profile line 126 from Mitchum (1978), p. 199.
LOGGING:	No.
OBJECTIVES:	To obtain a high-quality, continuous sequence through the entire Neogene in the Gulf of Mexico. This objective has not been met yet in the Gulf despite 5 DSDP legs in the area.
SEDIMENT TYPE:	Foraminiferal nannofossil ooze.

SITE NUMBER:	MFAN
POSITION:	26^{o} 33'N; 86^{o} 48'W
WATER DEPTH:	3000 m
PROPOSED DRILLING PROGRAM:	Hydraulic piston core an exploratory hole to 100 m. Rig re-entry cone and wash to set casing. Rotary-core to 600 m sub-bottom.
SEISMIC RECORD:	University of Texas, UTMSI Line GT2-10A (11 JN 1977, 1900).
LOGGING:	No.
OBJECTIVES:	To determine the extent of the widespread mass movement identified by Walker and Massengill (1970), to sample the sedimentary record of the modern and an older, underlying fanlobe, and to define the characteristics of the sediments underlying both lobes.
SEDIMENT TYPE:	Predominantly fine-grained sediments (silt and clay), interbedded with sand below 180 m.

SITE NUMBER:	FLA-2
POSITION:	27° 40'N; 85° 25'W
WATER DEPTH:	900 m
PROPOSED DRILLING PROGRAM:	HPC/XCB core to 750 m sub-bottom, or refusal.
SEISMIC RECORD:	Seismic profile line 138 of Mitchum (1978), p. 205.
LOGGING:	No.
OBJECTIVES:	To obtain a good quality Paleogene (and possibly Late Cretaceous) pelagic record for the Gulf of Mexico. The site has been chosen for its relatively thin Neogene cover underlain by a potentially continuous or nearly continuous Paleogene and Cretaceous section.
SEDIMENT TYPE:	Foraminiferal nannofossil ooze.

APPENDIX A

SHAKEDOWN AND SEATRIALS ENGINEERING AND DRILLING OPERATIONS PLAN

Principal Goals:

* Verify that all drilling systems are operational.
* Verify that logging winch braking system and the drill pipe severing systems are operational.
* Familiarize both SEDCO rig crews with ODP equipment.
* Acquire instrumentation data on ship systems.

I. The following drilling/ship systems should be operational:

1) ASK & PMS Systems
2) Drawworks
3) VARCO Top Drive
4) Heave Compensator
5) Coring Reel
6) Pipe Racker

II. Logging winch & drill pipe severing system:

1) Verify logging winch braking system by deploying cable with 2 drill collars as a dead weight. Approximate the maximum design torque of 18,000 ft.-lbs.

2) Test drill pipe severing system by lowering 1 stand of "junk" drill pipe 2,000 ft. (?) below vessel and shoot off with new global high energy severing system.

III. Deployment and operational training for rig crews on the following systems:

1) Rotary Core Barrel (RCB)
2) Advanced Piston Corer (APC)
3) Extended Core Barrel (XCB)
4) APC Core Orientation
5) APC Heat Flow (?)
6) Mechanical Bit Release (MBR)
7) Hydraulic Bit Release (HBR)
8) Re-entry Cone Deployment
9) Acoustic Re-entry Trials
10) Porewater Sampler (?)

IV. Test the following prototype tools and equipment:

1) MOD. II Advanced Piston Corer
2) New APC Core Orientation System
3) Extended Core Barrel (Compression Spring Model)
4) Bolted Latch Sleeve (RCB Coring System)
5) Hydraulic Bit Release MOD. IV (has been operationally released only once)
6) Deployment of re-entry cone guide base on "Double J Tool"
7) Test re-entry acoustic reflector pattern with EDO and Mesotech sonar tools

V. Deploy accelerometer on logging line to measure vertical displacement as a result of vessel excitation.

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